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Personality, Health and Well-Being among Different Age Groups

Edited by
Hajime Iwasa and Yuko Yoshida

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Article

A Cross-Temporal Meta-Analysis of Changes in Tourists' Well-Being in China 2011–2022

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Abstract: Analyzing the overall trend of changes in the well-being of Chinese tourists and its relationship with societal transformations is essential for understanding the psychological shifts of these tourists. This study utilizes cross-temporal meta-analysis and a time-lagged approach to examine 56 studies employing the General Well-Being Scale as the principal tool for evaluating the well-being of Chinese tourists from 2011 to 2022, with the objective of ascertaining whether trends in well-being levels among Chinese tourists and their macro-social indicators clarify discrepancies in tourists' well-being. The results demonstrate a strong positive link between the well-being of Chinese tourists and the year, signifying an annual increase. The well-being of Chinese tourists is markedly positively associated with economic conditions (per capita income and consumption levels) and social connectedness (urbanization rate, employment rate, and life expectancy); these five social indicators are essential determinants of its variations. This study contributes by elucidating the trend of well-being among Chinese tourists at the group level and confirming that five categories of social variables significantly influence their well-being. It can aid destinations in enhancing relevant social and economic policies, inventing tourism products, and accelerating the development of the tourism industry, thereby substantially boosting the well-being of Chinese tourists.

Keywords: tourists' well-being; social change; General Well-Being Scale; cross-temporal meta-analysis

1. Introduction

China, being one of the world's main sources of outbound tourists, saw a steady increase in the number of people departing before COVID-19. The country's spending on outbound tourism led the world for seven consecutive years (from 2013 to 2019) (Gao et al., 2022). Specifically, in 2019, Chinese tourists spent 255 billion dollars on cross-border travel, with the number of outbound trips reaching 6.01 billion. China significantly influences the advancement of the global tourist sector. Well-being is a paramount non-economic result of tourism (Gretzel & Stankov, 2021). In recent decades, tourism research has increasingly concentrated on well-being (Smith & Diekmann, 2017). An expanding corpus of literature indicates that tourism and leisure activities substantially enhance quality of life (McCabe & Johnson, 2013). Western nations are educated, industrialized, prosperous, and highly developed democratic societies, typically distinguished by a focus on individual accomplishment, self-esteem, and personal liberty. China significantly contrasts with the West regarding cultural attributes (Hofstede, 2016). In 2022, the report

from the 20th National Congress of the Communist Party of China (CPC) emphasized that the enhancement of citizens' livelihoods and the improvement of their quality of life are imperative. In a special economic, cultural, and political context, it has given rise to the topic of research on the well-being of Chinese tourists. This topic is crucial for the global tourism market to understand the needs and preferences of Chinese tourists. For cross-border tourism businesses, comprehending and meeting the demands of these tourists is essential to enhance their satisfaction and loyalty.

Tourism and leisure activities are widely regarded as a primary means to enhance individual well-being (L. Su et al., 2021). The expansion of the tourism sector and personal participation in related travel endeavors can enhance the subjective well-being of tourists (Kwon & Lee, 2020). It is widely accepted that participation in travel and leisure activities can alleviate loneliness and facilitate the reconstruction of social relationships, hence improving life expectancy and overall quality of life (Kan et al., 2023). Travel and leisure activities are commonly acknowledged as a method for achieving subjective well-being. Through engaging in and experiencing travel and leisure activities, one can alleviate stress, boost physical activity, enhance social connections, broaden their knowledge, and ultimately achieve a heightened sense of personal well-being (Samus et al., 2022). Therefore, participating in tourism activities is of great significance for the generation of well-being, and people can achieve the pursuit of well-being through this leisure activity of tourism.

In recent decades, the growth of holiday management and increased disposable money have led to exponential expansion in China's tourist business. Although people recognize the role of tourism in generating well-being and acknowledge the significance of tourists' well-being in pursuing a better life (Bimonte & Faralla, 2015), certain aspects of tourism in China might negatively impact the experience of tourists. For instance, the majority of Chinese tourists work within a constrained travel budget, and in Chinese culture, being economical is highly regarded. The absence of a complete annual leave system results in the majority of Chinese tourists traveling during public holidays, such as the National Day Golden Week. Overcrowded tourist sites and insufficient public amenities have compromised tourists' experiences, satisfaction, and overall well-being (Liang et al., 2021). The distinctive characteristics of the Chinese setting have somewhat eclipsed the impact of tourism on individuals' subjective well-being. Although several studies have explored the connection between tourism and tourists' subjective well-being, less research has focused on the specific well-being of Chinese tourists (Zheng et al., 2022). The psychological condition of specific social groups, such as the well-being of the Chinese, is affected by macro-social changes, including economic conditions (S. F. Xin et al., 2020). It was claimed that the impact of significant social transformations on human development should be assessed through two constructs: economic conditions and social connectedness (Z. Xin et al., 2010). Social connectedness refers to an aspect of the individual self that reflects a subjective sense of closeness and togetherness with one's social environment. Many studies have found an important role for social relationship variables (e.g., social connectedness, social acceptance, social support) in relation to subjective well-being (SWB) (Yoon, 2008). Xu found that economic conditions, urbanization rates, employment, and health substantially affect tourists' subjective well-being (Y. Xu & Xia, 2014). In fact, urbanization rates, work, and health are important indicators of social connectedness. Therefore, has the tourist-related well-being of the Chinese changed in this context? What are the trends in these changes? What are the underlying social factors?

In order to clarify the changes in well-being among Chinese tourists and the macro-level social factors influencing this well-being, this study selected 56 literature sources published between 2011 and 2022, involving 42,312 tourists. The well-being of Chinese tourists was examined by cross-temporal meta-analysis (CTMA), while macro-social ele-

ments affecting their well-being were investigated using time-lag analysis (Twenge, 1997). Through this method, the limitations of traditional meta-analysis in studying time effects are addressed, trends in Chinese tourists' well-being over time can be revealed, and the relationship between Chinese tourists' well-being and social indicators can be analyzed to reveal how social change affects group psychological development. Twenge (Twenge, 2000; Twenge et al., 2016; Twenge & Campbell, 2001) utilized this methodology to examine many psychological factors across time, including anxiety, self-esteem, and well-being. Currently, only a few scholars have used this method to study the well-being changes of specific groups such as teachers, university students, and urban residents, and there is no cross-temporal meta-analysis of the overall well-being changes of Chinese tourists and the social changes that affect tourist well-being under the background of economic development and social reform. Macro-social factors are determined by the distribution of money, power, and resources at global, national, and local levels (S. Zhang et al., 2023). This paper will examine the macro-social determinants influencing tourist well-being by cross-temporal meta-analysis.

2. Literature Review

2.1. Research Status of Tourists' Well-Being

Good psychological functioning and experience are the multi-faceted components that make up well-being (Ryan & Deci, 2001). The notion of well-being has historically developed from two philosophical schools: hedonism and eudaimonism (Waterman, 1993). The former highlights the enjoyment derived from certain activities, whereas the latter pertains to the significance of life (Ryan & Deci, 2001). Pleasure is a more direct emotional experience, while happiness is focused on the attainment of meaning and purpose (Vittersø, 2016). Subjective well-being (SWB) encompasses the cognitive and affective assessment of individuals' lives (Uysal & Sirgy, 2019), incorporating emotional responses to occurrences and cognitive evaluations of contentment and accomplishment (Snyder & Lopez, 2009). Subjective well-being (SWB) highlights the personal aspects of well-being, including feelings and moods (Kesebir & Diener, 2008). It encompasses both positive and negative consequences, in addition to general and domain-specific life satisfaction. Positive effects denote favorable emotions and sentiments, including joy, curiosity, engagement, and affection, which signify an individual's affirmative reaction to circumstances that suggest an optimal life experience. Conversely, negative effects pertain to adverse feelings and moods, including melancholy, stress, and depression, along with unfavorable responses to life, health, events, and the environment.

In the context of tourism, tourist well-being is a state of positive emotional experiences (joy, interest, satisfaction, and love) and a sense of meaning obtained from engaging in holiday leisure activities (Filep & Deery, 2010). Tourist well-being is regarded as a good sentiment experienced by individuals throughout the tourism journey, encompassing emotional, physical, intellectual, and spiritual dimensions, along with the consequent cognitive awareness (Tuo, 2015). The majority of the expanding corpus of research on tourism-related well-being has focused on subjective well-being (SWB), confirming that tourism has a positive effect on SWB (Mitas & Kroesen, 2020). An exemplary travel experience not only allows tourists to feel relaxed and delighted after the journey but also continuously influences their subjective well-being (L. Xu & Zhang, 2021). The Hedonic Adaptation Theory posits that travel is vital for enhancing a tourist's subjective well-being, with savoring serving as the primary psychological mechanism in this process (Z. Y. Li & Yan, 2021). This study argues that the concept of tourist well-being combines the core of subjective well-being from both the achievement and pleasure perspectives, emphasizing the positive emotional experience that tourism activities can bring to individuals and

their spiritual gains. Although the two research orientations have different emphases, both point to the positive significance of emotions for individuals. This study attempts to combine tourism and subjective well-being to further explain the degree of change in the development of tourists' well-being.

The study of Chinese tourists' well-being began in the 21st century (L. Su et al., 2021). After decades of rapid economic development, Chinese people started to pay attention to the issue of well-being, and intuitively feel that tourism can bring well-being to people (Pan, 2014). By evaluating the domestic tourists' well-being index using Guilin tourists as an example, it was found that the mean (M) score of tourists' well-being was 3.84, indicating that tourists' overall sense of well-being was generally moderate (T. Zhang, 2014). With the increase in per capita monthly income, tourists' life satisfaction has also shown a certain degree of an upward trend (Huang, 2015). With the popularization of tourism, tourists are increasingly pursuing higher quality in their travel experiences, and the level of well-being among tourists has remained stable (Zhan, 2017). Under the policy background of "beautiful countryside", "targeted poverty alleviation", and "rural revitalization strategy", rural areas have become important destinations for mass tourism, and rural vacation tourists have a higher level of well-being (Meng, 2019). Most scholars have discussed the level of tourists' well-being within a specific time period or with a specific case, and there is limited research regarding the overall trend of tourists' well-being in recent decades. Therefore, this paper will use the method of cross-temporal meta-analysis to explore the development trend of Chinese tourists' sense of well-being over the years.

Existing research mainly focuses on the factors that affect tourists' well-being (L. Su et al., 2019). Studies indicate that for Chinese tourists, their perception of service quality significantly influences their subjective well-being, particularly through their emotional responses and overall satisfaction with a destination. Notably, there is a discernible relationship between subjective well-being and factors like perception, emotion, and satisfaction (He et al., 2020). By examining the "agritourism" model, this study bridges various touch-points, including tourism experiences, hedonic well-being, intentions to revisit, and online word-of-mouth, offering suggestions on how to respond to the revitalization of rural tourism and attain sustainable tourism development (C. Chen et al., 2021). Based on data from 742 Chinese tourists, within the context of duty-free shopping during their trips to South Korea, it was discovered that the pragmatic, hedonic, and social experiences associated with the products positively affected the tourists' well-being (Kim et al., 2019a). This study investigates the correlation between intergenerational conflict and parents' subjective well-being, mediated sequentially by family intimacy and self-efficacy in connection to trip satisfaction (Hu et al., 2023). The above studies explore the factors that affect tourists' well-being from different micro perspectives, which have certain academic value for different types of tourists and case studies. Nevertheless, limited research exists about the influence of macro-societal changes on the well-being of tourists.

This study integrates the notion of tourist well-being with the correlation between tourism and subjective well-being; however, there is a paucity of research regarding the comprehensive examination of Chinese tourists' well-being and the underlying factors contributing to its fluctuations. Consequently, the theme of this study is articulated as an investigation into the trends in Chinese tourists' well-being and the factors that influence these changes.

2.2. Macro-Social Factors Influencing Chinese Tourists' Well-Being

In previous studies, the influencing factors on tourist well-being have mainly focused on demographic variables (Y. Chen et al., 2016) and the changing characteristics of well-being among various types of tourists in China. However, a substantial body of research

has demonstrated that tourist well-being, as a psychological variable, is inherently related to social changes (L. Su et al., 2021). China has seen swift progress throughout more than 40 years of reform and opening, attaining substantial achievements in the socioeconomic domain. Economic conditions can affect variations in personal income and consumption levels (Stanca, 2010). The process of industrialization and urbanization has not only absorbed a large number of people into cities, but has also brought new forms of leisure (Clark & Oswald, 1996). In terms of employment, unemployment significantly reduces well-being, and the losses from unemployment go beyond income, with more far-reaching effects on mental health (Z. Xin et al., 2010). With regard to the impact of health on subjective well-being, there is almost unanimous agreement that people in poor health are less happy.

With the increase in urbanization level, employed population, and life expectancy, people's lifestyles and leisure activities have continuously changed. Tourism, as a form of experiential economy, not only promotes economic growth (Cárdenas-García et al., 2015), but also socioeconomic development encourages more people to participate in tourism to enrich their lives, enhance their experiences, and increase their well-being (Uriely, 2005). Current research has examined the impact of socioeconomic determinants on the well-being of Chinese tourists, focusing mostly on economic conditions, urbanization rates, the employed population, and life expectancy. However, there has been no research conducted on integrating all these factors for comprehensive analysis.

Income functions as a primary catalyst of economic behavior. In economics, it is posited that increased personal income correlates with enhanced happiness. Easterlin shown that individuals in the United States with elevated earnings are more inclined to experience happiness or a high degree of happiness compared to those with diminished incomes (Abramovitz et al., 1974). However, since the "happiness paradox" first emerged, people have begun to realize that having more money does not necessarily make people happier. As income attains a specific threshold, the expenses associated with time and work surpass the revenue generated, resulting in a decline in happiness, hence establishing the concept of "happiness economics." Although the wealthy in a country may have a higher sense of happiness than the poor, in the long run, happiness does not increase with an increase in a country's income (Easterlin, 2003).

Income is a primary determinant of consumption patterns. Consumption can promote the generation of individual well-being (X. Wang & Sun, 2019) and good consumption behavior can help enhance well-being (Wu & Yuan, 2012). Cultural and tourism-related consumption projects show a gradually increasing marginal contribution to well-being (Zhou, 2015). Tourism consumption experiences can to a certain extent affect the emotions, sense of participation, and self-realization of tourists (Xie, 2005), thereby increasing their sense of well-being.

Urbanization is frequently affected by income and consumption patterns. As urbanization advances and ecological environment quality is enhanced, the well-being of urban dwellers will rise (H. Li et al., 2019). Simultaneously, urbanization has enhanced individuals' perceptions of distributive fairness and procedural justice, thereby elevating overall well-being (Jiang et al., 2017).

Employment is closely linked to urbanization and income trends. Employment is regarded as a significant contributor to well-being, since remunerated work is deemed essential for individual welfare by providing cash and satisfying many psychological demands (Stam et al., 2016). Employed individuals typically report more life satisfaction than the jobless, and those engaged in work exhibit markedly higher emotional well-being compared to their unemployed counterparts (Knabe et al., 2017). Moreover, individuals who participate in employment often gain a greater sense of self-esteem and enviable social

status (Connolly & Garling, 2022). Increased job satisfaction correlates with a heightened sense of personal well-being (Y. Xu & Wang, 2014).

Health is affected by and influences income, consumption, urbanization, and employment. Health profoundly affects the quality of life and is a vital predictor of personal well-being and happiness (F. Li et al., 2017). Individual health is a crucial contributor to overall well-being, with existing studies indicating that both psychological and physical health positively influence individuals' well-being (X. Zhang et al., 2017).

The existing literature has predominantly analyzed these elements separately, neglecting to synthesize them into a unified framework that demonstrates their interconnections and overall influence on tourists' well-being. This study aims to address this gap by conducting a comprehensive analysis of how five macro-social factors—income, consumption, urbanization, employment, and health—interact to affect the well-being of Chinese tourists.

3. Methods

3.1. Criteria for Scale Selection

Over the past 20 years, nearly 20 measurement tools have been used in studies of tourists' well-being (W. Zhang et al., 2024). The many scales used to measure tourist's well-being can be broadly categorized as follows: The initial group often associates Subjective Well-Being (SWB) with happiness (Diener, 2000). The General Well-Being (GWB) Scale, established by (Fazio, 1977), serves as a standardized measurement instrument created for the National Center for Health Statistics in the United States to assess participants' self-reported well-being. The scale assesses an individual's experience and equilibrium of happy and negative emotions, alongside their perception and evaluation of health, thereby synthesizing their subjective assessment of quality of life. The second group of scales measures Psychological Well-Being (PWB), developed by Ryff and Keyes (Ryff & Keyes, 1995). The third category of scales is the Multiple Happiness Questionnaire (MHQ), an important theoretical basis for the development of this questionnaire is the unification of SWB and PWB. In summary, the General Well-Being Scale (GWB) is a specialized and comprehensive tool for assessing subjective well-being, characterized by high reliability, frequent utilization, and extensive existing literature employing this scale. Consequently, this study will analyze literature on subjective well-being utilizing the General Well-Being Scale (GWB) revised by Duan, with the mean of the total scores serving as the metric for assessing the level of subjective well-being. A higher score correlates with an elevated level of subjective well-being.

Duan (1996) adapted the GWB scale into a Chinese version, using the first 18 items of the scale to measure. The revised scale includes six dimensions: 1. satisfaction and interest in life (items 6, 11); 2. worry about health (items 10, 15); 3. energy (items 1, 9, 14, 17); 4. mood of depression or happiness (items 4, 12, 18); 5. control over emotions and behavior (items 3, 7, 13); 6. relaxation and tension (items 2, 5, 8, 16). Participants' statements about happiness are used as the evaluation criterion. Items 1–14 use a 5-point or 6-point scale, while items 15–16 use a 10-point scale. Among them, items 1, 3, 6, 7, 9, 11, 13, 15, and 16 are negative questions, and the total score is obtained by adding the scores of all items after reversing the negative scores. Participants are evaluated based on their emotions over the preceding month, and the mean score of the overall scale is utilized to assess the tourist's level of well-being. A superior score signifies an elevated level of well-being. Therefore, this article collected original research data on Chinese tourists' GWB scores for cross-temporal meta-analysis. In order to facilitate the harmonization of measurements and avoid errors caused by different standards, if the scale uses a 6-point or 10-point scale, it is transformed into a 5-point scale according to certain rules (Dawes, 2008).

3.2. Literature Search

This article mainly studies the development of and changes in well-being among Chinese tourists. Therefore, the search scope mainly includes three literature databases in China: CNKI, Wan Fang Data, and VIP Chinese Journal Platform. Simultaneously, to guarantee the amount and quality of data, databases such as Web of Science, Wiley Online Library, Scopus, and Taylor & Francis Online are utilized to search for research articles regarding the well-being of Chinese tourists. The search time range is set from 1 January 2000 to 31 December 2022, including journal articles, theses and dissertations, and conference papers. The search was conducted by using keywords such as “tourist well-being”, “tourist happiness”, “subjective well-being”, “China”, and “Chinese” as the main subjects, keywords, and full-text search terms for multiple searches and screenings. In each article, the author, publication year, type of publication, survey area, sample size (N) (including the number of male and female groups), as well as the mean (M) and standard deviation (SD) of the scale, are extracted for cross-temporal meta-analysis.

3.3. Inclusive Rules

According to Twenge and Xin (Twenge, 2000; S. F. Xin et al., 2020), the studies including cross-temporal meta-analysis must comply with specific inclusion criteria: (1) the study must use the GWB (General Well-Being) scale as the test questionnaire. (2) The subjects must all come from domestic tourists within China, meaning individuals who are residents of mainland China traveling within the country. (3) The study must have a minimum of 30 male and 30 female subjects. A small sample size and an imbalance in the male-to-female ratio can affect differences in well-being levels. (4) The study must include the mean (M), standard deviation (SD), and total sample size (N). For papers that present research data devoid of extensive study findings, the following are used for processing and the data are included in the database: Formula (1) ($\bar{x} = \frac{\sum x_i n_i}{\sum n_i}$, where $\bar{x}$ represents the combined mean, x_i represents the mean, n_i represents the sample size); and Formula (2) ($S_T = \sqrt{\frac{[\sum n_i S_i^2 + \sum n_i (x_i - \bar{x}_i)^2]}{\sum n_i}}$, where S_T represents the combined standard deviation, S_i represents the standard deviation, $\bar{x}_i$ represents the combined mean, x_i represents the mean, n_i represents the sample size). (5) If identical data are released multiple times, the oldest instance is chosen. (6) Special stages or special groups should also be excluded as research subjects. The comprehensive information regarding the search strategy and selection procedure is illustrated in the PRISMA diagram presented in Figure 1.

As shown in Figure 1, this study identified 663 articles through the literature search, and 90 duplicate articles were removed during the initial screening. Subsequently, 198 articles were left after screening the titles and abstracts. Based on the specific inclusion criteria for this cross-temporal meta-analysis, 56 articles were ultimately selected for this study, including 17 journal articles and 39 theses and dissertations.

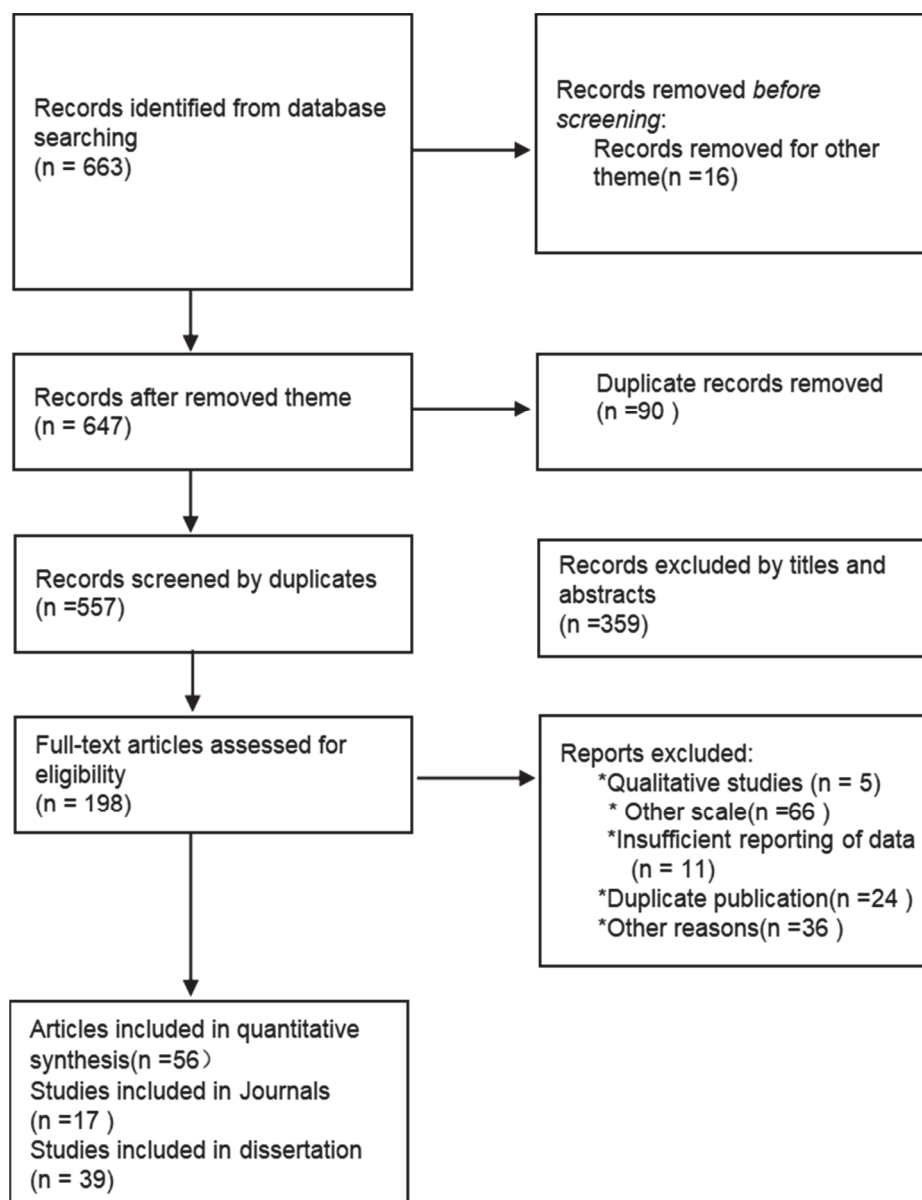


Figure 1. PRISMA diagram illustrating the search strategies and inclusion procedure. Note: * means manual exclusion.

3.4. Control Variable Coding

The cross-temporal meta-analysis, akin to a conventional meta-analysis, is affected by the attributes of the literature. In addition to being influenced by publication years, it may also be influenced by factors such as the source of the literature (journal type) and the source of the participants (region) (Twenge, 2000; Twenge et al., 2016; Twenge & Campbell, 2001). The research results can be affected by these factors.

A cross-temporal meta-analysis is essentially a secondary study. The data used in this analysis are derived from original research. Based on the study objectives of the cross-temporal meta-analysis, it is essential to define the types of studies to be included and to make adjustments according to the prevailing circumstances. The caliber of the analysis in cross-temporal meta-analysis is intrinsically linked to the quality of the literature incorporated. It can be used as a basis for revising inclusion and exclusion criteria, explaining relationships between research variables, and assigning weights when merging data (T. S. Zhang, 2015).

Different types of literature may have different criteria for data inclusion. Consequently, establishing publication quality guidelines is essential to investigate if the link between two variables is affected by the type of literature. Similarly, differences in socio-economic development conditions across different regions may lead to different criteria for data inclusion. Therefore, it is necessary to control for regional differences to assess whether they have an impact on the relationship between two variables.

Regional variations and publication quality requirements may result in discrepancies in the reported data. Variable coding of data according to type of publication and region of participants (Z. Xin & Zhang, 2009). For publication standards, Chinese publications were classified based on the latest complete catalog of core Chinese journals at Peking University (2021 edition), while foreign publications were classified according to JCR subject category rankings, and some master's and doctoral dissertations were also included. Therefore, the codes are as follows: 1 = core journal, 2 = general journal, 3 = master's and doctoral dissertations. For regional classification, in accordance with the most recent standard classification by the National Bureau of Statistics, 0 = no clear regional information, 1 = eastern region, 2 = central region, 3 = western region, 4 = covering multiple regions (including studies with participants from two or more regions).

Table 1 illustrates that research about the well-being of Chinese tourists commenced in 2011. Because literature from other years did not meet the inclusion rules, the study period was narrowed down from 2000–2022 to 2011–2022, including a sample size of 42,312. Statistical results are reported for different genders, with 20,247 males and 22,065 females. The specifics of all studies chosen for meta-analysis are presented in Table 1.

Table 1. Fundamental details of the source literature and variable coding assignment table.

NO.	Authors	Publication Year	Sample Size	Number of Male Groups	Number of Female Groups	Publication Class	Region	GWB (M)	GWB (SD)
1	Gao	2011	366	174	192	3	2	3.54	0.69
2	Zhao	2013	95	59	36	3	3	3.16	0.48
3	Gong	2013	190	32	158	3	2	3.64	0.81
4	Zhang	2014	491	228	262	2	3	3.84	NA
5	Ruan	2014	381	185	196	3	4	2.76	1.20
6	Wang	2015	317	103	206	3	1	3.32	1.37
7	Yan	2015	385	202	183	3	1	3.07	NA
8	Xiang	2016	373	186	187	3	1	2.82	1.27
9	Su et al.	2016	451	227	224	1	2	3.89	0.69
10	Ma & Zhang	2017	280	118	162	1	4	3.75	0.74
11	Yang	2017	227	124	103	3	1	3.6	0.72
12	Zhan	2017	261	110	151	3	2	3.93	0.91
13	Lv & Xie	2017	576	300	276	1	4	3.72	1.04
14	Zhang	2018	174	77	97	3	3	3.97	0.47
15	Wang	2018	617	297	320	3	1	3.71	1.15
16	Zheng	2018	259	110	149	3	1	3.02	0.55
17	Zhang et al.	2018	165	70	96	2	1	3.32	NA
18	Chen & Li	2019	306	152	154	2	1	3.54	0.71
19	Zhang	2019	703	296	407	3	2	4.03	0.89
20	Fu	2019	225	119	106	3	3	3.04	1.37
21	Zhou	2019	256	108	148	3	1	3.36	0.98
22	Meng	2019	610	269	341	3	2	3.67	0.99
23	Gao	2019	366	174	192	3	3	3.4	0.07
24	Tang	2019	294	110	184	3	4	2.74	1.16
25	Wang et al.	2020	332	181	151	1	1	4.23	0.73
26	Liu	2020	207	89	118	3	1	3.57	NA

Table 1. Cont.

NO.	Authors	Publication Year	Sample Size	Number of Male Groups	Number of Female Groups	Publication Class	Region	GWB (M)	GWB (SD)
27	Lian	2020	753	326	427	3	4	3.3	1.47
28	Liu	2020	401	164	237	3	4	3.71	0.64
29	Kim et al.	2020	742	330	412	1	0	4.24	0.92
30	He et al.	2020	541	259	282	1	2	3.88	0.7
31	Wang et al.	2021	345	162	183	2	1	3.40	NA
32	Feng	2021	302	135	167	3	1	3.76	NA
33	Shao	2021	388	181	207	3	1	3.74	0.86
34	Ma	2021	364	157	207	3	1	3.93	0.82
35	Jiang	2021	421	204	217	3	2	3.26	0.41
36	Lv	2021	474	207	267	3	2	3.81	1.12
37	Shao	2021	11,726	6166	5560	3	4	3.86	0.85
38	Cao	2021	542	188	354	3	4	3.35	1.03
39	Zhang	2021	261	138	123	3	1	3.98	0.6
40	Tu	2021	310	117	193	3	2	3.29	1.03
41	Bai	2021	316	200	116	3	3	3.67	NA
42	Sun	2021	400	173	227	3	3	3.67	0.94
43	Li et al.	2021	414	218	196	1	3	3.75	0.92
44	Cheng & Xu	2021	399	231	168	1	3	3.5	0.75
45	Feng & Yang	2022	271	122	149	2	1	3.73	0.81
46	Zhou et al.	2022	318	123	195	1	1	3.96	0.53
47	Guan & Cheng	2022	260	100	160	1	1	3.85	0.74
48	Guan	2022	460	191	269	3	1	3.27	NA
49	Cao	2022	220	108	112	3	2	3.82	0.59
50	Leng	2022	226	108	118	3	1	3.47	NA
51	Qiao	2022	385	209	176	3	2	3.89	1.07
52	Kuang	2022	306	132	174	3	1	3.98	1.04
53	Wu	2022	212	108	104	3	3	3.43	1.06
54	Chen	2022	384	130	254	3	3	3.66	0.78
55	Zheng et al.	2022	10,953	5126	5827	1	4	3.87	0.82
56	Peng et al.	2022	311	134	177	1	1	4.02	0.57

Note: Region: 0 = no definite region information; 1 = east; 2 = center; 3 = west; 4 = multiple. Publication class: 1 = core journal; 2 = publication from other academic sources; 3 = dissertations and master's theses. NA, missing values; M, mean score of tourist well-being; SD, standard deviation of tourist well-being.

3.5. Sources of Social Indicator Data

A cross-temporal meta-analysis can examine the evolution of tourists' well-being across time and investigate the correlation between social macro variables and tourists' well-being, elucidating the influence of social development and changes on their well-being. This involves selecting social indicators closely related to tourists' well-being and conducting correlation or time-lag analysis with the mean level of tourists' well-being.

This study adheres to the selection criteria established by (Twenge, 2000) to identify the relevant social indicators: (1) all social indicators can be easily quantified as important continuous variables; (2) all social indicators can truly explain the overall trend of change. Therefore, based on previous research by (S. F. Xin et al., 2020), this study selected two indicators of economic conditions: residents' per capita income and residents' consumption level, and three indicators of social connectedness: urbanization rate, employed population and health (life expectancy). The study seeks to elucidate the influence of social macro variables on tourist well-being by analyzing the role of five social indicators in predicting it. The names and data of these social indicators are obtained from the "China Statistical Yearbook" and the "China Tourism Statistical Yearbook".

4. Results

4.1. Overall Changes in Tourists' Well-Being over Time

The coded data were processed and analyzed using SPSS 21.0 software in this study. As illustrated in Figure 2, a scatter plot was generated using the years as the x -axis and the mean score of tourists' well-being as the y -axis. This allowed for an intuitive description of the changes in tourists' well-being over time. A rising trend was observed in the mean score of tourists' well-being in China from 2011 to 2022. Furthermore, Pearson correlation analysis was performed to quantify the association between the mean score of tourists' well-being and the number of years. The findings indicated a significant positive correlation between tourists' well-being and time ($r = 0.328$, $p < 0.05$). Moreover, a regression equation and 95% CI were added to further verify the relationship between the two variables. The result revealed that tourists' well-being showed an increasing trend with the years ($\beta = 0.041$, $R^2 = 11\%$, $p < 0.05$, 95% CI = (0.009, 0.074)). The R^2 value of 11% indicates that the year can explain 11% of the variation in tourists' well-being. A p -value below 0.05 signifies that this regression equation is statistically significant at the 0.05 level. Furthermore, although the squared year variable yielded a significant result in the regression equation, the curve exhibited minimal steepness. Consequently, no additional analyses for curvilinear effects were performed.

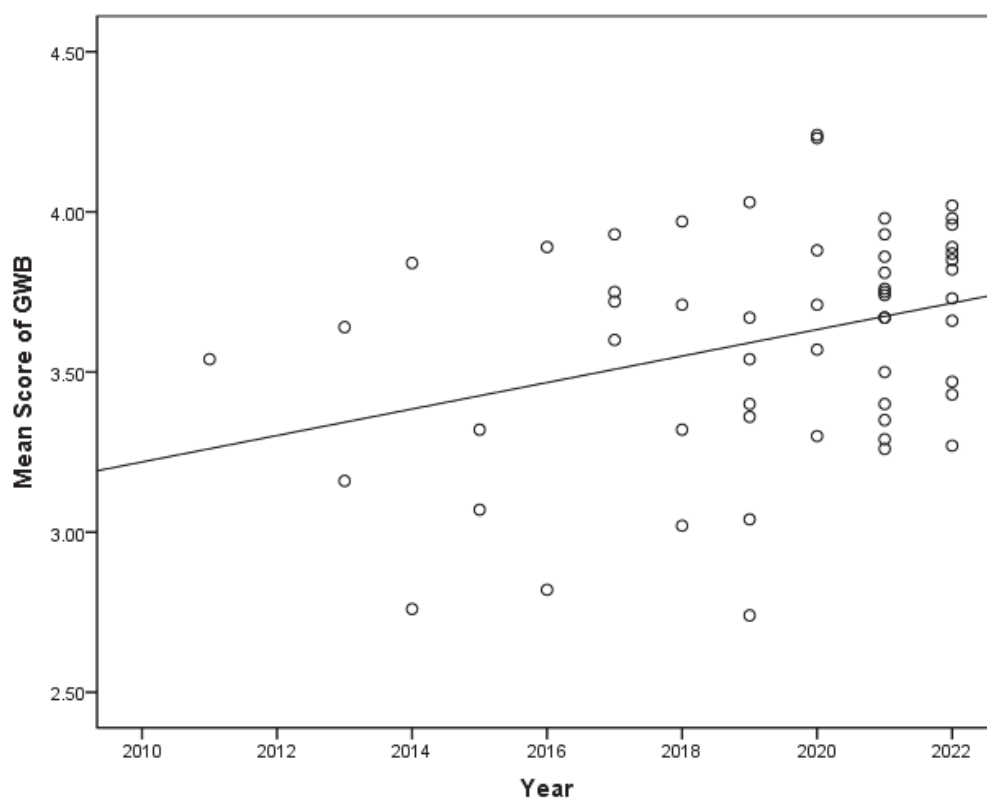


Figure 2. Changes in the mean (M) score of Chinese tourists' well-being from 2010 to 2022.

In addition to the influence of the year on the changes in tourists' well-being, cross-temporal meta-analysis is also affected by factors such as publication type and survey area (Z. Xin & Zhang, 2009). In order to control for these variables, this study conducted a multiple linear regression analysis using SPSS 21.0 software to explain the characteristics of tourists' well-being changes over time. Initially, tourists' well-being served as the dependent variable, while publication type and survey area were designated as independent variables in the first-level regression analysis, referred to as Model 1. At the same time, the year was included as an independent variable in the second-level regression analy-

sis, which was set as Model 2. As shown in Table 2, both Model 1 ($F1 = 4.407$, $p < 0.05$) and Model 2 ($F2 = 5.807$, $p < 0.01$) were statistically significant. The R^2 value was 14.3% in Model 1 and 25.1% in Model 2, indicating that the appearance of the year increased the explanatory power of the model by 10.8%, and the influence of the year on tourists' well-being was greater. When controlling for publication type and survey area, the results showed ($\beta = 0.36$, $p < 0.01$, 95% $CI = (0.012, 0.079)$), further demonstrating that the relationship between tourists' well-being and year in China was not affected by variables such as publication type and survey area. In summary, the well-being of Chinese tourists showed a significant upward trend from 2011 to 2022.

Table 2. Multiple regression analysis of predictor variables for General Well-Being (GWB).

Variable	Dependent Variable: GWB Score							
	F1	R ²	Model One 95% CI	β_1	F2	R ²	Model Two 95% CI	β_2
Publication class	4.407 **	0.143 **	(−0.167, −0.022)	−0.335 **	5.807 ***	0.251 ***	(−0.142, −0.001)	−0.253 **
Region			(−0.026, 0.084)	0.135			(−0.05, 0.06)	0.024
Publication year							(0.012, 0.079)	0.36 ***

** $p < 0.05$, *** $p < 0.01$.

4.2. Magnitude of Changes in Tourists' Well-Being over Time

As stated in the above conclusion, the level of well-being among Chinese tourists has been on the rise over the years. However, it is not clear how much the level of well-being has increased between 2011 and 2022. Consequently, a regression equation adjusted for sample size is employed to compute the mean scores of tourist well-being for the first year (2011) and the final year (2022) encompassed in the study. The specific operation is as follows: First, the regression equation is used to calculate the mean score of tourist well-being for a specific year ($y = bx + c$, where b is the partial regression coefficient, c is the intercept or constant, x is the year, and y is the average total mean score of tourist well-being). The regression equation can obtain the average total mean score of tourist well-being for 2011 and 2022. Second, use Formula (3) ($d = \frac{M_{2022} - M_{2011}}{M_{SD}}$, where d refers to effect size, M_{2022} refers to the average total mean score of tourist well-being in 2022, M_{2011} refers to the average total mean score of tourist well-being in 2011, M_{SD} refers to the average standard deviation value between 2011 and 2022) to obtain the effect size of the change in the mean of tourist well-being. After calculation, the mean of tourist well-being in 2011 and 2022 in China was 2.57 and 3.02, respectively. The mean score of tourist well-being increased by 0.45 points during this period, and the average standard deviation was 0.85 ($M_{SD} = 0.85$). The effect size d was 0.53 ($d = 0.53$), indicating an increase of 0.53 standard deviations. According to (Cohen, 1992), when $d = 0.80$ (absolute value), the effect size is large; when $d = 0.50$ (absolute value), the effect size is medium; and when $d = 0.20$ (absolute value), the effect size is small. Based on the results obtained in this article, the increase in the mean of tourist well-being in China is between the medium and large effect sizes. At the same time, when using Formula (4) ($r^2 = \left(\frac{d}{\sqrt{d^2 + 4}}\right)^2$, where d refers to effect size) to calculate the variance explained by the effect size d as a function of years, the result r^2 is 6.6%. In other words, the year can account for 6.6% of the variance in tourist well-being.

4.3. Correlations Between Mean Scores of Chinese Tourists' Well-Being and Social Indicators

The results of this study indicate a significant upward trend in the level of well-being among Chinese tourists from 2011 to 2022. What are the factors that contribute to this upward trend? As mentioned in the previous literature, the correlation between the level of tourist well-being and social indicators can provide a possible explanation

for this upward trend. To better understand how social change and development impact psychological variables, the cross-temporal meta-analysis method can shed light on the trends in psychological variables' development and the connections between individual psychological variables and social indicators. Time-lag analysis was used to demonstrate that the mean scores of social indicators (such as residents' per capita income, residents' consumption level, etc.) are closely related to the psychological indicators of the target population (such as tourists). If the coefficients between the mean score of tourist well-being and the scores of social indicators (such as residents' per capita income, residents' consumption level, urbanization rate, employed population and life expectancy) from the current year and the past 3 or 5 years are significant, it is considered that social indicators can predict changes in the level of tourist well-being. A time lag of 3 to 5 years substantiates the validity of the predictive influence of societal change on tourist well-being levels.

As shown in Table 3, it is reasonable that the time lag of 5 or 3 years helps us confirm the predictive effect of social change on the SWB level (S. F. Xin et al., 2020). The correlation between the mean score of the well-being level of Chinese tourists and the scores of five social indicators is almost significant at the current year, 3 years ago, and 5 years ago, showing a positive correlation. In other words, economic conditions (residents' per capita income and residents' consumption level) and social connectedness (urbanization rate, employed population and life expectancy) are all important factors that affect the rising well-being level of Chinese tourists.

Table 3. Correlations between the mean scores of Chinese tourist well-being and social indices.

Social Indicators	Actual Year		Three Years Prior		Five Years Prior	
	β	95% CI	β	95% CI	β	95% CI
Residents' per capita income	0.398 ***	(2.302, 3.484)	0.406 ***	(2.455, 3.495)	0.311 **	(2.725, 3.691)
Residents' consumption level	0.386 ***	(2.365, 3.517)	0.407 ***	(2.535, 3.507)	0.41 ***	(2.6, 3.516)
Urbanization rate	0.395 ***	(0.012, 0.076)	0.389 ***	(0.009, 0.062)	0.409 ***	(0.01, 0.058)
Employed population	−0.414 ***	(8.774, 30.809)	−0.376 **	(11.819, 65.691)	0.163	(−69.459, 26.103)
Life expectancy	0.409 ***	(0.052, 0.286)	0.378 **	(0.046, 0.34)	0.402 ***	(0.057, 0.335)

** $p < 0.05$, *** $p < 0.01$.

5. Discussion and Conclusions

5.1. The Level of Chinese Tourists' Well-Being Is Showing an Upward Trend

This study performed a cross-temporal meta-analysis of 56 papers utilizing the GWB scale to examine the evolution and fluctuations in well-being levels among Chinese tourists from 2011 to 2022. Firstly, the preliminary linear regression revealed a substantial positive association between the mean level of well-being of Chinese tourists and the year, signifying a general upward trend in their well-being over the preceding decade. Next, using a weighted regression equation, the study calculated the rate of change and found an increase of 0.53 standard deviations. This further validates the impact of China's rapid economic development and macro-social factors (urban development, social security, culture, education, etc.) on the overall rise in well-being levels among Chinese residents (Xing & Hu, 2022). Self-Determination Theory (SDT) suggests that the level of satisfaction with core psychological needs (autonomy, competence, and relatedness) has an impact on well-being (Ryan & Deci, 2000). Economic growth and urbanization in China have expanded opportunities for individuals to make self-directed choices in their lives. Increased disposable income and access to diverse leisure activities (e.g., travel) have allowed Chinese tourists to engage in activities that align with their personal interests and values. China's economic and social advancements have also fostered opportunities for individuals to develop and demonstrate competence. Exposure to new experiences through travel and cultural exchange has provided opportunities for learning and mastery, further boosting feelings of competence.

Social and cultural developments in China have strengthened interpersonal connections and community ties, which are essential for well-being. The upward trend in well-being among Chinese tourists reflects not only economic progress but also the fulfillment of fundamental psychological needs, which are essential for sustained well-being.

5.2. Impact of Social Changes on Tourists' Well-Being

This study used a cross-temporal meta-analysis to elucidate the macro-social elements affecting the enhancement of tourists' well-being by examining its underlying causes horizontally. The research results show that the economic conditions (residents' per capita income and residents' consumption level) and social connectedness (urbanization rate, employed population and life expectancy) are closely related to the upward trend of Chinese tourists' well-being level.

5.3. The Rise in Well-Being Levels Among Chinese Tourists May Be Related to Changes in the Economic Conditions

This study discovered that two indicators of the economic conditions (residents' per capita income and residents' consumption level) have a substantial beneficial influence on the well-being levels of tourists. The two economic conditions (residents' per capita income and residents' consumption level) from the current year, three years ago, and five years ago were all found to have a strong positive predictive influence on tourist well-being. Thus, an increase in income and consumption enhances the feeling of well-being (Jaikumar et al., 2018).

The per capita income of residents significantly enhances the well-being of tourists. Following the reform and opening up, China has had decades of rapid economic expansion, with its GDP attaining 17.9 trillion dollars in 2022, representing 14.4% of the global total and establishing itself as the world's second-largest economy. The swift economic growth enhances per capita income for locals, hence boosting tourism demand and creating additional opportunities for prospective travelers (Liu et al., 2013). Increased travel opportunities and frequency of travel enhance people's subjective well-being (Zheng et al., 2022). Therefore, an increase in residents' per capita income can effectively enhance tourists' well-being (Diener et al., 1993, 2018).

The consumption levels of residents positively influence the well-being of tourists. The correlation between well-being and consumption has consistently been a prominent subject of investigation. The rapid economic development will gradually change people's lifestyles, and their consumption will shift from pursuing quantity to pursuing quality. The consumption structure will gradually optimize from a low-level structure to a high-level structure (Ning, 2000). As a middle- to high-level consumption activity, tourism reflects people's desire for a better life. Relevant studies indicate that as the level of consumption increases, household consumption transitions from survival-oriented to enjoyment-oriented, and high-income individuals derive greater well-being from enjoyment-oriented consumption (Rao et al., 2019). As a kind of enjoyment consumption project, people can obtain a deeply spiritual experience, find fun and happiness, and achieve a sense of well-being through tourism (H. Zhang, 2022). Data from the Ctrip Travel website show that Chinese people, especially those in the middle- and high-income groups, believe that consumption brings the strongest well-being in tourism. Consequently, an elevated degree of consumption correlates with enhanced well-being among tourists (Noll & Weick, 2015).

5.4. The Rise in Well-Being Levels Among Chinese Tourists May Be Closely Related to Social Connectedness

The research results indicate that three social indicators associated with social connectedness (urbanization rate, employed population, and life expectancy) are highly correlated

with the increase in well-being among Chinese tourists. Furthermore, these three social connectedness indicators (urbanization rate, employed population, and life expectancy) positively predict tourist well-being in the current year as well as three and five years prior.

The degree of urbanization positively influences the well-being of tourists. Following the reform and opening up, China's urbanization has progressed swiftly, achieving an urbanization rate of 64.72% by 2022 (K. Wang et al., 2016). The increase in urbanization level has promoted the upgrading of tourism consumption demand and the expansion of investment in tourism public service facilities and infrastructure construction, providing a high-quality consumption environment and a convenient, comfortable tourism environment for tourists (Lin & Zhao, 2020). The advancement of urbanization concurrently promotes the tourism consumption capacity and enhances the quality of public tourism services, consequently improving tourists' well-being (Shen et al., 2023). Consequently, the swift advancement of urbanization significantly influences the enhancement of tourists' well-being (Navarro et al., 2020).

The overall current employment situation has a positive effect on the well-being of tourists. The growth in the employed population not only leads to higher personal income but also provides opportunities for individuals to fulfill their travel desires through their work engagements. Employed individuals can fulfil their physical and mental health requirements through health tourism, including medical treatment, rehabilitation, exercise, and recovery, while participating in business and official meetings (Guo & Ni, 2015). The relationship between occupation and economic income is closely related, and the amount of money that people in different occupations can freely dispose of varies significantly. Increased income correlates with elevated tourism motivation (F. Qiu, 1996). In addition, the increase in the employed population allows people to have income from their labor. Longer working hours also force people to seek novelty and well-being by escaping from the usual environmental pressures and complex interpersonal relationships. Therefore, tourism has become a way for many professional groups to pursue well-being.

Tourists' well-being improves as their life expectancy increases. Since the inception of the People's Republic of China, the average life expectancy has risen from 35 years to 78 years in 2022, effectively doubling over the years. This improvement in average life expectancy provides the basic physical conditions for people to travel and enjoy a better life. Poor health conditions are often barriers to participating in sports activities and tourism. Maintaining health and physical fitness should be emphasized to enhance a positive tourism experience (Rowinski et al., 2017). Nutritious dietary practices, physical activity, and psychological elements profoundly affect the health and well-being of elderly individuals (Guan et al., 2017). Therefore, as the average life expectancy in China continues to increase and people's health awareness grows stronger, the opportunities for outbound tourism increase, leading to a continuous improvement in the well-being of Chinese tourists (Evans & Soliman, 2019; Pourabdol et al., 2015).

Thus, it is important to consider the aforementioned research and discussions when trying to predict the psychological variables of specific groups, like the tourists' well-being in this study, because these macro-factors are indicative of social development status and are constantly changing. These factors include things like residents' per capita income, residents' consumption levels, urbanization rates, employed population and life expectancy. The findings from cross-temporal meta-analysis can concentrate on the macro-social indicators associated with psychological variables and offer precise insights for policies tailored to specific psychological factors, such as well-being, which is crucial for policy-makers. At the same time, this study combines both longitudinal (time dimension) and cross-sectional (macro-social indicators) perspectives, which makes the research method more comprehensive and enriches the theory of tourists' well-being.

6. Research Contribution

6.1. Theoretical Contribution

The first contribution is to clarify the trend of the well-being level among Chinese tourists at the group level. This study examines the trend of the psychological variable of well-being from the viewpoint of tourists. Given the high mobility of tourists and their dynamic behavior, it is difficult to longitudinally track changes in a psychological variable for tourists (Kim et al., 2019b). This study uses secondary data from the literature to explore the trend of well-being among tourists, thereby overcoming the difficulty of tracking the changes in tourist well-being. This study gathered material pertaining to travelers' well-being from 2011 to 2022, except for 2012 due to the absence of pertinent literature, and produced relevant indicators reflecting annual variations in tourists' well-being. Secondly, each piece of research literature studies "tourists" as a unit. Due to previous research on tourists in different backgrounds and case studies (H. Q. Qiu et al., 2022; Reitsamer & Brunner-Sperdin, 2017; L. J. Su et al., 2022), it is challenging to represent the changing characteristics of the "group" of tourists. The greatest innovation of this research is using a cross-temporal meta-analysis method, taking each piece of previous research as a research object and the "group" of tourists each year as a change scale. The 56 research studies conducted across China over 11 years enhance the representation of the well-being status of the tourist "group", hence expanding the comprehension of group psychological characteristics horizontally.

The second contribution is to ascertain the primary elements influencing the well-being of Chinese tourists. In the field of social psychology, many researchers point out that social psychology or social mentality (including social emotions) is a group phenomenon that is not equivalent to the accumulation of individual psychology (Lan & Pu, 2016). Therefore, when discussing various factors that influence tourist well-being, we should not ignore the abstract concept of the group, that is, the characteristics, properties, and values of the tourist group. More importantly, the social psychology of a group is not a static concept of traits. It should be viewed from a constructionist perspective, with the group constantly processing information in the surrounding environment, while the external social environment is changing with the times. This study examined five elements that may influence tourist well-being, based on China's social development features over the past decade, and employed a time-lag analysis method to ascertain any association among them. This study proves that the five indicators of residents' per capita income, residents' consumption level, urbanization rate, employed population and life expectancy, are important social factors affecting the well-being of Chinese tourists and continue to affect the change in tourist well-being over time.

6.2. Practical Contribution

Our research additionally offers the subsequent practical implications. First, it provides policy guidelines for tourism destination managers. Our findings confirm the positive impact of residents' per capita income, residents' consumption level, urbanization rate, employed population and life expectancy on the well-being of tourists. Policymakers can implement measures such as enhancing social security systems, instituting paid yearly leave for employees, expediting the expansion of high-quality medical services, and upgrading basic living facilities for inhabitants to promote travel. This action is anticipated to enhance the well-being and social welfare of the Chinese populace. Secondly, our research demonstrates that the current tourist products, services, and facilities in China do not meet the needs of all market segments. Tourist firms ought to build distinct tourist projects aimed at certain demographics throughout the creation of tourism products, thus augmenting the personalization and distinctiveness of these offerings. Group-based experiences (e.g., fam-

ily or community vacations) may have a greater impact on well-being in collectivist cultures than in individualistic societies, where individual achievement and autonomy may have a greater impact on well-being. We will adapt tourism policies and product development in other countries to cultural differences. For example, in countries with high levels of cultural heritage tourism, such as Greece or Italy, experiences that emphasize the promotion of personal connections to history or local culture may be more effective in increasing well-being than destinations that focus on modern, high-tech infrastructure.

7. Limitations and Future Research

Despite the valuable results attained in this investigation, certain limitations persist. Firstly, in addition to the GWB scale, alternative measures for assessing well-being include the Happiness Index Scale (HIS), the Psychological Well-being Scale (PWS), and the Multiple Happiness Questionnaire (MHQ). Cross-temporal meta-analysis may be test other scales to do comparative research with the GWB scale. Secondly, this study examined the temporal trends in the well-being levels of Chinese tourists by picking pertinent social indicators for macro analysis. The causal association between each social macro-factor and tourist well-being has not been validated using longitudinal approaches, nor has the precise influencing mechanism been thoroughly investigated. While there may be correlations between well-being and social indicators, this does not imply a direct causal link. The findings should be interpreted with caution, as there may be other factors at play, such as reverse causality, where changes in well-being could influence social indicators, or unobserved confounders that drive both variables simultaneously. Therefore, future research can study the internal relationships of macro-factors affecting the well-being of Chinese tourists to reveal the underlying mechanisms of their influencing factors. Furthermore, this study has confirmed the relationship between rapid economic development, social macro-factors, and tourists' well-being in China. Further exploration can be made in the future based on the hypothesized relationship between these internal factors and tourists' well-being.

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Article

Psychological Determinants of Conflict with the Law and Susceptibility to Rehabilitation in Relation to the Presence of Symptoms of Attention Deficit Hyperactivity Disorder

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Abstract: Background/Objectives: Many prison-sentenced individuals exhibit symptoms of mental dysfunctions, including attention deficit hyperactivity disorder (ADHD). The presence of co-occurring mental disorders further complicates their rehabilitation and social reintegration efforts. Given these challenges, understanding the role of specific disorders, such as ADHD, is critical for developing targeted interventions tailored to the needs of incarcerated individuals and improving their outcomes. This research aimed to clarify the relationships among hyperactivity, criminal behavior, and psychological functioning to inform preventative and therapeutic strategies. **Methods:** This study investigated the complex interplay among attention deficit hyperactivity disorder (ADHD) symptoms, criminal behavior, and various psychological factors in a sample of 391 male inmates from low-security Polish prisons and a control group of non-offending men. Principal component analysis (PCA) and Spearman's rank correlation were used to analyze the relationships among ADHD severity, type of crime (no crime, property crime, crime involving aggression), family functioning, childhood trauma, early maladaptive schemas, and mental health disorders. **Results:** The results revealed that while traumatic experiences were present across all groups, stronger family cohesion and support were associated with the absence of ADHD symptoms and criminal behavior. As ADHD severity and criminal behavior escalated, particularly in cases involving aggression, family support diminished, and maladaptive schemas, including "disconnection and rejection" and "excessive vigilance and inhibition", became more prominent, alongside increased correlations with mental health issues (anxiety and depression). **Conclusions:** The findings underscore the crucial role of family environment and early intervention in mitigating the risks associated with ADHD and criminal behavior, highlighting the need for comprehensive interventions targeting maladaptive schemas and providing support for both internalizing and externalizing symptoms. Limitations include the retrospective nature of data collection and the exclusive focus on male inmates in low-security facilities.

Keywords: attention deficit hyperactivity disorder (ADHD); criminal behavior; trauma; mental health; personality

1. Introduction

Global studies on the mental health of incarcerated individuals reveal that this group is disproportionately composed of socially marginalized individuals who frequently expe-

rience mental disorders [1]. Data from Canadian national studies indicate that up to 44% of incarcerated individuals exhibit symptoms of mental disorders [2]. Similarly, findings from Scandinavian penitentiary institutions suggest that this figure ranges between 50% and 75%, while U.S. prison statistics report that approximately 70% of juvenile offenders exhibit at least one mental disorder [3,4]. Furthermore, incarcerated individuals are more likely to be diagnosed with co-occurring mental disorders compared to the general population [5]. These clinical symptoms complicate their ability to engage in social rehabilitation and learn new behaviors and coping mechanisms [6,7]. This presents a significant challenge for professionals tasked with supporting and preparing them for reintegration into society. Consequently, research aimed at identifying mental disorders among inmates is vital for developing targeted interventions for this population.

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder typically diagnosed in childhood around the ages of 6–7. It is estimated that ADHD symptoms are observed in 5.9% to 10% of the general population [8–11]. Although symptoms often diminish with age, they can persist into adolescence and adulthood to varying degrees. As a result, there is increasing interest in understanding the transition from childhood ADHD to adult ADHD, a progression supported by long-term studies [12,13]. In adulthood, the prevalence of ADHD is estimated to range between 3% and 6% [14,15], though symptoms persist into adulthood in 50% to 70% of cases [16–18].

Research indicates that the deficits associated with ADHD can significantly impact the long-term functioning of affected individuals [19]. Compared to the general population, people with ADHD are more likely to experience mental and behavioral disorders [20]. Traits such as neuroticism and impulsivity are intrinsic to the disorder, often manifesting as emotional regulation deficits, distractibility, irresponsibility, and risk-taking tendencies in later stages of life [21]. Among adults with ADHD, conduct disorders and personality disorders are commonly diagnosed [22–24]. Additionally, up to 12% of adults with ADHD are diagnosed with anxiety disorders, and a significant proportion also experience depressive symptoms [25–27]. Addiction is another disorder frequently observed in adults with ADHD [28–31].

Attention deficit hyperactivity disorder has been studied for its impact on various aspects of individual behavior, particularly in the context of criminal behavior. Numerous studies have indicated a significant correlation between ADHD symptoms and an increased risk of engaging in criminal activities [32–37]. It was suggested that individuals with ADHD, particularly those who were not diagnosed early or who did not receive appropriate interventions, were more likely to exhibit impulsive behaviors that can lead to criminal actions, especially during adolescence [32–34].

Several studies, including both short- and long-term analyses conducted among offender populations [32,35,36,38], suggest that ADHD is a risk factor for criminal behavior. For example, research conducted on Swedish prisoners serving long-term sentences found that up to 40% of inmates could be diagnosed with ADHD [35]. However, it is important to note that the incarcerated individuals with ADHD in this study more frequently exhibited symptoms of other mental disorders compared to a control group of non-incarcerated individuals with ADHD. Similarly, a meta-analysis by S. Young et al. [36] based on data from 15 countries estimated the prevalence of ADHD among the prison population to be approximately 25.5%, highlighting that individuals with ADHD constitute a significant portion of the incarcerated population.

In Danish population-based studies, the relationship between childhood or adolescent ADHD and criminal convictions was examined, with additional factors such as co-occurring mental disorders and parental socioeconomic status considered as potential aggravating

influences. These studies indicated that individuals with ADHD were 1.6 times more likely to have criminal convictions, a figure notably lower than most similar analyses [39].

Findings from a study conducted in a Norwegian prison in Bergen are also noteworthy [40]. This study analyzed 43 inmates referred for psychiatric treatment through the penitentiary healthcare system. Depending on the diagnostic tools used, ADHD symptoms were identified in 74% to 100% of these inmates. However, in-depth studies and additional interviews with third parties reduced this estimate to 35%. It is worth noting that this group was referred for consultation based on observable deficits identified by their environment, indicating that they represented a subgroup at high risk of mental disorders within the inmate population.

The psychological underpinnings of this relationship are complex. Studies by Moffitt et al. [41], replicated across various populations, including American and British samples [42], indicate that attention deficits are primarily associated with educational difficulties, while impulsivity and hyperactivity increase the likelihood of engaging in conflicts with the law. Moreover, as noted by the authors of both studies, the functioning of individuals with ADHD is significantly influenced by factors such as socioeconomic conditions (particularly during childhood), the school environment, and the presence of mature parenting during adolescence. According to the cited research, positive behavioral changes can be fostered within this group at any stage of development.

Additionally, maladaptive schemas rooted in early negative experiences or trauma can further exacerbate the risk of criminal behavior in individuals with ADHD [43–46]. Studies have demonstrated that childhood trauma, including abuse and neglect, is prevalent among individuals with ADHD and contributes to the development of maladaptive schemas that shape subsequent behaviors [46–49]. These findings underscore the importance of understanding these psychological factors when analyzing the pathways linking ADHD to criminal behavior (Figure 1).

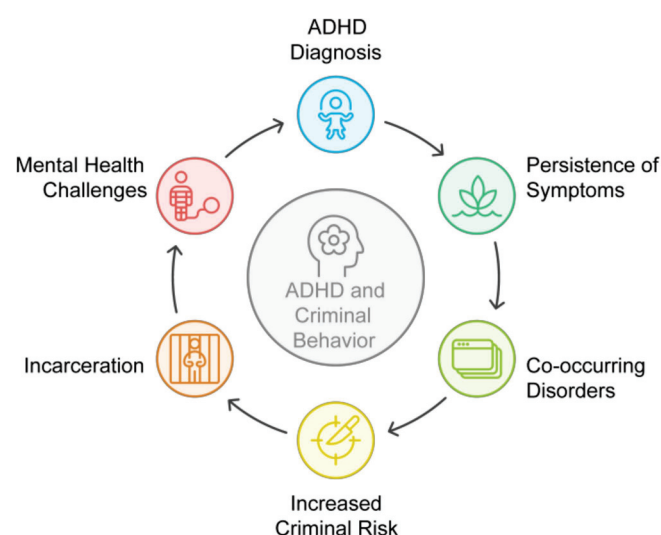


Figure 1. The cycle of ADHD and criminal behavior. This diagram illustrates the interconnected factors contributing to the increased risk of criminal behavior in individuals with ADHD, emphasizing how various elements reinforce one another, creating a challenging pathway.

Long-term studies comparing three groups of children diagnosed with ADHD in hospital settings provide further insight [32,50]. These groups included children with ADHD alone, children with ADHD and oppositional defiant behaviors, and children with ADHD and conduct disorders. A control group was also included for comparison. Observed until at least age 18, all ADHD-diagnosed groups committed crimes more frequently than the control group, with the worst outcomes seen in children with both

ADHD and conduct disorders, who committed crimes almost nine times more often than controls.

To summarize, most studies on ADHD and criminal behavior suggest that individuals with ADHD who also experience other mental disorders are more prone to criminal activity. Thus, ADHD alone is not considered a direct risk factor for criminal behavior. Instead, long-term studies often focus on clinical groups with pronounced symptoms or problematic behaviors, which may not represent the broader population of individuals with ADHD [51]. Criminal behavior is more prevalent among individuals with ADHD when additional deficits or disorders—such as improper socialization, socioeconomic challenges, or conduct disorders and addictions—are present. When ADHD coexists with these factors, the risk of criminal behavior significantly increases [28,51,52]. S. Barra et al. [53] also emphasize that ADHD is frequently accompanied by significant emotional and behavioral issues not captured by diagnostic criteria. These issues can influence the functioning and behavior of individuals with ADHD, including their involvement in criminal activity, even when not directly related to the disorder.

One category of crimes committed by this group includes traffic offenses. The coexistence of ADHD with personality traits such as impulsivity, hyperactivity, and an increased tendency to consume alcohol heightens the likelihood of uncontrolled and dangerous driving behaviors [54–56].

Despite the growing literature data, there remain significant gaps in understanding how ADHD symptoms interact with psychological factors such as maladaptive schemas and childhood trauma to influence specific types of crime. For instance, while ADHD is widely associated with impulsivity and aggressive behavior, the nuanced relationship between ADHD symptoms and the underlying psychological factors often receive insufficient attention [54–56]. This lack of clarity impedes the development of targeted intervention strategies that could mitigate the risk of criminal behavior in affected individuals. To address these gaps, this study proposes the following specific hypotheses: (H1) individuals with higher levels of maladaptive schemas are more likely to exhibit criminal behavior compared to those with adaptive schemas; (H2) a history of childhood trauma is positively correlated with the severity of ADHD symptoms and criminal behavior; and (H3) the type of crime committed varies depending on the individual's psychological profile and ADHD symptomatology. By exploring these hypotheses, this research aims to enhance the understanding of the interplay among ADHD, criminal behavior, and psychological factors in penitentiary contexts, ultimately contributing to the development of more effective psychosocial support programs and intervention strategies.

This study aimed to analyze the relationship between hyperactivity and criminal behavior among first-time and repeat offenders serving sentences in low-security prisons characterized by a lower degree of moral degradation. A control group of non-offending men was included for comparison. In the comparisons, we considered varying levels of ADHD symptoms in the studied groups, as well as the different types of crimes committed by the offenders (property crimes and crimes involving aggression). This approach allowed for a better understanding of the connections among family relationships, early childhood trauma, maladaptive emotional schemas, and mental disorders.

2. Materials and Methods

2.1. Participants

The study included detainees from semi-open facilities in Poland selected for presenting a lower degree of moral degradation. Individuals from these facilities were included, excluding those with intellectual disabilities. Of 437 invited, 411 responded, and 350 questionnaires were analyzed. The choice of semi-open facilities was justified by the relevance

of this subgroup in the Polish prison system, characterized by lower security and greater compliance of detainees with rules. Individuals incarcerated in these units are generally those deemed to have a lower degree of moral degradation, serving sentences for crimes of lesser social harm or demonstrating good behavior and compliance with prison regulations. These inmates typically exhibit greater independence and adaptability in their interactions with others.

Semi-open correctional facilities operate with reduced security measures, such as open cells during the day and permitting inmates to work outside the prison under minimal supervision or in some cases without any escort [57]. Inmates in these settings are often more motivated to exhibit socially acceptable behavior. To underscore the significance of this group within the Polish penitentiary system, it is notable that according to 2023 statistics from the Polish Prison Service [58], there were 34,684 inmates in closed facilities at the end of the year compared to 28,129 in semi-open facilities. Inmates in semi-open facilities accounted for 43.8% of the prison population, while those in closed facilities comprised 54.09%, with the remaining 2.2% in open facilities. These statistics highlight the diversity and complexity of the incarcerated population, emphasizing the importance of studying distinct subgroups.

Despite this diversity, research—particularly on ADHD—has predominantly focused on inmates in closed facilities with higher degrees of moral degradation. This tendency mirrors the generalization of findings from clinical groups with pronounced ADHD symptoms to the broader ADHD population, a practice that can lead to overinterpretation and limited applicability of results.

The study was conducted in accordance with the Declaration of Helsinki (2013) and approved by the Institutional Review Board of Poznan University of Medical Sciences, Poznan, Poland (398/2022, 19 May 2022).

2.2. Instruments and Procedures

The study was conducted in 2023 across two regions of Poland—eastern and western—in four different penitentiary units in Poznań, Iława, Wronki, and Białystok. This geographical spread was designed to increase the diversity of the study population. Participants were informed about the study's purpose and assured of their responses' anonymity. Written consent was obtained from all participants prior to their involvement, and participation was entirely voluntary.

The researchers administering the study received specialized training on using the DIVA-5.0 diagnostic interview and providing clear instructions for other self-report tools. This ensured consistency in the data collection process and accuracy in the application of the diagnostic methods.

The study utilized standardized or adapted questionnaire methods tailored to the Polish population. The researchers conducted the ADHD diagnostic interviews, while the remaining self-report measures were independently completed by participants using the “paper-and-pencil” method.

The primary tool for ADHD diagnosis was the Diagnostic Interview for ADHD in Adults (DIVA-5.0). This interview enables the identification of attention deficit hyperactivity disorder (ADHD) in adults. During the interview, the researchers asked participants questions about the diagnostic criteria and provided examples of ADHD-related symptoms observed in childhood and adulthood. The diagnostic criteria employed in this tool align with those outlined in the DSM-V. The descriptions of ADHD-related behaviors comprehensively address all diagnostic criteria. The current version of DIVA-5.0 is an evolution of its predecessor, DIVA 2.0 [59]. Generally, the tool's sensitivity is reported at 91.30%, while its specificity is 93.62% [60]. Like others, the Polish version of the interview was

developed by the DIVA Foundation. As with other language versions, the interview was first translated into Polish and then back-translated into Dutch.

Early childhood traumatic experiences were assessed using the Childhood Trauma Questionnaire (CTQ). This tool consists of 28 questions, which participants answer on a 1-to-5 Likert scale. The questionnaire enables the evaluation of early childhood trauma related to emotional, physical, and sexual abuse, as well as emotional and physical neglect [61,62]. The study used the Polish version of the tool adapted by Murzyn [63]. The original tool demonstrates satisfactory psychometric parameters regarding reliability ($\alpha = 0.79\text{--}0.96$) [62].

The Young Schema Questionnaire (YSQ-S3; Polish translation) was used to measure early maladaptive emotional schemas [64]. Young identified eighteen persistent behavioral, emotional, and motivational patterns presented by individuals. The questionnaire allows for evaluating the intensity of each of these patterns, as well as the specific areas they cover. Participants responded to 90 statements using a Likert scale (range: 1 to 6). The tool was adapted in 2018. Reliability analysis using Cronbach's alpha revealed varied internal consistency across subscales, ranging from 0.62 to 0.81. These values can be considered acceptable and comparable to similar validations of this tool in other countries. The Family Assessment Scale (FAS; adapted and standardized for Polish conditions in 2013) [65] was used to measure participants' functioning patterns in the family environment. The questionnaire consists of 62 questions, to which participants respond by selecting one answer on a 1-to-5 Likert scale. The statements form eight scales that provide a comprehensive description of the family. The reliability coefficients for the Polish version range from 0.70 to 0.93 (Cronbach's alpha). Another tool used in the study was the General Health Questionnaire (GHQ-30; Polish translation) for assessing the mental health of adults in the general population [66]. The tool was adapted to Polish conditions in 2010. It can be used to detect non-psychotic mental disorders. The total test score includes factors such as depression and anxiety, interpersonal relationships, and overall functioning disorders. Participants respond to 30 questions using a four-point Likert scale. The scale's internal consistency was evaluated using Cronbach's alpha, which reached 0.97, indicating high homogeneity. The survey was also used to gather basic data about the participants for the study.

2.3. Preliminary Analyses

This study explored the relationships between family functioning, childhood trauma, early maladaptive schemas, mental health disorders, ADHD severity, and criminal behavior in a sample of 391 males. The sociodemographic data of all participants are presented in Table 1. The assessment included eight measures of family functioning ("general assessment", "sustainable coherence", "sustainable flexibility", "unbound", "tangled", "stiffness", "chaotic", "family communication", and "satisfaction with family life"), five measures of childhood traumatic events ("physical neglect", "emotional neglect", "sexual abuse", "physical abuse", and "emotional abuse"), five measures of early maladaptive schemas ("disconnection and rejection", "weakened autonomy", "defective borders", "targeting others", and "excessive vigilance and inhibition"), and three mental health disorders ("anxiety and depression", "disturbed interpersonal relationships", and "impairment of general functioning"). After excluding 41 outliers, the analyses focused on two primary divisions: ADHD severity (non-ADHD, moderate ADHD, severe ADHD; $n = 301, 32,$ and 17 respectively) and criminal behavior (no criminal record, property crime, crime involving aggression; $n = 118, 110,$ and 122 respectively). Principal component analysis (PCA), using Statistica 13, was conducted separately on two sets of variables: (1) thirteen variables encompassing family functioning and childhood trauma and (2) eight variables related to maladaptive schemas and mental health disorders. Correlation matrices based

on correlation analysis with variances calculated as $SS/(N-1)$ were used as input for PCA. A scree plot determined the number of principal components to retain. Spearman's rank correlation test assessed the strength of relationships among the analyzed variables. The values of the correlation strength were interpreted as: <0.2—very weak; 0.20 to 0.39—weak; 0.40 to 0.59—moderate; 0.60 to 0.79—strong; and 0.80 to 1.00—very strong. A p -value of <0.05 was considered significant.

Table 1. Sociodemographic data of the participants.

	Category	<i>n</i>	%
Severity of ADHD	Non-ADHD	303	86
	Moderate ADHD	33	9
	Severe ADHD	16	5
Nature of crime	No criminal record	118	34
	Against property	193	55
	Involving aggression	41	12
Age (years)	Mean $\pm$ standard deviation	38 $\pm$ 10 years	
Marital status	Single	212	60
	Married	79	22
	Divorced	58	16
	Widowed	3	1
Education	Primary	55	16
	Vocational	84	24
	Secondary	146	41
	Bachelor's degree	15	4
	Higher	52	15
Mother's education	Primary	42	12
	Vocational	103	29
	Secondary	130	37
	Bachelor's degree	4	1
	Higher	73	21
Father's education	Primary	38	11
	Vocational	139	40
	Secondary	117	34
	Bachelor's degree	3	1
	Higher	50	14
Family	Complete	239	68
	Incomplete	69	20
	Reconstructed	44	13
Family upbringing	Mother only	179	51
	Father only	13	4
	Equal parents	135	38
	Grandparents	22	6
	Other	3	2

Table 1. *Cont.*

	Category	<i>n</i>	%
Mental illness in family	No	321	91
	Yes	31	9
ADHD in childhood	No	341	97
	Yes	11	3

The mean age and standard deviation in groups for ADHD were: non-ADHD 38 ± 10.2 years, moderate ADHD 34 ± 7.4 years, and severe ADHD 38 ± 10 years. There were no significant differences in age between ADHD groups ($p = 0.0845$); Nature of crime: no criminal record 33 ± 10.1 years, against property 40 ± 9.6 years, and involving aggression 38 ± 7.8 years. There was a significant difference in age between the crime-dependent groups ($p < 0.0001$): the group of participants without criminal records was significantly younger than both other groups with criminal records, but there were no significant differences regarding age of the groups with criminal records.

In statistical analysis, our choice of principal component analysis (PCA) was appropriate for reducing the dimensionality of our data and identifying the underlying structure of the variables associated with ADHD and criminal behavior. It was particularly beneficial in dealing with high-dimensional data, as it simplifies analysis and visualization without losing critical information. PCA enabled the visualization of high-dimensional data in two dimensions. We extracted the principal components that accounted for the greatest variance, enhancing the interpretability and effectiveness of those analyses.

3. Results

We used principal component analysis (PCA) to examine the relationships among ADHD severity (non-ADHD, moderate, severe), criminal behavior (no record, property crime, crime involving aggression), and various psychological and behavioral variables. Based on the pattern matrix of factor loadings, the PCA identified principal components explaining significant variance within the dataset. Each component represents a linear combination of the original variables, revealing the underlying structure of the data. The results provide insights into the factors associated with ADHD severity and its relationship to criminal behavior. Biplots visualize the relationships between variables and components. The proximity of variables within each plot suggests correlations; for example, the consistent proximity of “anxiety” and “depression” would indicate a strong correlation. Furthermore, the clustering of data points based on ADHD severity and crime type reveals potential distinct patterns associated with different levels of the disorder and types of criminal activity. Points that are close together within a quadrant indicate a strong correlation or similar loading on the principal components. These variables tend to behave similarly or share common underlying factors. Different clusters or spread-out points suggest variability among the variables, indicating distinct influences or contributions to the principal components. The axes represent the principal components (PC1, PC2), which are linear combinations of original variables. The percentage explains how much variance each component accounts for in the data. Quadrant I (top right): variables in this quadrant positively contribute to the axes’ principal components. Quadrant II (top left): variables here contribute positively to one component and negatively to the other. Quadrant III (bottom left): variables in this quadrant negatively affect both components. Quadrant IV (bottom right): variables positively contribute to one component, but negatively to the other.

3.1. Family Functioning and Early Childhood Traumatic Events

Three separate principal component analysis plots were constructed relating to the severity of ADHD in different categories: ADHD-negative, moderate, and severe (Figure 2A–C). In ADHD-negative cases, principal component 1 explains 37.66% of the

variance and 2 14.42% (Figure 2A). Emotional abuse (−0.713), emotional neglect (−0.685), and unbound (−0.727) indicate notable negative environmental impacts (Supplementary Materials Table S1). The variables highlight adverse and severe experiences. Family communication (0.806) and satisfaction with family life (0.798) reveal a strong positive correlation, indicating significant family support. Both are strongly associated with Factor 1, indicating strong ties to positive family dynamics. Additionally, sustainable coherence (0.785) and flexibility (0.660) highlight adaptive family dynamics (Supplementary Materials Table S1).

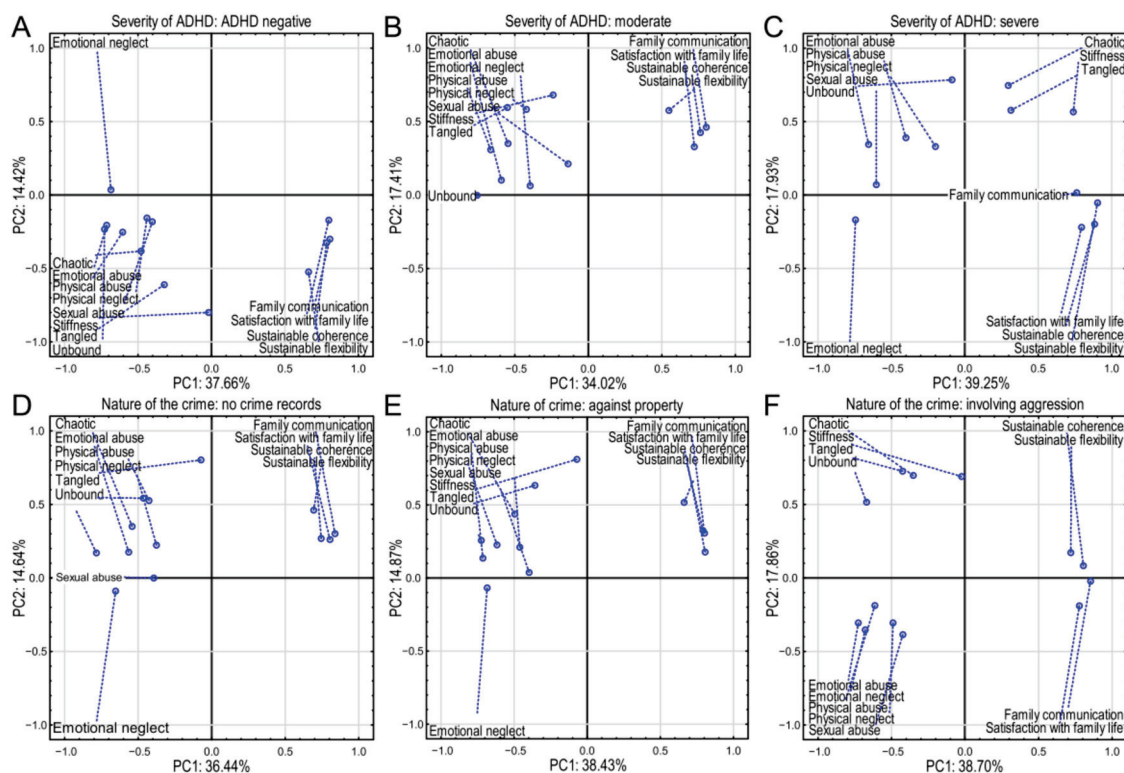


Figure 2. Principal component analysis (PCA) of family environment factors and their relationship to ADHD severity and criminal behavior. Six biplots display the relationships between family environment variables and principal components (PC1 and PC2) for six groups: three levels of ADHD severity (negative, moderate, severe; panels (A–C)) and three types of criminal behavior (no crime, crime against property, crime involving aggression; panels (D–F)). Each point represents a variable. The closer a point is to an axis, the higher the correlation (positive or negative) with that PC. The percentage of variance explained by each PC is shown. The dashed lines connect the variables to their coordinates.

The moderate-ADHD group principal component 1 explained 34.02% of the variance, and PC2 was 17.41% (Figure 2B). Strong negative impacts were emotional abuse (−0.714) and emotional neglect (−0.685). This indicates a similar pattern, suggesting that abuse is more strongly related to the moderate-ADHD group in comparison to positive family aspects (Supplementary Materials Table S1). “Unbound” (−0.724) and “emotional neglect” (−0.685) were of significant concern, reflecting potential internal struggles and past trauma. The variables showed how significant concern, reflecting potential internal struggles and past trauma, can influence ADHD patients. Positive influence revealed that family communication (0.803) and satisfaction with family life (0.807) could be interpreted as continued family support. Sustainable coherence (0.791) indicated some resilience (Supplementary Materials Table S1) and was more pronounced, showing the impact on this group of moderate negative experiences, with family dynamics still playing a supportive role.

In the severe-ADHD group, component 1 explained 39.25% of the variance and PC2 17.93% (Figure 2C). Negative factors such as emotional neglect (-0.744), physical abuse (-0.725), and emotional abuse (-0.656) indicated significant impacts of negative experiences. Positive influences of sustainable coherence (0.885) and flexibility (0.905) suggest high adaptability and possibly compensatory mechanisms for negative factors (Supplementary Materials Table S1). A notable change in “unbound” showed less negative correlation compared to previous tables, suggesting more complexity in behavior patterns within severe ADHD. Severe ADHD was associated more strongly with various abuse factors, but positive family dynamics also played a role. There was a strong influence of negative factors, indicating fewer protective effects from family.

Each plot in Figure 2A–C highlights a consistent theme where certain negative experiences are associated with different severities of ADHD, whereas family dynamics and satisfaction appear to be potential protective factors. Understanding these relationships can inform targeted interventions focusing on family communication and addressing abuse to potentially mitigate ADHD severity.

In the individuals without criminal records, principal component 1 explained 36.44% of the variance and principal component 2 14.87% (Figure 2D). Negative associations such as emotional neglect (-0.653) and unbound (-0.785) highlight potential areas of concern (Supplementary Materials Table S2). Still, emotional neglect was revealed to be less significant than in criminal groups. Physical neglect (0.559) and emotional neglect (0.517) values indicated that past neglectful experiences were associated even in individuals with no criminal records. Family communication (0.839) and satisfaction with family life (0.804) values showed that strong family support was associated with the absence of criminal behavior (Supplementary Materials Table S2). Individuals without criminal records benefit from strong family support, which offsets negative experiences like abuse or neglect. This points to the importance of supportive environments in preventing potential criminal behaviors. In the crimes-against-property group, principal component 1 explained 38.43% of the variance and PC2 14.87% (Figure 2E). Negative influence in crimes without aggression showed associations with emotional neglect (-0.685) and physical abuse (-0.617). This indicates a strong association with property crimes. Physical abuse (-0.617) and emotional abuse (-0.714) had significant negative loadings, emphasizing the severe impacts of trauma. Family communication (0.803) and sustainable coherence (0.791) maintained some protective effects (Supplementary Materials Table S2), suggesting that these factors may deter property crimes. Positive family dynamics can help reduce these criminal tendencies. Important negative factors, though less impactful in this group, indicate how neglect and abuse are linked to property crimes, with positive family dynamics providing some mitigation. In cases with criminal records involving aggression, principal component 1 explained 38.70% of the variance and PC2 17.86% (Figure 2F). Emotional abuse (-0.726) and emotional neglect (-0.679) were strongly correlated with aggressive behaviors. The influence of “unbound” and “tangled” indicate the complexities of aggression-related behaviors linked to ADHD problems, especially when compounded by negative experiences. Positive associations such as family communication (0.854) were significant mitigating factors for aggressive behavior and offered protective effects, though weaker in this context. Sustainable coherence (0.804) remained important, highlighting its role in moderating aggression (Supplementary Materials Table S2). Aggressive criminal behavior was closely related to various forms of abuse and temper issues, with family communication and emotional expression serving as mitigating factors. There was a strong correlation between negative experiences and aggressive behavior, with some protective family effects.

Across all groups, adverse experiences (e.g., neglect, abuse) correlated with criminal behaviors, while positive family interactions offered protective effects. Fostering supportive

family environments and addressing abuse can reduce criminal tendencies, highlighting areas for potential intervention and prevention. Family support in communication and satisfaction served as protective factors across groups and were generally protective, but varied in influence across contexts, with consistently strong negative impacts of emotional and physical abuse/neglect, especially in more severe ADHD and criminal categories. Interventions should target these areas to mitigate effects, emphasizing the importance of addressing adverse experiences and enhancing family support to reduce unfavorable outcomes related to ADHD and criminal behavior. Thus, therapeutic interventions should reinforce the importance of strengthening family functioning and addressing traumatic experiences to reduce ADHD impact and criminal tendencies.

Spearman's coefficient correlations also supported the principal component observations. The correlation matrices revealed exciting patterns in the relationships between family environment variables and the six groups (three levels of ADHD severity and three crime types) (Supplementary Materials: Tables S3 and S4). We observed negative correlations with positive family functioning: across all six groups, sustainable coherence, sustainable flexibility, and family communication showed strong positive correlations with one another and consistently exhibited strong negative correlations with unbound, chaotic, emotional neglect, emotional abuse, and physical abuse. This indicates that better family functioning (higher scores on positive variables) is associated with lower levels of family dysfunction (lower scores on negative variables). Unbound, chaotic, emotional neglect, emotional abuse, and physical abuse tended to correlate positively with one another, representing different facets of dysfunctional family environments. The magnitude of these correlations varied across the six groups, suggesting the relative prominence of these aspects differs according to ADHD severity and crime type. "Sexual abuse" showed a more variable pattern, sometimes correlating more strongly with other forms of abuse and sometimes more weakly.

ADHD severity and family environment correlations suggested a trend where higher ADHD severity (moving from negative to severe) is associated with a weakening of positive family factors (lower correlations with sustainable coherence, sustainable flexibility, and family communication) and a simultaneous strengthening of negative family factors (higher correlations with unbound, chaotic, emotional neglect, etc.). The patterns of the three crime-related groups suggest that the no-crime group shows stronger correlations with the positive family factors and weaker correlations with the negative factors than the groups with crimes, particularly those involving aggression.

The shift in correlations across ADHD severity groups suggests a possible dose-response effect, where more severe ADHD is associated with a more dysfunctional family environment. For instance, the negative correlations between positive family factors and negative factors might become less pronounced as ADHD severity increases. Regarding criminality, the no-crime group showed the strongest positive correlations with positive family factors and the weakest correlations with negative family factors. The crime-against-property group showed somewhat of a pattern between the no-crime and aggression groups, implying a possible gradient in the relationship between family environment dysfunction and type of criminal behavior. The correlation patterns showed a gradient effect related to the kind of crime committed. The no-crime group displayed the most substantial negative correlations between the positive family functioning variables and the negative variables.

In contrast, the "crime involving aggression" group showed much weaker negative correlations or sometimes even positive correlations between some positive and negative variables. This suggests that progressively more severe criminal behaviors are associated with less influence from positive family environment factors and perhaps even a more complex

interplay between positive and negative family factors. The crime-against-property group showed patterns somewhat intermediate between the no-crime and aggression groups.

These correlation matrices support the hypothesis that family environment plays a significant role in both ADHD and criminal behavior. A positive family environment appears to have a protective effect against both conditions. However, the strength of this protective effect seems to diminish with increasing ADHD severity and the severity of criminal behavior. The results suggest a complex interaction where multiple factors related to both family environment and individual characteristics contribute to both ADHD presentation and engagement in criminal activity.

3.2. Early Maladaptive Emotional Patterns and Mental Health Disorders

Across all panels in Figure 3A–F, PC1 consistently accounts for a larger proportion of the variance (between 42.20% and 53.38%) than PC2 (between 19.19% and 24.90%). The exact percentages vary slightly across the panels, indicating that the relative importance of the first two principal components might be subtly influenced by the specific group (ADHD severity or crime type).

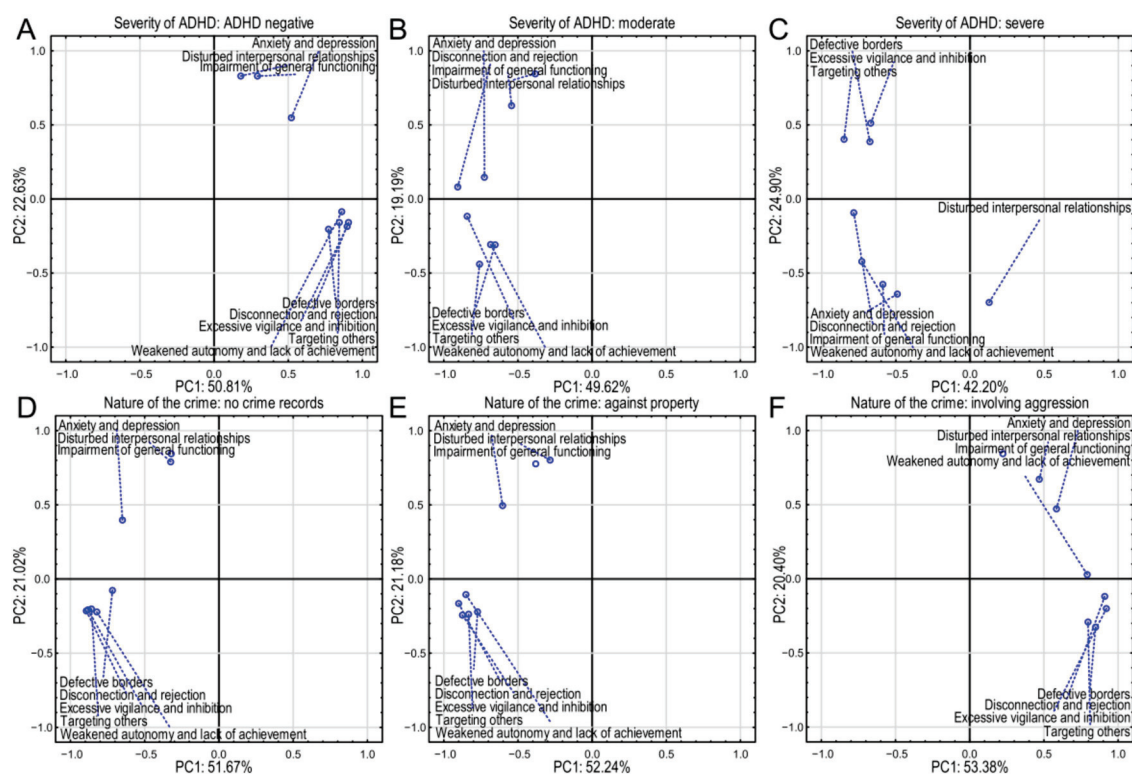


Figure 3. Principal component analysis (PCA) biplots illustrating the relationships among psychological and behavioral characteristics and ADHD severity and criminal behavior. Each panel displays the loading of variables on the first two principal components (PC1 and PC2). The percentage of variance explained by each PC is indicated. Points closer to the axes indicate stronger positive (positive side of the axis) or negative (negative side of the axis) correlations. Dashed lines connect each variable to its coordinate. (A–C) Associations of psychological and behavioral characteristics with different levels of ADHD severity. (D–F) Associations of psychological and behavioral characteristics with different types of criminal behavior.

The non-ADHD group biplot shows that PC1 explains 50.81% of the variance, and PC2 explains 22.63% (Figure 3A). “Anxiety and depression”, “disturbed interpersonal relationships”, and “impairment of general functioning” (internalizing characteristics) are positioned on the negative side of PC2. “Weakened autonomy and lack of achievement”,

“defective borders”, “targeting others”, “disconnection and rejection”, and “excessive vigilance and inhibition” (externalizing characteristics) are located more on the negative side of PC1. Strong positive loadings were observed for disconnection and rejection (0.906), weakened autonomy (0.861), defective borders (0.772), targeting others (0.844), and excessive vigilance (0.897) (Supplementary Materials Table S5). This suggests that PC1 represents externalizing behaviors and indicates these are key constructs for individuals without ADHD. Principal component 2 showed strong positive loadings for anxiety and depression (0.548), disturbed interpersonal relationships (0.830), and impairment of general functioning (0.829) (Supplementary Materials Table S5). This indicates that PC2 represents internalizing difficulties and suggests relationship challenges in the non-ADHD group. Disconnection and rejection showed a strong positive association, implying that individuals without ADHD are likely to experience significant feelings of disconnection and rejection. Excessive vigilance and inhibition had another strong positive loading, highlighting anxiety-driven behaviors. Although positive, the loading for disturbed interpersonal relationships was less significant compared to others, indicating less direct correlation within this factor. This grouping suggests that individuals without ADHD struggle primarily with feelings of rejection and anxiety, impacting their interpersonal relationships.

In the moderate-ADHD group, PC1 explained 49.62% of the variance and PC2 19.19% (Figure 3B). There were strong negative loadings in PC1 for disconnection and rejection (−0.905), weakened autonomy (−0.684), defective borders (−0.654), targeting others (−0.758), excessive vigilance (−0.843), and anxiety and depression (−0.727) compared to non-ADHD cases, indicating a slightly different impact with moderate severity (Supplementary Materials Table S5). This suggests that PC1 represents a combination of externalizing and internalizing problems with a negative association. On the other hand, in PC2, strong positive loading for disturbed interpersonal relationships (0.844) and impairment of general functioning (0.630) emphasizes relationship and functional impairments (Supplementary Materials Table S5). The strong negative loading for disconnection and rejection indicates that as individuals experience moderate ADHD symptoms, feelings of disconnection may manifest differently or become internalized, and that for anxiety and depression shows that anxiety becomes a significant aspect of their experience. Impairment of general functioning strongly correlated with factor 2, indicating that interpersonal relationships start to show significant impairment with moderate ADHD severity. This suggests that as ADHD symptom severity increases, individuals experience less overt disconnection, but greater internal struggles with anxiety and functioning.

In the severe-ADHD group (Figure 3C), PC1 explained 42.20% of the variance and PC2 24.90%. Principal component 1 revealed strong negative loadings for disconnection and rejection (−0.785), weakened autonomy (−0.729), defective borders (−0.675), targeting others (−0.850), and excessive vigilance (−0.669). Disconnection and rejection and excessive vigilance and inhibition again have high negative loadings, underscoring their continued importance (Supplementary Materials Table S5). Similarly to the moderate ADHD group, this points to externalizing issues, but with a negative association. PC2 revealed strong negative loading for anxiety and depression (−0.643) and disturbed interpersonal relationships (−0.699), critical issues in severe ADHD, suggesting a negative association with internalizing problems in this group (Supplementary Materials Table S5). Disconnection and rejection indicates a sustained negative experience, but hints at resilience in coping mechanisms. Anxiety and depression is moderately negative, showing these experiences are critical in severe cases, perhaps pointing to more profound emotional distress. Disturbed interpersonal relationships highlights significant relationship issues, suggesting that severe ADHD strongly impacts social connections, leading to potential conflicts or isolation.

Here, the analysis indicates that in severe ADHD, emotional health and interpersonal dynamics are substantially impaired.

PC1 explained 51.67% of the variance in cases with no criminal records and PC2 21.02% (Figure 3D). PC1 showed strong negative loadings for disconnection and rejection (-0.894), weakened autonomy (-0.822), defective borders (-0.716), targeting others (-0.858), and excessive vigilance (-0.882) (Supplementary Materials Table S6). Similarly to ADHD, disconnection and rejection (-0.894) and excessive vigilance and inhibition (-0.882) were central to the factors affecting individuals without criminal records (Supplementary Materials Table S6). This shows a negative association with externalizing behaviors. Additionally, there were strong positive loadings for disturbed interpersonal relationships (0.790) and impairment of general functioning (0.844), indicating internalizing issues (Supplementary Materials Table S6). Impairment of general functioning had a strong loading in PC2, indicating significant challenges in functioning. The significant negative loading for disconnection and rejection suggests that feelings of disconnection may contribute to positive social behaviors, preventing criminality. That for impairment of general functioning indicates that lack of functionality correlates positively with potential criminal behaviors, even among those with no prior records. This implies that fostering healthy relationships may mitigate crime risk.

In the group committing crimes against property, PC1 explains 52.24% of the variance and PC2 21.18% (Figure 3E). PC1 showed strong negative loadings for disconnection and rejection (-0.900), weakened autonomy (-0.850), defective borders (-0.773), targeting others (-0.833), and excessive vigilance (-0.875) (Supplementary Materials Table S6). Again, disconnection and rejection and excessive vigilance and inhibition appeared showed strong negative relationships, similar to the moderate-ADHD and severe-ADHD groups and non-criminals, suggesting a negative association with externalizing behaviors. Additionally, strong positive loadings in PC2 for disturbed interpersonal relationships (0.803) and impairment of general functioning (0.776) were again related to internalizing problems (Supplementary Materials Table S6). Disturbed interpersonal relationships had a positive loading, showing potential links to property crimes. Disconnection and rejection and excessive vigilance and inhibition both showed significant negative associations with property crimes, indicating that these factors may deter such behaviors among individuals with ADHD. The positive loading for disturbed interpersonal relationships suggests that relationship disturbances may increase the risk of property crimes. This suggests that problems in interpersonal dynamics can lead to property crimes, particularly if other supportive factors are compromised.

In the group of people convicted of crimes involving aggression, PC1 explained 53.38% of the variance and PC2 20.40% (Figure 3F). PC1 showed strong positive loadings for disconnection and rejection (0.909), defective borders (0.849), targeting others (0.797), and excessive vigilance (0.921) (Supplementary Materials Table S6). In contrast, disconnection and rejection and excessive vigilance and inhibition switched to strong positive loadings in this group, indicating their association with aggressive behaviors. This suggests that PC1 represents externalizing behaviors. PC2 showed strong positive loadings for disturbed interpersonal relationships (0.671) and impairment of general functioning (0.844), pointing to internalizing difficulties (Supplementary Materials Table S6). The variable of anxiety and depression showed moderate positive associations, reflecting emotional factors that may drive aggressive acts. Disconnection and rejection was significantly positive, indicating that feelings of disconnection may heighten aggressive tendencies. Excessive vigilance and inhibition strongly correlated with aggressive behavior, suggesting that anxiety and a heightened state of alertness lead to increased aggression. The finding for disturbed interpersonal relationships further supports the idea that relationship issues are strongly

associated with aggressive tendencies in individuals with severe ADHD. Thus, feelings of rejection and anxiety can correlate with aggression, showing that emotional distress may provoke more severe criminal behaviors.

Across groups, PC1 consistently showed strong loadings (positive or negative) related to externalizing behaviors (defective borders, targeting others, weakened autonomy, disconnection and rejection, and excessive vigilance and inhibition). The operators (positive/negative) may change, but the involvement of these variables is apparent. On the other hand, across all groups, PC2 consistently showed strong loadings related to internalizing problems (anxiety and depression, disturbed interpersonal relationships, impairment of general functioning). The operators may vary, but these variables remain consistently associated.

The main difference lies in the operators of the loadings on PC1. The change in the operators of the loadings of externalizing variables on PC1 across different tables may reflect different underlying processes driving these behaviors and the relationships between externalizing and internalizing problems. The PCA suggested a complex relationship among ADHD severity, behavioral characteristics, and criminal behavior. The shifts in the prominence of different variables with changing ADHD severity and crime types indicate that various factors might be at play in each scenario. Further analysis and discussion are needed to understand these relationships' nuances fully.

The patterns suggest that as ADHD severity increases, there is a shift in the prominent characteristics. In the negative-ADHD group (A), anxiety and depression are most strongly associated. As severity increases (B and C), attributes like defective borders, excessive vigilance and inhibition, and targeting others become more prominent. Disturbed interpersonal relationships also appears across severity levels, but its relative importance seems to change. Panels D, E, and F show the PCA for individuals with different criminal records. Similarly to the ADHD panels, the x and y axes represent PC1 and PC2, respectively, with percentages indicating variance explained.

This component often shows strong positive loadings for variables representing externalizing behaviors (defective borders, targeting others, weakened autonomy, disconnection and rejection, and excessive vigilance and inhibition). Conversely, it often shows weaker positive or negative loadings for internalizing problems (anxiety and depression, disturbed interpersonal relationships, impairment of general functioning). This suggests that PC1 broadly represents a dimension of behavioral disinhibition versus internalizing distress. The operator (+ or −) of the loadings for a specific variable could change from one table to another depending on the particular group, showing that PC1 is not necessarily a direct measure of externalizing behavior, but rather a combination of several factors. PC2 displays more variation across the tables. It often involves a contrast between variables representing internalizing and externalizing difficulties, but in a less systematic way compared to PC1. The loadings on PC2 are sometimes weaker than those on PC1, indicating that PC2 represents a less dominant dimension of variance.

Across all groups, the constructs of disconnection and rejection and excessive vigilance and inhibition consistently showed strong relationships with both severe ADHD and criminal behavior patterns. Disturbances in interpersonal relationships and impairments in general functioning were strong indicators across severity levels and crime types. As severity increases, the association with negative outcomes (anxiety, depression) strengthened, hinting at the need for integrated interventions targeting these issues across populations.

Disconnection and rejection and excessive vigilance and inhibition consistently appeared as critical factors. They correlated with emotional distress and interpersonal issues in ADHD. Impaired relationships are a significant theme in the crime-related tables. They often serve as a foundational element for protective factors against crime and risk factors

for aggressive behaviors. The analysis showed a similar pattern of psychological and behavioral characteristics across the three groups, but with varying importance. Anxiety and depression and impairment of general functioning appeared consistently, but with shifting prominence concerning other characteristics like defective borders. The panel for crimes involving aggression (Figure 3F) shows the strongest association with defective borders and related characteristics.

The observations of correlations supported the analysis of the principal components. The correlation matrices illuminate the relationships between various psychological and behavioral characteristics and both ADHD severity and the presence/type of criminal behavior. Across all six groups (Supplementary Materials Tables S7 and S8), variables representing externalizing behaviors (disconnection and rejection, weakened autonomy and lack of achievement, defective borders, targeting others, excessive vigilance and inhibition) showed strong positive correlations with one another. This indicates that these behaviors tend to cluster together: individuals exhibiting one of these traits are more likely to exhibit others. The relationships between externalizing behaviors and internalizing symptoms (anxiety and depression, disturbed interpersonal relationships, impairment of general functioning) were generally weaker and less consistent across the groups. While some correlations existed, they were frequently not statistically significant (N/S), implying that the strength and direction of the association between externalizing behaviors and internalizing symptoms vary substantially across the different groups.

As ADHD severity increases from non-ADHD to severe, the intercorrelations among the externalizing behaviors generally remained high, but the magnitude showed some variation. The correlations between externalizing behaviors and internalizing symptoms changed. While internalizing problems may show some association with the externalizing behaviors in the lower-severity ADHD groups, the association appears less consistent and weaker at higher severity levels. This suggests a potential shift in the phenotypic presentation of ADHD across severity.

Comparing the three crime-related groups revealed a similar pattern to the ADHD severity groups. The no-crime group exhibited stronger correlations between externalizing and internalizing symptoms. In contrast, the crime-involving-aggression group demonstrated less pronounced and consistent correlations, suggesting that the co-occurrence of internalizing and externalizing traits is less intense in individuals engaging in aggressive criminal behaviors. The crime-against-property group again demonstrated an intermediate pattern. These relationships may indicate that individuals in the higher-severity ADHD groups and the crime-involving-aggression group exhibit less cohesion in their internal experiences and understanding of their own mental states. This in turn increases their tendency to rely on rigid, maladaptive coping mechanisms, such as outward-directed aggression or impulsive behaviors that lack a sufficiently defined direction or purpose.

The matrices suggest a core pattern of highly interconnected externalizing behaviors across all groups. The relationships between these externalizing behaviors and internalizing symptoms, however, were less consistent and appeared moderated by both ADHD severity and the type of criminal behavior. Individuals with more severe ADHD and those who engaged in aggressive criminal behavior seemed to display a somewhat stronger association between externalizing and internalizing problems. This implies that the clinical presentation of ADHD and its relationship to criminal behavior is multifaceted and likely involves complex interactions among different behavioral and psychological factors.

In the case of family and trauma, despite the results being similar in numbers, the vectors were primarily significant (in the case of ADHD and moderate ADHD, as well as in the absence of crime and property crime). However, regarding the lack of ADHD and

severe ADHD, as well as the absence of crime and crimes involving aggression, there is general confusion about everything.

From a psychological perspective, if someone has experienced trauma and had a supportive family, they understand that it was inappropriate (as is the case with no ADHD and absence of crime). In the case of moderate ADHD, the family may have been supportive, but did not explain the traumatic event as negative: instead, they tried to divert attention. In contrast, in the case of severe ADHD and crimes involving aggression, the family sent ambiguous signals, meaning that for dramatic events, they negated both the child and the situation. Perhaps the family itself were aggressive, so the child had to rationalize that it was the norm—clearly, the signals were ambiguous.

4. Discussion

Mental and behavioral disorders have become a critical focus in the rehabilitation of incarcerated individuals. Research indicates that up to 70% of the incarcerated population may experience symptoms of mental disorders [2–4]. Among these, ADHD has emerged as a key area of investigation. While some studies suggest ADHD is a significant risk factor in criminal behavior [35,51,67], results remain inconclusive. For instance, a meta-analysis of long-term studies on ADHD and criminality found that hyperactivity was associated with a relative risk of 2.2 for arrests and 3.3 for convictions [39]. Other studies confirm a higher prevalence of hyperactivity among convicted individuals, including both men and women [32,39,68].

Conversely, some researchers caution against overinterpreting these findings. They argue that long-term studies often focus on clinical populations with pronounced ADHD symptoms or problematic behaviors [40]. Studies of incarcerated individuals further reveal that those with ADHD diagnoses frequently exhibit co-occurring mental disorders or socialization difficulties, both of which independently increase the risk of criminal behavior [51]. This suggests that ADHD alone may not significantly elevate the risk of criminality, but when coupled with other disorders, the likelihood increases substantially [24,52]. These discrepancies highlight the need for further investigation into factors that influence these relationships.

This study examined the relationships among family functioning, childhood trauma, early maladaptive schemas, mental health disorders, ADHD severity, and criminal behavior. The findings reveal complex interconnections among these factors. Traumatic events were prevalent across all groups analyzed, regardless of ADHD severity or criminal behavior. However, individuals without ADHD symptoms or a history of criminality reported greater family cohesion and a stronger protective influence of the family in coping with negative experiences. In contrast, this protective effect diminished as ADHD symptoms intensified, particularly among those convicted of violent crimes. Incarcerated individuals convicted of violent offenses described their family environments as less supportive and cohesive. These findings align with prior research highlighting the critical role of family dynamics in shaping children's development and behavior [65,66].

The family environment, encompassing parents and primary caregivers, plays a pivotal role in daily interactions, communication, providing a protective space, and modeling social relationships. This aligns with meta-analyses showing statistically significant relationships between negative parenting practices and an increased likelihood of ADHD symptoms and diagnosis [67]. Similar patterns are observed in offender populations, where factors such as neglect, parental violence, or lack of support, when combined with biological vulnerabilities, contribute to repeated conflicts with the law [68,69].

The study also found a complex relationship among maladaptive emotional schemas, mental disorders, ADHD symptoms, and criminal behavior. In individuals without ADHD

traits or criminal behaviors, a more precise distinction emerged between clinical symptoms of mental disorders (primarily anxiety and depression) and personality symptoms (manifested as maladaptive emotional schemas). However, as ADHD symptoms intensified and behaviors progressed from no criminal activity to property crimes and eventually to violent crimes, maladaptive emotional schemas became more pronounced. These schemas also showed stronger correlations with mental health symptoms.

Among individuals with more severe ADHD symptoms and violent criminal behavior, schema domains such as disconnection and rejection and excessive vigilance and inhibition were notably prevalent. Research confirms that maladaptive emotional schemas are associated with symptoms of psychological disorders, including anxiety and depression [70,71]. Consistently with these findings, the present study observed stronger associations among maladaptive emotional schemas, anxiety, and depression in groups with more intense ADHD symptoms and among those convicted of violent crimes. This suggests more significant psychological deficits in these groups regarding current symptoms and personality traits. Such deficits hinder the ability to form healthy interpersonal relationships or seek support from others.

ADHD and criminal behavior appear to be multifaceted phenomena influenced by individual (constitutional) and external (environmental) factors. Recognizing the disorder and providing a diagnosis is a crucial element of support, as pharmacological treatment alone has been shown to produce beneficial effects in managing observable symptoms of the disorder [72,73]. Environmental support is critical in mitigating the development of psychopathology, as it can buffer against the emergence of negative symptoms in adulthood. Individuals lacking adequate family support are more likely to struggle with negative experiences and are less capable of integrating life events positively. These individuals also exhibit a greater tendency to experience co-occurring mental disorders.

However, it is important to note that both this and other studies on environmental resources and their impact on rehabilitation and support for individuals with ADHD should be interpreted with caution, due to the specific nature of the studied populations.

These findings underscore the importance of carefully designed interventions for individuals with ADHD symptoms and offender populations. Such interventions should include individualized assessments to identify both resources and deficits. Programs should focus on teaching new, adaptive relationship patterns and, in line with schema therapy principles, fostering healthy role models who exemplify self-regulation, joy, and freedom.

Recognizing the critical role of the environment in providing support, modeling, and shaping appropriate attitudes, attention should also be given to the need for training and skill development among social services, public service officers, and healthcare professionals. Such efforts can help reduce the stigma associated with ADHD while simultaneously enhancing societal resources to promote socially beneficial attitudes.

These measures can empower individuals in these groups to better utilize societal resources and integrate more positively into their environments.

5. Limitations

This research has several limitations that should be taken into account. The tools used to assess ADHD relied on retrospective self-reporting requiring participants to recall past symptoms, which the researchers then categorized as indicative of the disorder. Due to the conditions of penitentiary isolation under which the study was conducted, it was impossible to verify these reported behaviors or assess their diagnostic significance.

The tool's structure (DIVA-5.0), primarily based on interviews with the individual being assessed, further limits the ability to gather additional data. This methodological approach may contribute to phenomena such as impression management or self-deception.

Consequently, the findings rely heavily on participants' recollections and subjective perceptions of their past experiences.

In designing future studies, it would be valuable to consider collecting supplementary data from prison staff (medical and custodial) and exploring the possibility of gathering information from participants' family environments.

Additionally, the study focused exclusively on male convicts serving sentences in lower-security facilities. While this group represents a significant portion of the incarcerated population in Polish prisons and is often the target of resource-based interventions (e.g., work programs), the findings may not be generalizable to other groups. For instance, the correlations observed in this study might be more pronounced in populations exhibiting higher levels of moral corruption.

Moreover, the exclusion of female participants limits the applicability of the findings to incarcerated women, who may experience different influences due to gender-specific factors such as the nature of crimes committed, upbringing, and societal expectations.

The cultural context of the study—Polish prisons—could be broadened to include other penitentiary environments, such as individuals serving substitute penalties or correctional facilities in other countries.

Finally, it also seems essential to design similar studies with a longitudinal approach. Examining both traumatic factors and family dynamics (potentially including intergenerational trauma) would provide a better understanding of the dynamics and interdependence of the relationships described in the manuscript. Such research could also significantly impact our understanding of the mutual influence of biological and environmental factors on the development of maladaptive emotional schemas associated with personality formation.

Future research should aim to include female participants and account for variability in correctional settings across different cultural contexts to enhance the generalizability of findings. Broadening the scope of the study to encompass these groups would offer a more comprehensive understanding of the relationships among ADHD, criminal behavior, and psychological factors.

6. Conclusions

The research presented is innovative, as it explores the intricate relationships among ADHD, criminality, and other psychological factors within a standardized sample of convicts exhibiting a lower degree of moral degradation. This cohort represents a substantial portion of the Polish prison population. The findings highlight the complex interplay among ADHD severity, criminal behavior, family environment, and psychological characteristics. They underscore the critical role of family support and early intervention in mitigating adverse experiences to reduce the risk of severe ADHD symptoms and associated criminal tendencies.

Clinical interventions should prioritize fostering supportive family environments, addressing maladaptive emotional patterns, and providing comprehensive care for internalizing and externalizing symptoms. Such an approach could help minimize the impact of ADHD on criminal behavior and improve outcomes for affected individuals. Within the context of this research, teaching family members specific skills related to providing support for individuals with ADHD seems particularly important. This is because properly directed support, providing both community and flexibility and allowing for emotional expression, enables the internalization of appropriate coping mechanisms for the future.

When diagnosing adults with hyperactivity traits, it is crucial to adopt a comprehensive approach that considers persistent symptoms across various domains, including relationships and mental health. This understanding would enable the development of tar-

geted interventions to enhance functioning and support individuals in adopting adaptive coping mechanisms for past traumas.

For adults with hyperactivity traits in penitentiary settings, additional support in managing deficits, mental health difficulties, and family and social relationships is crucial. Consequently, it is worthwhile to train prison staff to understand the nature of ADHD and its consequences, as well as the possibilities of providing appropriate support. Simultaneously, it is essential to limit the phenomenon of stigmatization, which could hinder individuals with ADHD from serving their sentences in conditions with a reduced security system. Tailored interventions can empower them to navigate their challenges more effectively and reduce the likelihood of recidivism.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/brainsci15020141/s1>. Supplementary correlation matrices and eigenvectors for analyzed data. Table S1: ADHD eigenvectors; Table S2: CRIME eigenvectors; Table S3: ADHD correlations; Table S4: CRIME Correlations; Table S5: ADHD eigenvectors A; Table S6: CRIME eigenvectors A; Table S7: ADHD correlations A; Table S8, CRIME Correlations A.

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Article

Depression, Anxiety, and Stress Symptoms (DASS-21) in Elderly Women in Association with Health Status (SHSQ-25): A Cross-Sectional Study

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Abstract: Background/Objectives: International studies state that older adults are at an increased risk of mental health symptoms and disorders (depression, anxiety, and stress), especially elderly women aged >65 years. The literature on this topic is scarce, and there is a need for studies that investigate the associations between mental health issues and overall health in elderly women. This study aimed to investigate depression, anxiety, and stress symptoms in elderly women in association with health status. **Methods:** A community-based cross-sectional study was conducted in Klaipeda, Lithuania, in 2020. The survey included elderly women (n = 306) aged 65 to 80 years studying at the Third Age University in Klaipeda city. The DASS-21 and SHSQ-25 scales were used for the survey. Associations and correlations between both scale indicators were calculated. **Results:** Sociodemographic factors such as age, marital status, and place of residence were not statistically significant in terms of mental health, except for women living alone, who had slightly lower levels of depressive symptoms ($p = 0.015$). Mental health issues were quite common; almost half of the participants had higher than normal levels of anxiety (49.0%) and depression (48.4%), and one-third (29.8%) experienced stress. A strong positive correlation was observed between mental health symptoms and physical health, with anxiety having the greatest effect size on fatigue (Cohen's $d = 0.950$, $p < 0.001$), cardiovascular symptoms (Cohen's $d = 0.757$, $p < 0.001$), and mental status (Cohen's $d = 1.036$, $p < 0.001$). Depressive symptoms had a large effect size on fatigue (Cohen's $d = 0.764$, $p < 0.001$) and mental status (Cohen's $d = 0.816$, $p < 0.001$), while stress had a moderate effect size on all health domains. **Conclusions:** The findings highlight that anxiety symptoms are a major contributor to mental health conditions and overall health in elderly women. This study's results emphasise the need for targeted interventions to address mental health challenges in elderly women.

Keywords: elderly women; depression; anxiety; stress; health status

1. Introduction

Globally, there is a continuous trend in life expectancy, with the proportion of people aged over 80 years growing the fastest [1]. The age and life expectancy of the population are increasing, and the number of health disorders and non-communicable diseases, as well as medical, social, and economic problems, is also increasing. The growth in life expectancy

reflects the positive impact of improved social conditions and applied health policies. However, despite living longer, most people are ill or live with a disability for a long time in old age [2]. Cognitive and psychosocial changes are common in older people. As people age, they experience sensory impairment, cognitive decline, frailty, cardiovascular problems, difficulty with daily activities, and an increased risk of falls. These problems are especially common after the age of 85 [3,4]. The health status of older adults is influenced by not only physiological but also social factors, such as loneliness and social isolation [5]. Loneliness has been shown to be particularly important for mental health conditions in the elderly [5,6].

Depression, anxiety, and stress symptoms are the most common mental health problems in older age [7]. Late-life depression is characterised by depressive symptoms in the elderly, associated with mental and physical health challenges. Depressive symptoms are common in older adults with chronic non-communicable diseases. In this case, the functions of older adults are impaired. Depressive symptoms contribute to cognitive decline and are associated with low self-esteem, a loss of interest in daily activities, insomnia, and suicide in the elderly [4,8–10]. Depression in an aging population causes somatic symptoms, emotional disturbances, social withdrawal, concentration difficulties, psychomotor retardation, anhedonia, and a loss of energy [11–13].

Anxiety in the elderly manifests as fear that occurs when facing a possible threat or unknown situation. This is a normal reaction when faced with danger; however, if it is overwhelming or the feeling persists, then it can manifest as an anxiety disorder. Anxiety disorders negatively affect quality of life [14,15]. Stress in the elderly is characterised by manifestations in the cognitive and emotional scopes [16]. It affects concentration, memory, social relationships, and sleep [12,17–20].

An estimated 3.8% of the population experiences depression, including 5% of adults (4% of men and 6% of women) and 5.7% of adults older than 60 years. Approximately 280 million people worldwide have depression. Depressive symptoms are present in about one-third of elderly people. According to studies, with increasing age, the course of depression worsens [1,21]. A review analysing studies from 34 countries revealed that the prevalence of depression and anxiety among the elderly could reach up to 19.2%, emphasising the need for enhanced mental health care in this group [22]. Special attention needs to be paid to the increasing prevalence of depression in the elderly, as early detection and early interventions could promote their health and improve their well-being [23]. Depression can cause physical health problems in the elderly, often originating from loneliness. Depressed individuals show poorer health-related behaviours, a risk of cardiovascular disease, and higher levels of inflammatory markers [24].

Previous studies have found that elderly women are at a greater risk of depression than men [4,25–28]. In a review of 85 studies conducted on all continents, except for Antarctica, strong empirical evidence was found for gender differences in depression among older adults aged 60 or above. Older women scored higher than older men in dimensional measures of depressive symptoms, and older women had higher diagnosis rates of unipolar depression than older men. This pattern was observed in 69 (81%) of the 85 studies [25]. Older women are more vulnerable to negative life events, rumination, and hormonal changes, and they are more affected by psychosocial factors, such as widowhood, living alone, illness, cognitive decline, financial comfort, and caregiving [22,25].

Older adults can suffer from anxiety related to aging. While anxiety is a common experience for everyone, individuals with anxiety disorders often feel intense disproportionate fear and worry accompanied by physical tension and cognitive or behavioural symptoms. These symptoms are difficult to control. If untreated, they can interfere with daily activities, affecting family, social, academic, or work life. It is estimated that approximately 4%

of the global population suffers from anxiety disorders. A survey showed that, in 2019, 301 million people worldwide had anxiety disorders, making them the most prevalent mental health issue [29]. Despite effective treatments, only about one in four (27.6%) people suffering from anxiety and requiring treatment receive it. The main barrier to receiving professional support is a lack of information about possible treatments, low awareness, insufficient investment in mental health services, a lack of trained healthcare providers, and social stigma. Some authors call for the need to improve the identification and treatment of anxiety disorders [21,30].

In elderly people, depression and anxiety not only impair mental health but also have a significant impact on physical health. Anxiety and depression, especially their comorbidities, should be managed in elderly people, given their long-term impact on physical disorders and disability. Anxiety and depression are associated with heart disease, hypertension, asthma, vision disorders, persistent cough, gastrointestinal problems, and sleep disturbances [31–33].

Factors such as spousal death, widowhood, divorce, loneliness, serious spousal and family member health or behavioural problems, job loss, and financial difficulties can trigger significant stress in elderly individuals. The psychological effect of a death may be a potential factor in the development of chronic stress. In addition, stress may be followed by cognitive decline [18,34–36]. Severe and prolonged stress can lead to health problems in elderly individuals. Chronic stress may increase the likelihood of other illnesses and lead to various health complications. Attention should be paid to the harmful effects of stress due to their role in various pathological conditions and diseases. Long-term stress impairs cognitive abilities and is associated with fatigue, emotional disorders, anxiety, and depression [19,20,37–39]. Studies examining older adults revealed that stress reduces efforts to be physically active [40].

Chronic non-communicable diseases, long-term treatment, and cognitive decline increase emotional suffering and depression in older people [23]. International studies show that stress and depression need to be consistently investigated because they can cause additional health problems, especially in elderly women who are prone to mental health disorders [22,25,40]. Early identification and targeted intervention to reduce stress and depression could expand prevention possibilities and contribute to the promotion of health and the prevention of chronic diseases [23,41–44]. It is crucial to investigate mental health disorders (for instance, depression, anxiety, and stress) and overall health, as well as the associations between them.

The aim of this study was to investigate depression, anxiety, and stress symptoms in elderly women in association with health status.

2. Materials and Methods

2.1. Study Design and Participants

A community-based cross-sectional study was conducted in 2020 in Klaipeda, Lithuania. Elderly people at the Third Age University in Klaipeda ($n = 500$), aged 65 years or over, were invited to participate in a survey (Figure 1).

Criteria-based sampling was used. Respondents met the following criteria:

Inclusion criteria:

- Female;
- 65–80 years old;
- Attending the Third Age University in Klaipeda;
- Correctly filled out forms.

Exclusion criteria:

- Male;
- Age less than 65 or over 80 years;
- Incorrectly filled out forms.

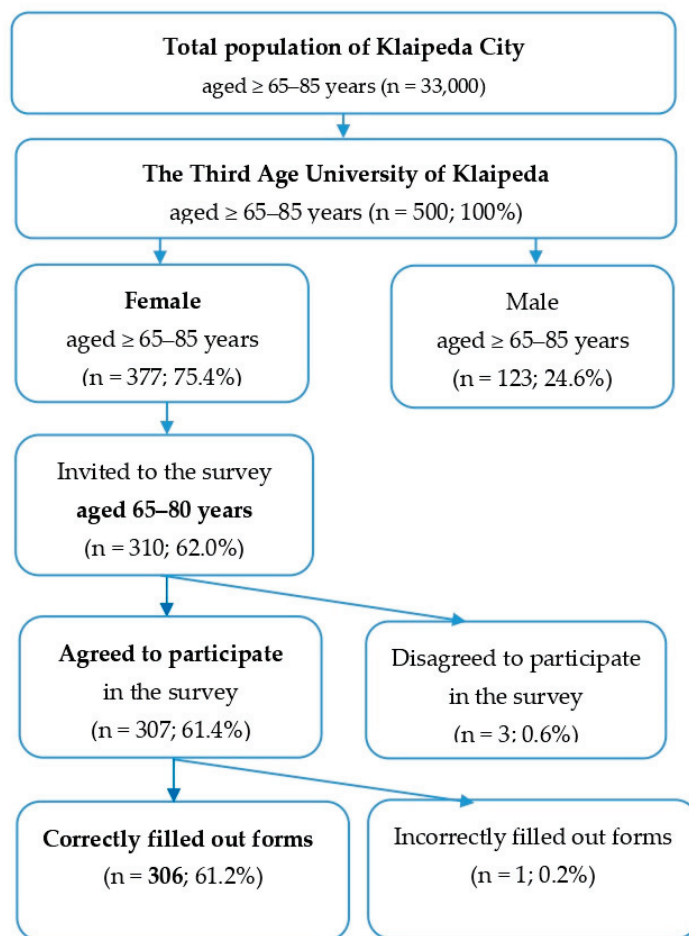


Figure 1. Flowchart of the study participants.

The male group was excluded from the study due to the small number of participants (n = 123) (it would be incorrect to draw any conclusions from a gender perspective with unequal sample groups of respondents). Elderly women (n = 306) participated in the study. Our respondents were non-clinical participants; they were students at the Third Age University in Klaipeda.

2.2. Study Variables

The sociodemographic characteristics of the sample are presented in Table 1. The elderly women (n = 306) were divided into three groups: 65–70 years (n = 155), 71–75 years (n = 93), and 76–80 years or over (n = 56) (Table 1).

The participants were divided into four groups according to marital status: single, married/in partnership, divorced, and widowed. The majority of the respondents were widowed (44.8%, n = 137) or married/in partnership (38.2%, n = 117). The respondents were divided into two groups according to residential status: living alone and not living alone (living with a spouse, partner, children, etc.).

Table 1. Sociodemographic characteristics.

Variables	Categories	Number	Percentage
Age	65–70	155	51.0
	71–75	93	36.0
	76–80	56	18.4
Marital status	Single	15	4.9
	Married/in partnership	117	38.2
	Divorced	37	12.1
	Widowed	137	44.8
Residence status	Living alone	189	61.8
	Not living alone	117	38.2
Total	Female	306	100

2.3. Measurement Tools

Two questionnaires (DASS-21 and SHSQ-25) were used in this study.

DASS-21

DASS-21—the Depression Anxiety Stress Scale—was used to assess the severity of the core symptoms of depression, anxiety (symptoms of psychological arousal), and stress (more cognitive and subjective symptoms of anxiety). The DASS-21 consists of 21 items and is a short version of the 42-item DASS (DASS-42) [45–48]. This tool was used to measure depression, anxiety, and stress symptoms in elderly women for several reasons: the measure is short, understandable, and easy to use, and it allows for a quick assessment of mental health parameters. The DASS-21 was used to quickly detect potential risks of depression, anxiety, and stress so that elderly women could receive primary psychological support. It did not assess the presence or absence of depression or anxiety. Furthermore, it was not used to clinically diagnose depression or anxiety, but rather to investigate mental and emotional states.

The DASS-21 Lithuanian version has sufficient reliability and, thus, can be used for the Lithuanian population [49,50]. The use of the DASS-21 methodology complies with the requirements of the International and Lithuanian Test Use Regulations [51,52] and professional (medical/psychological) ethics. The individuals who participated in this survey were informed about where and how to receive professional psychological support when necessary.

The development of the DASS-21 was based on differences in the levels of depression, anxiety, and stress symptoms experienced by individuals with normal or more affected levels.

- The depression scale assesses dysphoria, anhedonia, hopelessness, self-deprecation, and a lack of interest and involvement in life, coupled with an overall devaluation of life.
- The anxiety scale assesses autonomic arousal, situational anxiety, and subjective feelings of anxiety.
- The stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulties in relaxing; nervous arousal; and being easily upset/agitated, irritable/over-reactive, and impatient.

Using a Likert scale, respondents rate each question from 0 to 3 points:

0—Did not apply to me at all (never).

1—Applied to me to some degree or some of the time (sometimes).

2—Applied to me to a considerable degree or a good part of the time (often).

3—Applied to me very much or most of the time (almost always).

Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. Scores for depression, anxiety, and stress are calculated by summing the scores for the relevant items [53]:

D (depression)—3, 5, 10, 13, 16, 17, and 21.

A (anxiety)—2, 4, 7, 9, 15, 19, and 20.

S (stress)—1, 6, 8, 11, 12, 14, and 18.

To calculate the final score, the DASS-21 scores need to be multiplied by 2. The evaluation score for depression, anxiety, and stress symptoms is divided into 5 levels: normal, mild, moderate, severe, and extremely severe. The severity labels describe the full range of scores in the population. For example, “mild” means that the person is above average, but probably still below the typical severity of someone seeking support [45].

“Normal” is defined as D: 0–9, A: 0–7, S: 0–14.

“Mild” severity is defined as D: 10–13, A: 8–9, S: 15–18.

“Moderate” severity is defined as D: 14–20, A: 10–14, S: 19–25.

“Severe” is defined as D: 21–27, A: 15–19, S: 26–33

“Extremely severe” is defined as D: 28+, A: 20+, S: 34+.

The DASS-21 scores need to be multiplied by 2 to calculate the final score [53].

SHSQ-25

The SHS (suboptimal health status) score was derived from the data collected from the SHSQ-25. The SHSQ-25 includes 25 items on SHS and targets physiological and psychological SHS; it is a reliable and valid instrument for measuring sub-health status [43].

The SHSQ-25 is short and easy to complete; therefore, it is an instrument suitable for use in large-scale studies of the general population. The self-rated questionnaire asks respondents to rate a specific statement on a five-point Likert-type scale based on how often they suffered from specific health complaints in the preceding three months: (1) never or almost never, (2) occasionally, (3) often, (4) very often, and (5) always. The SHSQ-25 highlights the multidimensionality of SHS by encompassing the following domains: (1) fatigue (9 questions: 1–6 and 8–10), (2) the cardiovascular system (3 questions: 11–13), (3) the digestive tract (3 questions: 14–16), (4) the immune system (3 questions: 7, 17, and 25), and (5) mental status (7 questions: 18–24) [54].

Rating of the Likert-scale-assigned points: when summing the scores, the Likert scale scores are converted from 0 to 4 points: 1—0; 2—1; 3—2; 4—3; and 5—4.

The SHSQ-25 score ranges from 0 to 100 points: 0 points indicate the lowest level of health (good health), and 100 points indicate the highest level of health (poor health). The SHS score is calculated by summing the scores for all questions, yielding a total score ranging from 0 to 100 points.

Suboptimal health status is defined as an SHSQ-25 score above 35 points. Scores above 35 indicate SHS, and higher scores represent more severe SHS. The higher the respondent’s SHSQ-25 score, the more severe their suboptimal health status.

According to this, two groups are distinguished: optimal and suboptimal health status. In our study, the respondents were divided into two groups according to their health status: optimal (less than 35 points) health was found in 92.5% (283) of the respondents, and suboptimal (more than 35 points) health was determined in 7.5% (23) of the respondents.

2.4. Statistical Analysis

To clarify the appropriateness of the presented research methodology and the reliability of the obtained empirical data, as well as to determine the extent to which different variables of the research instrument measure the same phenomenon, Cronbach’s Alpha coefficient was calculated. For the overall DASS-21, Cronbach’s Alpha was 0.889; regarding the subscales, it was 0.711 for depression, 0.715 for anxiety, and 0.762 for stress (Table 2).

Table 2. Cronbach’s Alpha for the DASS-21.

DASS-21			
Depression	Anxiety	Stress	Total
0.711	0.715	0.762	0.889

For the SHSQ-25, Cronbach’s Alpha coefficient was calculated to be 0.829. This indicates a high internal consistency. The SHSQ-25 includes five domains. The internal consistency of the SHSQ-25 subscales was not assessed, as Cronbach’s Alpha can only be calculated when a subscale consists of at least 50 items. A statistical analysis was performed using SPSS V.25 for Windows.

A frequency analysis was used to determine the prevalence of mental disorder symptoms in the population under analysis; this was carried out by splitting the symptoms into individual intervals according to the severity of the selected mental problems. Additionally, a descriptive analysis of central tendency measures (mean $\pm$ standard deviation (SD)) was used to obtain the gross scores of the data under analysis.

The normality of the variable distribution was tested using the Kolmogorov–Smirnov(a) test [55]. This showed that the data were not normally distributed. Student’s *t*-test (for equal variances) was used to assess the differences between the two categories.

Cohen’s *d* (*d*) effect size was also estimated for a better comparison of the effect size in identifying the branches of the research [56]. To estimate the effect size, we applied the norms according to which Cohen’s *d* and Hedges’ *g* effect sizes are interpreted: Cohen’s *d* and Hedges’ *g* = 0.15—small, 0.40—medium, and 0.75—large effects in gerontology [57]. In cases where the effect size was estimated between different sample sizes, Hedges’ effect was taken into account.

To assess the relationships between the DASS-21 and SHSQ-25 subscales, Pearson’s correlation was calculated. A larger coefficient absolute value described a stronger relationship between the variables in contingency tables. The strength of the correlation was categorised as follows: negligible (0.00–0.10), weak (0.10–0.39), moderate (0.40–0.69), strong (0.70–0.89), and very strong (0.90–1.00) [55,58].

The Kruskal–Wallis statistical criterion was applied when it was necessary to assess the statistical differences between three or more groups (according to age and marital status groups), and the Mann–Whitney criterion was applied when the statistical differences between two groups (according to residential status) were assessed.

All differences were considered statistically significant at a critical level of $p < 0.05$.

3. Results

3.1. DASS-21 Scores

The mean scores for depression, anxiety, and stress symptoms are the main measures of mental health status in elderly women. The means and standard deviations of the DASS-21 scores are presented in Table 3 according to sociodemographic factors. The data include the depression (D), anxiety (A), and stress (S) scores and the total DASS-21 score. The mean depression score for the examined women was 9.85 ± 6.67 , the anxiety score was 9.98 ± 6.97 , the stress score was 12.11 ± 7.19 , and the total DASS-21 score was 16.00 ± 9.42 (Table 3).

Age

The Kruskal–Wallis test results show no statistically significant differences in the depression, anxiety, or stress scores across the age groups ($p > 0.05$ for all comparisons). The mean depressive symptom scores were 9.76 (65–70 years), 9.84 (71–75 years), and 10.10 (76–80 years), with no significant age-related differences ($H(2) = 0.522$, $p = 0.770$).

The anxiety scores also showed minimal differences across the age groups, although they tended to increase with age: 9.71 (65–70 years), 10.04 (71–75 years), and 10.75 (76–80 years) ($H(2) = 1.247, p = 0.536$). The stress scores were similarly consistent across the age groups: the means for the three age groups were 11.98, 11.69, and 12.92, with no statistically significant difference ($H(2) = 0.520, p = 0.771$). The lack of statistically significant age-related differences suggests that age is not significant in terms of depressive symptoms, anxiety symptoms, or stress levels in the elderly women group.

Table 3. Comparison of DASS-21 total and subscale scores according to sociodemographic characteristics.

Variables	Depression Mean (SD)	Anxiety Mean (SD)	Stress Mean (SD)	Total
Age				
65–70	9.76 ± 7.22	9.71 ± 7.39	11.98 ± 7.39	15.75 ± 10.03
71–75	9.84 ± 5.86	10.04 ± 6.00	11.69 ± 6.48	15.79 ± 8.01
76–80	10.10 ± 6.53	10.75 ± 7.44	12.92 ± 7.79	16.96 ± 10.10
Kruskal–Wallis	$H(2) = 0.522$ $p = 0.770$	$H(2) = 1.247$ $p = 0.536$	$H(2) = 0.520$ $p = 0.771$	$H(2) = 0.440$ $p = 0.803$
Marital status				
Single	8.13 ± 5.62	9.46 ± 5.52	10.66 ± 6.53	14.13 ± 8.06
Married/in partnership	10.46 ± 5.47	10.39 ± 5.68	12.25 ± 5.95	16.58 ± 7.39
Divorced	9.42 ± 7.16	9.72 ± 7.87	12.17 ± 7.78	15.69 ± 10.44
Widowed	10.27 ± 8.40	9.89 ± 7.83	12.00 ± 8.79	16.08 ± 11.67
Kruskal–Wallis	$H(3) = 6.621$ $p = 0.085$	$H(3) = 3.493$ $p = 0.322$	$H(3) = 1.722$ $p = 0.632$	$H(3) = 3.888$ $p = 0.274$
Residential status				
Living alone	9.48 ± 7.30	9.73 ± 7.67	12.02 ± 7.87	15.64 ± 10.49
Living not alone	10.46 ± 5.47	10.39 ± 5.68	12.25 ± 5.95	16.58 ± 7.39
Mann–Whitney U ¹	$z = -2.429, r = 0.138$ $p = 0.015$	$z = -1.849$ $p = 0.064$	$z = -1.064$ $p = 0.287$	$z = -1.90$ $p = 0.057$
Total	9.85 ± 6.67	9.98 ± 6.97	12.11 ± 7.19	16.00 ± 9.42

¹ In cases where a statistically significant difference ($p < 0.05$) was determined, the effect size r was calculated.

Marital status

Marital status revealed differences in the mean scores for the DASS-21 indicators, although none were statistically significant. The depressive symptom scores ranged from 8.13 (single) to 10.46 (married/in partnership), but the differences were not significant ($H(3) = 6.621, p = 0.085$). The anxiety symptom scores showed small differences according to marital status, with a mean ranging from 9.46 to 10.39 ($H(3) = 3.493, p = 0.322$).

The stress scores varied slightly across the marital categories (10.66–12.25) and had no significant effect ($H(3) = 1.722, p = 0.632$). It was observed that the married/in partnership participants tended to have slightly higher depression and stress scores than the other groups.

Residential status

The Mann–Whitney U test revealed a statistically significant difference in the depression scores between those living alone and those not living alone ($z = -2.429, p = 0.015$). Women living alone had slightly lower depression scores (9.48 ± 7.30) than those not living alone (10.46 ± 5.47). However, the anxiety and stress scores did not differ much by residential status: the anxiety scores ranged from 9.73 ± 7.63 to 10.39 ± 5.68 ($z = -1.849, p = 0.064$), and the stress scores ranged from 12.02 ± 7.87 to 12.25 ± 5.95 ($z = -1.064, p = 0.287$).

The results in Figure 2 show the distribution of the research participants across five severity categories—normal, mild, moderate, severe, and extremely severe—offering a

detailed view of mental health states. The severity ratings of depression, anxiety, and stress symptoms in elderly women are presented as percentages (Figure 2).

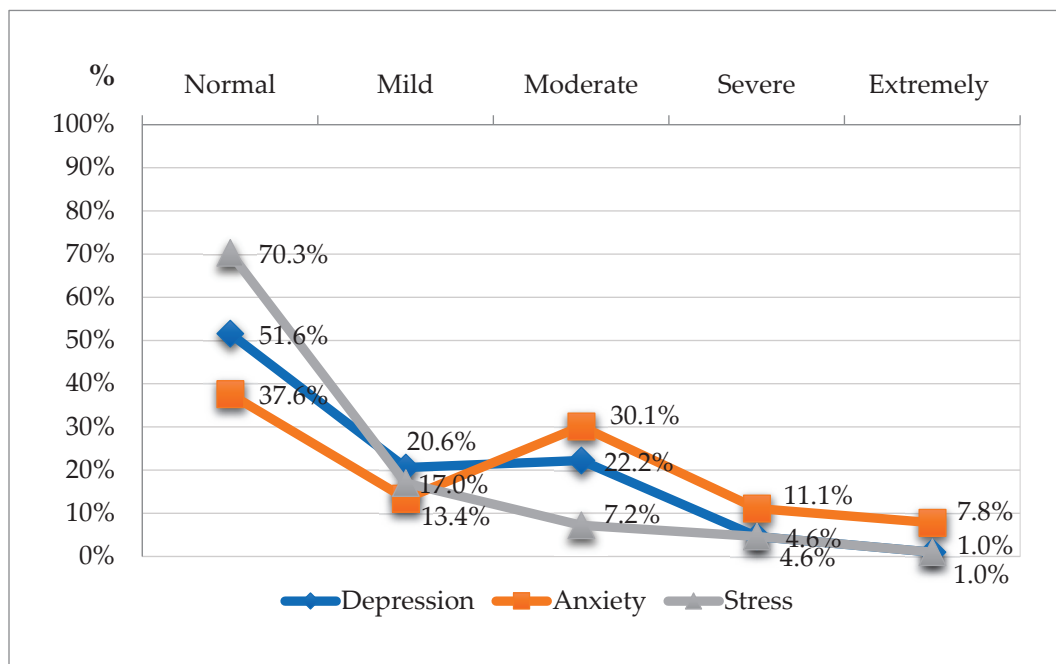


Figure 2. DASS-21 subscale severity ratings.

Depression

By analysing the severity of depressive symptoms, it was determined that over half of the participants (51.6%, $n = 158$) fell within the normal range of depression, indicating no clinical symptoms. Approximately 20.6% ($n = 63$) exhibited mild depressive symptoms. Quite a large proportion—about one-fifth of the respondents (22.2%, $n = 68$)—fell within the moderate category, showing more prominent depressive symptoms. Severe depressive symptoms were observed in 4.6% ($n = 14$), and extremely severe depressive symptoms were observed in 1.0% ($n = 3$).

Anxiety

The percentage distribution of anxiety severity showed that 37.6% of the participants ($n = 115$) fell into the normal anxiety range, and mild anxiety symptoms were reported by 13.4% ($n = 41$). Almost one-third (30.1% ($n = 92$)) of the respondents were classified within the moderate anxiety range, indicating considerable anxiety prevalence within this sample of elderly women. Severe anxiety symptoms were observed in 11.1% ($n = 34$), while 7.8% ($n = 24$) fell within the extremely severe category.

Stress

A stress scores analysis showed that the majority of the participants (70.3% ($n = 215$)) reported normal levels of stress. Mild stress was reported by 17.0% ($n = 52$), indicating that a small group experienced low-level stress. Only 7.2% ($n = 22$) exhibited moderate stress, 4.6% ($n = 14$) exhibited severe stress, and 1.0% ($n = 3$) exhibited extremely severe stress.

3.2. SHSQ-25 Scores

The SHSQ-25 total and subscale scores are presented in Table 4 according to sociodemographic characteristics, as well as the health status scores of the elderly women. The data include the means and standard deviations of the SHSQ-25 scores, which were analysed according to sociodemographic factors (Table 4).

Table 4. Comparison of SHSQ-25 total and subscale scores according to sociodemographic characteristics.

Variables	Fatigue Mean (SD)	Cardiovascular System Mean (SD)	Digestive System Mean (SD)	Immune System Mean (SD)	Mental Status Mean (SD)	Total
Age						
65–70	8.90 ± 4.25	1.93 ± 1.88	1.81 ± 1.53	2.29 ± 1.64	7.49 ± 3.67	22.42 ± 9.26
71–75	8.07 ± 4.07	1.87 ± 1.68	1.70 ± 1.55	2.25 ± 1.66	7.35 ± 3.88	21.25 ± 9.38
76–80	8.66 ± 4.00	1.95 ± 1.66	1.64 ± 1.31	2.55 ± 1.45	7.28 ± 3.54	22.09 ± 8.05
Kruskal–Wallis	$H(2) = 1.448$ $p = 0.485$	$H(2) = 0.113$ $p = 0.945$	$H(2) = 0.169$ $p = 0.919$	$H(2) = 3.953$ $p = 0.139$	$H(2) = 0.130$ $p = 0.937$	$H(2) = 1.631$ $p = 0.442$
Marital status						
Single	8.27 ± 4.33	2.33 ± 2.35	1.40 ± 1.12	1.80 ± 1.32	6.47 ± 4.14	20.27 ± 9.90
Married/in partnership	8.83 ± 3.87	1.98 ± 1.98	1.80 ± 1.48	2.30 ± 1.47	7.72 ± 3.30	22.63 ± 8.24
Divorced	8.05 ± 4.46	2.22 ± 1.38	1.81 ± 1.76	2.35 ± 1.62	8.10 ± 4.12	22.54 ± 9.86
Widowed	8.55 ± 4.31	1.72 ± 1.58	1.72 ± 1.47	2.39 ± 1.76	7.08 ± 3.80	21.45 ± 9.43
Kruskal–Wallis	$H(2) = 0.625$ $p = 0.732$	$H(2) = 4.784$ $p = 0.091$	$H(2) = 0.488$ $p = 0.784$	$H(2) = 1.150$ $p = 0.563$	$H(2) = 2.126$ $p = 0.346$	$H(2) = 0.318$ $p = 0.853$
Residential status						
Living alone	8.43 ± 4.32	1.86 ± 1.63	1.71 ± 1.50	2.33 ± 1.70	7.23 ± 3.90	21.57 ± 9.52
Living not alone	8.82 ± 3.87	1.98 ± 1.98	1.80 ± 1.48	1.30 ± 1.47	7.72 ± 3.30	22.63 ± 8.25
Mann–Whitney U	$z = -1.137$ $p = 0.256$	$z = -0.014$ $p = 0.989$	$z = -0.634$ $p = 0.526$	$z = -0.010$ $p = 0.992$	$z = -1.256$ $p = 0.209$	$z = -0.998$ $p = 0.318$
Total	8.58 ± 4.15	1.91 ± 1.77	1.75 ± 1.49	2.32 ± 1.62	7.42 ± 3.69	21.98 ± 9.05

Sex

The elderly women were found to have a fatigue score of 8.58 ± 4.15 , a cardiovascular score of 1.91 ± 1.77 , a digestive system score of 1.75 ± 1.49 , an immune system score of 2.32 ± 1.62 , a mental status score of 7.42 ± 3.69 , and a total health SHSQ-25 score of 21.98 ± 9.05 .

Age

The Kruskal–Wallis test results showed no statistically significant differences in any of the SHSQ-25 subscales or the total score between the age groups (65–70, 71–75, and 76–80). This suggests that age does not play a significant role in differentiating health status in this sample. Fatigue estimates differed slightly between the age groups: 65–70 years—8.89, 71–75 years—8.07, and 76–80 years—8.66. However, this was not statistically significant ($H(2) = 1.448$, $p = 0.485$). The scores for the cardiovascular, digestive, immune, and mental systems remained similar and differed statistically insignificantly ($p > 0.05$). The total health scores according to age group ranged from 21.25 ± 9.38 to 22.42 ± 9.26 ; however, no statistically significant differences were found between the age groups ($H(2) = 1.631$, $p = 0.442$).

Marital status

Marital status had no significant effect on the SHSQ-25 domains or on the total score: the fatigue scores ranged from 8.05 (divorced) to 8.83 (married/in partnership), with no significant differences ($H(2) = 0.625$, $p = 0.732$). The scores for the cardiovascular, digestive, immune, and mental systems were similar and did not differ statistically significantly by marital status ($p > 0.05$). The overall health score varied minimally from 20.27 ± 9.90 (single) to 22.63 ± 8.24 (married/in partnership), indicating no significant differences ($H(2) = 0.318$, $p = 0.853$).

Residential status

There were no statistically significant differences in any of the SHSQ-25 domains or the total health score between those who lived alone and those who did not live alone. On all subscales, except for the immune system, the scores for the health indicator “not living alone” were slightly higher than those for “living alone”, but the difference was not significant ($p > 0.05$). The fatigue scores of 8.43 ± 4.32 (living alone) and 8.82 ± 3.87 (living not alone) ($z = -1.137$, $p = 0.256$) and the total scores of 21.57 ± 9.52 and 22.63 ± 8.25 were similar and not statistically significant ($p > 0.05$) (Table 4).

In all health status areas, statistically significant differences and large effect sizes were found between the optimal and suboptimal health groups. The key indicators are discussed below. The mean fatigue score for the participants in optimal health was 8.04 ± 3.74 , while that for the participants in suboptimal health was significantly higher at 15.21 ± 3.08 ($t = -8.940$, $p < 0.001$), with a large effect size (Hedges’ $g = 1.930$). The mean cardiovascular score for the optimal health group was 1.67 ± 1.44 lower than that for the suboptimal group at 4.82 ± 2.67 , but the difference was statistically significant ($t = -5.592$, $p < 0.001$), and the effect size was large (Hedges’ $g = 2.01$). The total optimal health score (20.52 ± 7.68) was lower than the suboptimal health score (39.83 ± 4.55), indicating a significant difference in overall health ($t = -18.334$, $p < 0.001$) and the largest effect size (Hedges’ $g = 2.575$) (Table 5).

Table 5. Health status domains in study groups.

Health Status Domain	Optimal (n = 283) Mean (SD)	Suboptimal (n = 23) Mean (SD)	t	p	Effect Size Hedges’ g
Fatigue	8.04 ± 3.74	15.21 ± 3.08	-8.940	0.000	1.930
Cardiovascular System	1.67 ± 1.44	4.82 ± 2.67	-5.592	0.000	2.01
Digestive System	1.60 ± 1.35	3.56 ± 1.87	-6.463	0.000	1.405
Immune System	2.13 ± 1.41	4.56 ± 2.23	-5.132	0.000	1.634
Mental Status	7.07 ± 3.53	11.65 ± 2.79	-6.050	0.000	1.315
Total	20.52 ± 7.68	39.83 ± 4.55	-18.334	0.000	2.575

Cohen’s d or Hedges’ g = 0.15, 0.40, and 0.75 used to interpret small, medium, and large effects in gerontology (by Brydges, 2019) [57].

Tables 6–8 present the SHSQ-25 scores related to depression, anxiety, and stress. This allows for an evaluation of the associations between the SHSQ-25 health domains and the severity of depression, anxiety, and stress symptoms as measured by the DASS-21. These results provide a nuanced understanding of how mental health conditions influence physical health and psychological well-being in elderly women.

Table 6. Comparison of the SHSQ-25 domain scores between the non-depression and depression groups.

Severity	Non-Depression n = 158 (51.6%)	Depression n = 148 (48.4%)	t	p	Effect Size Cohen’s d
Fatigue	7.14 ± 3.71	10.11 ± 4.06	-6.682	< 0.000	0.764
Cardiovascular System	1.53 ± 1.50	2.31 ± 1.94	-3.935	< 0.000	0.449
Digestive System	1.56 ± 1.40	1.95 ± 1.56	-2.334	< 0.020	0.263
Immune System	1.83 ± 1.33	2.84 ± 1.73	-5.777	< 0.000	0.655
Mental Status	6.07 ± 3.40	8.86 ± 3.44	-7.129	< 0.000	0.816
Total	18.13 ± 18.26	26.08 ± 8.02	-8.528	< 0.000	0.564

Cohen’s d or Hedges’ g = 0.15, 0.40, and 0.75 used to interpret small, medium, and large effects in gerontology (by Brydges, 2019) [57].

Table 7. Comparison of the SHSQ-25 domain scores between the non-anxiety and anxiety groups.

Severity	Non-Anxiety n = 115 (37.6%)	Anxiety n = 191 (62.4%)	t	p	Effect Size Cohen's d
Fatigue	6.50 ± 3.52	10.11 ± 4.06	−7.357	<0.000	0.950
Cardiovascular System	1.15 ± 1.33	2.37 ± 1.85	−6.172	<0.000	0.757
Digestive System	1.28 ± 1.19	2.03 ± 1.59	−4.404	<0.000	0.534
Immune System	1.74 ± 1.22	2.67 ± 1.72	−5.075	<0.000	0.624
Mental Status	5.31 ± 3.05	8.69 ± 3.46	−8.632	<0.000	1.036
Total	15.98 ± 7.48	25.58 ± 7.95	−10.463	<0.000	1.244

Cohen's d or Hedges' g = 0.15, 0.40, and 0.75 used to interpret small, medium, and large effects in gerontology (by Brydges, 2019) [57].

Table 8. Comparison of the SHSQ-25 domain scores between the non-stress and stress groups.

Severity	Non-Stress n = 215 (70.3%)	Stress n = 91 (29.7%)	t	p	Effect Size Hedges' g
Fatigue	7.87 ± 4.00	10.25 ± 4.04	−4.737	<0.000	0.593
Cardiovascular System	1.70 ± 1.52	2.40 ± 2.19	−3.175	<0.000	0.400
Digestive System	1.53 ± 1.40	2.25 ± 1.59	−3.936	<0.000	0.494
Immune System	2.19 ± 1.48	2.62 ± 1.89	−2.090	<0.000	0.267
Mental Status	6.74 ± 3.64	9.02 ± 3.29	−5.152	<0.000	0.644
Total	20.05 ± 8.66	26.54 ± 8.33	−6.060	<0.000	0.758

Cohen's d or Hedges' g = 0.15, 0.40, and 0.75 used to interpret small, medium, and large effects in gerontology (by Brydges, 2019) [57].

The mental status scores were significantly higher in the depression group (8.86 ± 3.44) than in the non-depression group (6.07 ± 3.40), leading to a very large effect size (Cohen's $d = 0.816$, $p < 0.001$) (Table 6).

Similarly, the fatigue rates were significantly higher in the depression group (10.11 ± 4.06) than in the non-depression group (7.14 ± 3.71), which was supported by the large effect size (Cohen's $d = 0.764$, $p < 0.001$). A similar trend prevailed in terms of the immune system, in that depressive symptoms were associated with a higher number of immune symptoms (2.84 ± 1.73 vs. 1.83 ± 1.33), resulting in a medium effect size (Cohen's $d = 0.655$, $p < 0.001$). The effect size for the cardiovascular system was medium but slightly lower (Cohen's $d = 0.449$, $p < 0.001$), while the effect size for the digestive system was the smallest (Cohen's $d = 0.263$, $p < 0.001$) (Table 6).

The results of the SHSQ-25 domains in the anxiety and non-anxiety groups show that anxiety has a pronounced effect on all health domains. The overall result shows that the anxiety group had a significantly higher total score (25.58 ± 7.95) than the non-anxiety group (15.98 ± 7.48), with a very large effect size (Cohen's $d = 1.244$, $p < 0.001$). Mental health symptoms were significantly higher in the anxiety group (8.69 ± 3.46) than in the non-anxiety group (5.31 ± 3.05), and the effect size was large (Cohen's $d = 1.036$, $p < 0.001$). Anxiety appeared to correlate strongly with fatigue, with the anxiety group scoring significantly higher (10.11 ± 4.06) than the non-anxiety group (6.50 ± 3.52), as well as having a large effect size (Cohen's $d = 0.950$, $p < 0.001$). A similar trend in cardiovascular symptoms was observed: the women in the anxiety group had a higher prevalence (2.37 ± 1.85) of these symptoms than the women in the non-anxiety group (1.15 ± 1.33), resulting in a large effect size (Cohen's $d = 0.757$, $p < 0.001$). The other effect sizes were medium: concerning the immune system, the women in the anxiety group had higher (2.67 ± 1.72)

scores than the women in the non-anxiety group (1.74 ± 1.22), with a moderate effect size (Cohen's $d = 0.624$, $p < 0.001$). The digestive system symptoms were higher in the anxiety group (2.03 ± 1.59) than in the non-anxiety group (1.28 ± 1.19), with a moderate effect size (Cohen's $d = 0.534$, $p < 0.001$) (Table 7).

The results of the SHSQ-25 domains in the stress and non-stress groups show that stress has a smaller effect on all health domains such as depression and anxiety. It was found that stress significantly increased fatigue in women, as indicated by the stress group scoring higher (10.25 ± 4.04) in this area than the non-stress group (7.87 ± 4.00), with a medium effect size (Hedges' $g = 0.593$, $p < 0.001$) (Table 8).

The stress group was also found to be significantly worse in terms of mental state (9.02 ± 3.29) than the non-stress group (6.74 ± 3.64), which resulted in a medium effect size (Hedges' $g = 0.644$, $p < 0.001$). The results show that digestive symptoms were significantly increased in the stress group (2.25 ± 1.59) compared with in the non-stress group (1.53 ± 1.40), with a medium effect size (Hedges' $g = 0.494$, $p < 0.001$). The total SHSQ-25 score was higher in the stress group (26.54 ± 8.33) than in the non-stress group (20.05 ± 8.66), resulting in a large effect size (Hedges' $g = 0.758$, $p < 0.001$).

The other effect sizes were small: cardiovascular system disorders caused by stress correlated with higher cardiovascular scores (2.40 ± 2.19 vs. 1.70 ± 1.52), evaluated as a small effect size (Hedges' $g = 0.401$, $p < 0.001$). The immune system problems associated with stress showed a small effect size on immune system scores (2.62 ± 1.89 vs. 2.19 ± 1.48) (Hedges' $g = 0.267$, $p < 0.001$) (Table 8).

3.3. Correlations Between DASS-21 and SHSQ-25

A correlation analysis was conducted, and it revealed important insights into the relationships between the DASS-21 (Depression, Anxiety, and Stress Scale) and SHSQ-25 (Health Status Questionnaire) subscales among elderly women (Table 9).

Depression correlations

An analysis of the correlation coefficients indicated that the depressive symptoms in the elderly women were moderately related ($r = 0.436$, $p < 0.01$) to fatigue and demonstrated a moderate relationship ($r = 0.448$, $p < 0.001$) with mental status, which suggests a significant link between depressive symptoms and perceived mental well-being (Table 9). Depressive symptoms also moderately correlated ($r = 0.304$, $p < 0.01$) with immune health, indicating a potential connection between them, though this relationship was weaker than that with the other health indicators. The cardiovascular and digestive system correlations with depressive symptoms were weak ($r = 0.291$ and $r = 0.163$), indicating limited associations (Table 9).

Anxiety correlations

The anxiety and fatigue scores revealed a moderate correlation, with a Spearman correlation coefficient (r) of 0.533, which was statistically significant ($p < 0.01$), indicating a relationship between anxiety and physical exhaustion. Anxiety also strongly positively correlated ($r = 0.521$, moderate) with mental status, emphasising the psychological implications of anxiety ($p < 0.01$). Cardiovascular symptoms were related to anxiety levels with a moderate correlation ($r = 0.430$, $p < 0.001$). The other systems—the immune system ($r = 0.282$) and the digestive system ($r = 0.222$)—exhibited weak correlations, indicating less robust connections to anxiety (Table 9).

Table 9. Spearman correlations between the DASS-21 and SHSQ-25 scales and other characteristics.

	Fatigue	Cardiovascular System	Digestive System	Immune System	Mental Status	Depression	Anxiety	Stress
SHSQ-25 Fatigue								
SHSQ-25 Cardiovascular System	0.349 **							
SHSQ-25 Digestive System	0.301 **	0.239 **						
SHSQ-25 Immune System	0.461 **	0.268 **	0.200 **					
SHSQ-25 Mental Status	0.410 **	0.219 **	0.236 **	0.387 **				
DASS-21 Depression	0.436 **	0.291 **	0.163 **	0.304 **	0.448 **			
DASS-21 Anxiety	0.533 **	0.430 **	0.222 **	0.282 **	0.521 **	0.650 **		
DASS-21 Stress	0.409 **	0.201 **	0.264 **	0.185 **	0.414 **	0.623 **	0.639 **	
Residential Status	−0.065	−0.001	−0.036	−0.001	−0.072	−0.139 *	−0.106	−0.038

** Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level.

Stress correlations

Both mental status and fatigue showed moderate correlations ($r = 0.414$ and $r = 0.409$) with stress, implying that stress is associated with mental state and energy levels. The cardiovascular, digestive, and immune systems demonstrated weak correlations ($r = 0.201$, $r = 0.264$, and $r = 0.185$, respectively) with stress, underscoring a weaker but statistically significant relationship between stress and these systems ($p < 0.01$) (Table 9).

4. Discussion

4.1. Main Findings

In our study, we found that 51.6% of elderly women met the depression norm, 37.6% met the anxiety norm, and 70.3% met the stress norm. This confirms that women who met the norm were characterised by better mental health. The remaining respondents had mental health indicator scores higher than the norm: anxiety was the most common (62.4% in total), followed by depression (48.4% in total) and stress (29.8% in total). Mental health status had a large effect size on fatigue, cardiovascular symptoms, and mental well-being, and a medium effect size on the immune and digestive systems. Anxiety had a large effect size on total health status (the anxiety group had a value of 25.58 ± 7.95 , and the non-anxiety group had a value of 15.98 ± 7.48 , resulting in a very large effect size (Cohen's $d = 1.244$)), as well as on mental status and fatigue. The effect sizes show that depressive symptoms also had a large effect size on mental status and fatigue. Stress had a medium effect size on the above indicators (mental status and fatigue).

Regarding sociodemographic factors, age, marital status, and place of residence did not have statistically significant effects on the prevalence of mental health problems. Women living alone reported slightly lower depressive symptom scores. The participants assigned to the suboptimal health group showed significantly higher SHSQ-25 health status scores in all domains (fatigue, cardiovascular, digestive, immune systems, and mental status).

4.2. The Role of Anxiety in Health Status

The results of our study are consistent with those of global and regional studies showing that elderly women are more likely to experience negative emotional health conditions, such as depression, anxiety, and stress symptoms. Previous work suggests that hormonal changes, life events (e.g., widowhood), and societal expectations increase elderly women's susceptibility to depression and anxiety [25]. This study adds to the scientific literature by linking mental health problems to specific health domains, such as fatigue, cardiovascular, digestive, and immune symptoms and mental status.

Anxiety was the most common mental health disorder, with almost half of the elderly women studied experiencing significant anxiety symptoms. This finding is supported by other studies [30,59,60], indicating that anxiety disorders are common in the older population. Research data show that almost half of the elderly population experiences significant anxiety symptoms [60]. Data from 23 community surveys conducted by World Mental Health (WMH) in 21 countries revealed that 9.8% of 51,547 respondents (response rate = 71.3%) had a 12-month DSM-IV anxiety disorder [30].

We identified a strong association between anxiety and mental state, as well as fatigue, which underscores the interrelationship between psychological distress and physical exhaustion. This is also confirmed by previous research; a specific relationship was identified between psychological anxiety symptoms and SHS (suboptimal health status) [61]. In that study, the authors employed a network analysis to examine the connection between SHS and anxiety symptoms among Chinese residents. “Decreased responsiveness”, “Shortness of breath”, and “Uncontrollable worry” emerged as the central symptoms in the network model. Additionally, “Irritability” and “Exhaustion” functioned as bridge nodes, linking different clusters in the network. This confirms that anxiety can affect various health status domains and the severity of disorders [61].

It is noteworthy that anxiety also showed a moderate association with cardiovascular and immune symptoms, indicating a systemic effect of anxiety on health. Anxiety is an important risk factor for cardiovascular and other common diseases. This is confirmed by other studies demonstrating that anxiety influenced cardiovascular and other common diseases. A previous study found high prevalence rates of depression, anxiety, and stress in cardiac patients [62]. Among cardiovascular patients, the overall prevalence of depression was 31.3% (95% confidence interval: 25.4–38.0%), that of anxiety was 32.9% (95% confidence interval: 21.9–46.6%), and that of stress was 57.7% (95% confidence interval: 45.3–63.3%) [62]. Some studies suggested that anxiety and depressive symptoms were moderately associated with a lower quality of life in people with cardiovascular disorders [63]; therefore, integrating the assessment and treatment of psychological factors into the care of elderly people with cardiovascular system disorders is important. This highlights the benefits of targeted anxiety interventions for the elderly age group [59,63–65].

These findings reveal different patterns of mental health severity in elderly women, with anxiety and depressive symptoms being the most common and severe, followed by stress symptoms to a much lesser degree.

4.3. The Role of Depression in Health Status

The results confirm that depression has broad relationships across all health domains, including a moderate association with fatigue and immune system symptoms. Depression has a systemic negative influence on overall health. However, there is also a reverse relationship: studies on depression in Chinese older adults show that poor health and multiple chronic diseases are risk factors for depression [66]. In addition, a lack of sleep at night may be one of the causes of mental disorders or consequences of previous mental disorders, and these factors may lead to depression [67].

Depressive disorders are common throughout the life course, and depressive symptoms are present in up to one-third of older adults [1]. In a meta-analysis of 42 articles on depression, conducted by other authors, pooled prevalence estimates based on a random-effects model indicated a depression prevalence rate of 19.2% (95% CI: 13.0–27.5%) [7]. Scientific studies suggest that the prevalence of depression is more relevant in women. For example, the overall prevalence of depressive symptoms was higher among Chinese women [68]. Elderly women tend to score higher on depression measures than older men [25,69].

We found that increased depression scores were significantly associated with higher cardiovascular system scores. This is supported by the results of other authors' studies. Depressive symptoms were significantly associated with both physical and psychological health status in patients with heart failure. Thus, depressive symptoms are risk factors for poor health status in patients with heart failure [69]. However, increasing resilience may help to improve the psychological health status of patients with depression and heart failure [69]. It is important to note that scientific research shows that depressive symptoms are common in patients with heart failure and have been associated with increased morbidity and mortality [70,71], as well as impaired health status [72].

Some studies have shown that anxiety and depressive symptoms are moderately associated with poorer quality of life. Therefore, integrating the assessment and treatment of psychological factors into the care of older adults with cardiovascular disorders is important [73]. A study conducted in the U.S. not only confirmed the significant burden of disease for major depressive disorder among the U.S. elderly, but also showed an incremental decrease in quality-adjusted life years with the increasing severity of depressive symptoms, as well as significant losses in quality-adjusted life years due to mild depression [73]. The findings of other studies also indicated that anxiety and depressive symptoms were moderately associated with a lower quality of life. Integrating the routine assessment and treatment of psychological factors into the care of older patients with cardiovascular disorders is important for optimising their overall health outcomes and improving their quality of life [63].

Previous studies found that age did not significantly influence the occurrence of depressive symptoms [68,74], and our findings support these results. Studies have suggested that other factors may also influence the occurrence of depression. The prevalence of depressive symptoms was lower among married older adults than among single elderly individuals (i.e., divorced, unmarried, or widowed) [68]. Our study results show that depressive symptom scores did not statistically significantly differ by marital status (single, married/in partnership, divorced, widowed). However, a statistically significant difference was found according to residential status (living alone, living with others) ($p = 0.015$).

4.4. The Role of Stress in Health Status

Our study revealed that, although stress had a relatively smaller association with health domains than with anxiety and depression, its moderate correlation with fatigue and mental status highlights its importance in elderly women. The results related to stress are consistent with those of [40], emphasising the cumulative effect of life stressors on an aging population.

Previous studies found that approximately half of the elderly had high-intensity stress symptoms, and, in most participants, behaviours that could negatively affect self-care manifested [75]. Studies by other authors demonstrated a lower degree of stress in elderly people in society. A meta-analysis of stress studies (13 articles reviewed) revealed that stress was experienced by 13.9% (95% CI: 5.5–30.9%) of respondents [7].

The authors studied stress symptoms in elderly subjects and the coping strategies that they used, verifying the relationship between these variables, and they found that elderly individuals may experience stress symptoms due to physical, psychological, and social changes during aging [75]. We found that married/in-partnership participants tended to have slightly higher stress scores than other groups (single, widowed, and divorced).

Stress affects all health domains. Our research found that stress significantly increased fatigue in women, as indicated by the stress group scoring higher than the non-stress group. The stress group was also found to be significantly worse in terms of mental state. Studies by other authors found that stress includes stressful life events, depressive symptoms,

and insomnia. Insomnia and stressful life events were the most strongly associated with increased incidence. Some studies showed that stress affects the behaviour and activity of older people [40,76].

4.5. Promotion of Mental Health and Well-Being in the Elderly

The WHO's response to promoting mental health in older people recommends creating a physical and social environment that supports well-being and empowers people to do the things that matter to them. Social activities can significantly improve mental health, life satisfaction, and quality of life, and they can reduce symptoms of depression. Examples of interventions include friendship initiatives, community and support groups, social skills training, creative arts groups, leisure and educational services, and volunteering programmes. The WHO has developed activities to help governments address the mental health needs of older people: *Decade of Healthy Ageing (2021–2030)* (<https://www.who.int/initiatives/decade-of-healthy-ageing>, accessed on 15 December 2024) and the *Comprehensive mental health action plan 2013–2030* (<https://www.who.int/publications/i/item/9789240031029>, accessed on 15 December 2024), *Mental Health Gap Action Programme (mh-GAP)* (<https://www.who.int/teams/mental-health-and-substance-use/treatment-care/mental-health-gap-action-programme>, accessed on 15 December 2024), and the *Living with the times* (<https://interagencystandingcommittee.org/iasc-reference-group-mental-health-and-psychosocial-support-emergency-settings/living-times-mental-health-and-psychosocial-support-toolkit-older-adults-during-covid-19-pandemic>, accessed on 15 December 2024) and psychological interventions have been proposed to address depression, anxiety, and stress [77].

Nowadays, mindfulness-based interventions and mindfulness-based cognitive therapy show a positive effect on depression, anxiety, and stress reduction, and they could also be used in elderly people; in addition, it has been found that animal-assisted interventions (AAIs) reduce the degree of arousal, improve the quality of social interaction, and lift mood. The available results show that AAIs have a positive effect on communication and coping abilities [78,79].

4.6. Limitations

The results related to residential status suggest that living alone may be associated with slightly lower depressive symptom scores in elderly women, which may indicate a beneficial aspect of autonomy or self-reliance. Further investigation is required to determine the reasons for this association.

Although, in our study, the associations between depression, anxiety, and stress in elderly women and marital status were insignificant, these aspects could be analysed in future studies, as our findings contradict those of other authors.

4.7. Future Research

In this study, we limited the sample to women only. However, future studies could examine the prevalence of depression, anxiety, and stress symptoms in the elderly male population aged over 65 years. In order to understand the mental health of the aging population, it is important to study depression, anxiety, and stress symptoms and other mental health indicators in both genders. Future research could include potential confounding factors, such as chronic disease history.

5. Conclusions

This study highlights that elderly women face significant mental health challenges, particularly symptoms of anxiety, depression, and stress, which are closely linked to overall health. Among the elderly women examined, anxiety symptoms emerged as the most

prevalent mental health problem, affecting nearly 49.0% of the respondents, followed by depressive symptoms (48.4%) and stress symptoms (29.8%). An analysis of the results revealed that depression, anxiety, and stress symptoms had a significant association with fatigue, cardiovascular disorders, and mental status, with anxiety symptoms showing the strongest associations. Anxiety symptoms not only had a significant association with physical health and fatigue, but also showed a moderate association with cardiovascular and immune disorders. Depressive symptoms also exhibited significant associations, particularly with fatigue and mental status, while the effect size of stress on health domains was moderate. Sociodemographic factors, including age, marital status, and place of residence, were not statistically significant in terms of the mental health domains, although single women reported slightly lower scores of depressive symptoms. Women who were classified as having suboptimal health had significantly higher SHSQ-25 scores in all domains (fatigue, cardiovascular system, digestive system, immune system, and mental status) than those classified as having optimal health. This study's findings highlight the need for targeted mental health interventions to improve the overall health status of elderly women before their elevated symptom levels of depression, anxiety, and stress reach disease level. This study on depression, anxiety, and stress could provide a useful reference for reducing the risk of depression, preventing stress, and promoting mental health in elderly women. Reducing stress and tension can improve overall health.

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Informed Consent Statement: The completion of the administered questionnaire constituted the participants' informed consent.

Data Availability Statement: The data are not publicly available due to confidentiality and privacy considerations. In addition, restrictions apply to the availability of these data due to our policy statement of sharing data. Data are available only upon reasonable request.

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Article

The Predictability of Stress Coping Strategies and Psychological Capital on the Psychological Well-Being of Autistic Spectrum Children's Mothers in the Kingdom of Saudi Arabia

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Abstract: There is an increasing number of studies concerned with the study of children with autism spectrum disorder (ASD). At the same time, there is a lack of interest in studies on their families, especially on mothers who represent the first breadwinner for a child who suffers from a deficit in social communication with others, reflected in their well-being (PWB). This study aimed to reveal the possibility of predicting the PWB of autistic spectrum children's mothers through the variables of coping strategies and psychological capital (PsyCap). The study used a predictive, descriptive research method to reveal the ability of the variables—coping strategies (problem-solving, avoidance, support, re-evaluation, remorse) and PsyCap (self-efficacy, optimism, hope, and resilience)—in predicting the PWB of autistic spectrum children's mothers. The study sample consisted of (248) mothers, to whom coping strategies, PsyCap, and PWB measures were applied. The results showed that there were statistically significant differences between working and housewife mothers of autistic spectrum children in solving problems ($t = 3.162, p < 0.002$), avoidance ($t = 1.973, p < 0.05$), positive coping ($t = 2.307, p < 0.022$), self-efficacy ($t = 3.667, p < 0.000$), resilience ($t = 3.338, p < 0.001$), PsyCap ($t = 2.866, p < 0.005$), and PWB ($t = 2.549, p < 0.011$). Meanwhile, there were no statistically significant differences in social support, problem reassessment, remorse, negative coping, optimism, and hope. Also, there were no statistically significant differences due to the number of children in coping strategies, PsyCap, and PWB. The results also showed that there were statistically significant differences at the level of significance (0.05) between mothers whose age was less than 40 years and those 40 years and older in solving problems ($t = 2.093, p < 0.037$) in favor of mothers of the age group 40 years and older ($M = 22.00, SD = 1.22$), and avoidance ($t = 1.987, p < 0.048$) in favor of mothers under 40 years of age ($M = 6.228, SD = 0.464$). However, there were no statistically significant differences in social support, problem reassessment, remorse, positive coping, negative coping, self-efficacy, optimism, hope, resilience, the total degree of PsyCap, and well-being due to the variable of the mother's age. The regression analysis results showed that optimism and problem-solving contributed to (39.90%) of the total change in PWB for mothers of children with autism spectrum. The study's findings indicate the need to develop the ability of autistic spectrum children's mothers to solve problems and their PsyCap, which is represented in self-efficacy, optimism, hope, and resilience, to enhance their PWB, which may have a positive impact on their autistic spectrum child.

Keywords: ASD; stress coping; PsyCap; PWB; autistic spectrum children's mothers

1. Introduction and Theoretical Background

Disability is an issue all societies face, and it results in many social, psychological, health, and economic problems for the disabled, their family, and their community. One of these disabilities is ASD, as it appears at an early stage in a child's life and continues

throughout life. According to the core characteristics of ASD, as identified by the DSM 5 [1], autistic children have challenges with social communication.

A review of the theoretical literature on the prevalence rates of ASD worldwide found that prevalence rates varied by country, gender, assessment tools, socioeconomic status, and continent in which the survey was conducted [2–6]. A meta-analysis [3] of 27 studies on the prevalence of ASD found that the average prevalence rate of ASD was 9.19 per 1000 population. A recent study [5] in Saudi Arabia found that one in every 40 children had the disorder (2.51%). Also, Alyami et al. [4] found that ASD prevalence was higher among males than among females (3:1).

Within the literature on ASD, it is considered one of the most severe childhood problems, as this disorder combines mental and social disability, which negatively affects the normal life of the family, especially when it is accompanied by a deficiency in effective parenting skills, as the parents' way of thinking is affected, and anger outbursts increase, which affects the child and their behavior skills [7]. Hence, a child's upbringing with ASD presents unique challenges that may affect the mental health of parents, as well as affect parental involvement and control over social skills, which leads to poor PWB of the entire family [8]. Many studies [8,9] revealed the susceptibility of parents of autistic spectrum children to depression.

The problem of disability is one multifaceted problem, as its impact does not include the disabled child only but the entire family, as children with disabilities and their families suffer from negative attitudes from society, which increases the disabled family's problems [10]. Also, Imtair and Zulaitny [7] found that the stress resulting from the presence of an autistic spectrum child may cause depression and burnout for the family.

The disability of the autistic spectrum child is a stressful situation that may lead to a change in the roles and expectations of the family members and the accompanying reactions of the parents as a result of their loss of the hopes and aspirations associated with the birth of the child. Discovering symptoms of autism in children represents a shock to the family, causing stressful conditions psychologically, socially, and economically; it is considered the starting point for a series of general stresses for the family, especially the mother [11].

The presence of an autistic child in the family is stressful for the mother [12,13]. The results of previous studies [14] found a high level of psychological stress among mothers of autistic spectrum children. The previous studies [15,16] found that the level of psychological stress among mothers with autism spectrum disorder is higher than the level of psychological stress among fathers. Varghese and Venkatesan [17] revealed that mothers of autistic spectrum children suffer from burnout symptoms, and the results also showed mothers' need for psychological services, social support, and training on skills to deal with psychological burnout. The results of Al-Mahdi's study [18] also found that mothers of autistic spectrum children suffer from stress due to the inability of their children to meet the requirements of daily living and the lack of community support.

The autistic spectrum children's parents are shocked when the diagnosis of their children with autism spectrum is confirmed, followed by denial. Their reactions appear in many symptoms, including approaching other doctors for a second opinion in the hope that the first doctor's diagnosis is incorrect; then, the parents project their painful thoughts leads to reactions of grief, guilt, and remorse, a stage of going abroad and looking for support, and finally, a reaction of acceptance [19–21].

Thus, it becomes clear that different disabilities have negative effects on the child and their family, causing psychological stress [22]. International statistics indicate that 80% of modern diseases are caused by psychological stress that individuals fail to confront effectively, regardless of the type of coping strategies used [23]. Coping strategies with stress are considered factors that help humans maintain psychological and social compatibility in the face of stressful life events and reduce their negative outcomes [8,24]. Coping is the individual's efforts in dealing with stressful events and is classified into problem-focused and emotion-focused coping. Thus, the strategies for dealing with stress indicate a

tendency to respond effectively to stressful events and seek information to solve them [25]. It also represents the behavioral, cognitive, or emotional reactions of mothers of children on the autistic spectrum towards situations and events that cause stress to relieve their psychological state and reduce the impact of the stressful event on mothers [8].

Emotion-focused coping strategies are the efforts to regulate emotions and reduce hardship and emotional distress, such as avoidance, substitution, positive re-evaluation, and control of stress and emotions [26]. By contrast, coping strategies focus on solving the problem by dealing directly with the stressful situation and trying to control it directly by using one's resources to solve the problem; through the strategy of searching for a solution to the problem, and on seeking social support, appreciation, and care through emotional, material, or moral support from others and cultural environment [27].

Abdullahi [28] showed that parents of autistic spectrum children use coping strategies through personal resources, support from family and friends, community resources, and religious strategies to cope with the stress resulting from their negative thoughts that they cannot change the behavior of their autistic child. A child with an ASD in essential communication and social interaction skills generates inappropriate interaction patterns with their parents, which increases parents' stress and discomfort leading to increased inappropriate interactions between the child and his parents, so there is a need to train parents to reduce their stress [8,19,28].

Mostafa's study [29] found that parents of autistic spectrum children used coping strategies for stress resulting from their child's disorder, such as searching for information and knowledge, avoidance, and denying that information; this results recommended the necessity of providing support to the parents of autistic spectrum children.

Many factors affect coping strategies, including personal variables such as locus of control, self-esteem, personality type, psychological hardness, and self-efficacy, as well as demographic variables such as chronological age, gender, and economic level [30].

Formal and informal social support for mothers of children with autism spectrum is considered an essential source of stress coping resulting from the disability, as it increases the ability of the parents to assume the responsibility of caring for the child as well as their ability to face the stress associated with the problems of the disabled child in general and the autistic child in particular [19]. Abdel-Aziz's study [31] showed that mothers of autistic spectrum children have several needs for support, including social support, followed by cognitive and training support, and then financial support. Miranda et al. [32] indicated the need for mothers of autistic spectrum children for social support to cope with the stress resulting from their children's disabilities.

Many studies [33–35] indicated that families with autistic spectrum children need education, psychological care, daily care, and support programs for their children, in addition to financial, emotional, and cognitive mental health support. Previous studies have also shown that there is a statistically significant correlation between social support and services provided to children with autism spectrum and the quality of life of their families [36–38]. Thus, social support is considered one of the most important resources for improving the quality of family life [39]. Brown et al. [40] and Obst et al. [41] indicated that the quality of support provided to families with disabilities, rather than its quantity, is the strongest indicator of the quality of life of families.

Ashkib and Awena [42] found that the level of psychological stress among mothers of children with ASD is a result of lack of social support. Smith et al. [43] revealed that there is a significant correlation between social support and PWB for mothers of children with autism spectrum. Social support had a statistically significant effect on the mental health of mothers of adolescents and adults with autism spectrum. In the same context, Davis et al. [44] found that one of the strongest predictors of the quality of life of families with disabilities is support from extended family members. These studies indicated the role that social support plays in the ability of mothers of autistic spectrum children to cope with the stress associated with raising their autistic spectrum child.

PsyCap is an important personal resource that enhances individuals' ability to develop and remain positive in the worst life scenarios; it includes four dimensions: self-efficacy, hope, resilience, and optimism [45,46]. PsyCap is thus generated by individuals' belief that they can pursue their goals, persevere in achieving these goals, and mobilize efforts and activities in this regard; the ability to withstand difficult situations and the flexibility to regain balance after experiencing them; and a positive attitude regarding achieving success in the present and future [47]. Self-efficacy is defined as an individual's confidence in their ability to mobilize the motivation, cognitive resources, and courses of action needed to achieve certain goals; individuals with high self-efficacy tend to generalize the expectations of their ability to perform tasks across new situations and are more positive when faced with difficult and unknown situations [48]. Resilience is the ability to recover from adversity, uncertainty, and failure and adapt to changing and stressful life demands [49]. A statistically significant association has been found between high resilience and good physical and mental health [50]. Optimism refers to an individual's expectation of achieving positive outcomes [51]. Numerous studies and research have shown the beneficial aspects of optimism in various areas of life, such as physical health, prevention of depression, effective decision-making, and life satisfaction [52].

Rather than just this simple set of the four components mentioned above, PsyCap acts as a higher-level construct of the four positive psychological resources (self-efficacy, optimism, hope, resilience, and predictability of work outcomes) beyond its four components, as PsyCap is an integrated, flexible construct, and thus can be improved [50,52,53].

Given that PsyCap is the best positive construct worth studying for its impact on psychological well-being, research has come to explore the benefits of PsyCap on the psychological well-being of mothers of children with autism spectrum disorder, as it enhances individuals' ability to manage stressful situations, which increases the quality of life and psychological well-being [51,53]. Because the concept of PsyCap is relatively new, very few studies have examined it in parents of children with autism spectrum disorder. Hence, the authors of the current study hypothesized that PsyCap may contribute to the psychological well-being of mothers with autism spectrum disorder.

PWB is the desired goal that a person seeks to reach, the achievement of which leads to an individual's feeling contentment, joy, optimism, and self-realization, enabling them to manage themselves, as this affects a person's view of themselves, regardless of stress [54]. The sense of the quality of life and PWB of parents of children with disabilities is not the same as that of parents of non-disabled children because the presence of a child with a disability in the family may be a cause of dissatisfaction and a low sense of the quality of life and affects their willingness to face the resulting stress and the extent of the availability of support from the community and institutions. Zuna et al. [55] found that the quality of life of each member of the family, including the individual with disabilities, affects each other, so it is necessary to consider the quality of life of each family member.

Previous studies have indicated a lower level of quality of life for mothers of autistic spectrum children from a lower educational level [56]; as indicated by the study of Piovesan et al. [57], there was a significant correlation between depressive symptoms in mothers of an autistic spectrum child and a decrease in their quality of life.

Among the factors that may help in facing stress resulting from the challenges of giving birth to an autistic child is the PsyCap of the mother, which includes motivation, hope, optimism, psychological resilience, self-confidence, and self-entitlement, all of which lead to a feeling of happiness and resistance to stress and thus feelings of PWB [58]. Self-efficacy refers to the positive belief of the individual, resilience is the process of good adaptation in the event of trauma, and hope is a pattern of attribution through which positive attitudes are interpreted in a personal and continuous way that is recognized [59,60].

Previous studies [15–18,42,55,57,61] found that the mothers of children with autism spectrum have more stress than their fathers, and this stress negatively impacts their mental health outcomes because they are constantly struggling between their family responsibilities and their excessive concern for their spectrum autistic children; it becomes clear that there

is a need to investigate the predictors of PWB of mothers of children with autism spectrum, given that they are the primary caregivers for the care of their autistic child.

2. Purpose of the Present Study

Given the continuous increase in the prevalence of ASD in the Kingdom of Saudi Arabia [2,4,5] and the findings of previous studies, which indicated that there was a significant impact of child disabilities on mothers' mental health and stress [15–18,55,56], it is important to investigate predictors of PWB among mothers of children with ASD. Therefore, the current study sought to examine the predictability of the variables of coping strategies and PsyCap with the PWB of mothers of autistic spectrum children.

3. Methods

Study Design and Sample

The current study relied on a descriptive approach to predict the PWB of autistic spectrum children's mothers through coping strategies with stress and PsyCap. The sample of the study consisted of (248) mothers who were responsible for taking care of their autistic spectrum children citizens residing in the Kingdom of Saudi Arabia, and their ages ranged between (33 and 51) years (Table 1). The study was applied in the period from 14 August 2023 until 17 May 2024 after obtaining approval from the Institutional Ethics Committee of Princess Nourah bint Abdulrahman University (IRB Log Number: 23-0495); written informed consent was obtained from all participants by checking the box "I agree to participate in this study". One of the study tools was a questionnaire that collected demographic data such as age, gender, number of children, place of residence, number of children with ASD, and access to support from a specialized autism society.

Table 1. Demographic characteristics of the study participants ($N = 248$).

Variables	<i>n</i> (%)
Mean of Age	37.613
Standard Deviation	4.197
Age Group	
Less than 40 years old	158 (63.71%)
40 years and older	90 (36.29%)
Number of Children	
Less than 4 children	100 (40.32%)
4 children and more	148 (59.68%)
Work	
Employed	107 (43.14%)
Not employed	141 (56.86%)

The criteria for including or excluding the participants in this study included the following: they should be mothers of children with ASD, residing in Saudi Arabia, and responsible for raising and caring for one or more children with autism spectrum disorder. According to these criteria, eight cases were excluded as they refused to participate in the study because they were busy with their work, and four mothers were excluded because they did not have autistic children, but had a child with other disorders such as an intellectual disability and Down syndrome.

4. Measures

4.1. Stress Coping Strategies Checklist (SCSC)

The SCSC was prepared by Abu-Al-Atta [61] to assess coping strategies for mothers of autistic spectrum children. The checklist consists of (28) items distributed over five strategies: problem-solving, avoidance, social support, positive evaluation, and remorse. It is answered with one of the three options: yes (3), to some extent (2), or no (1).

In the current study, the psychometric properties of SCSC were verified. Internal consistency was verified by calculating the correlation coefficients between the items and the total score of the dimension. Table 2 shows the results:

Table 2. Pearson correlation coefficients between items and their dimension total score.

Item	Dimension	Correlation	Item	Dimension	Correlation
1	Problem-solving	0.844 **	15	Social support	0.936 **
2		0.872 **	16		0.879 **
3		0.825 **	17		0.902 **
4		0.806 **	18		0.911 **
5		0.853 **	19		0.895 **
6		0.729 **	20		0.862 **
7		0.835 **	21		0.821 **
8	Avoidance	0.774 **	22	Re-appraisal of the problem	0.883 **
9		0.702 **	23		0.794 **
10		0.782 **	24	Remorse	0.941 **
11		0.719 **	25		0.824 **
12		0.746 **	26		0.851 **
13		0.783 **	27		0.746 **
14		0.791 **	28		0.814 **

** Correlation is significant at the 0.01 level (2-tailed).

The results in Table 2 indicate that the correlation coefficients between items of the SCSC with their dimensions were positive and statistically significant ($p < 0.01$), and ranged between (0.719 and 0.941). These results indicate the internal consistency of SCSC. The reliability coefficients of re-testing for the dimensions were (0.76, 0.75, 0.71, 0.72, 0.77), respectively. Also, the reliability coefficients of Cronbach's alpha for the dimensions of SCSC were (0.847, 0.804, 0.915, 0.899), respectively.

4.2. Psychological Capital Scale (PCS)

By reviewing the theoretical literature and measures of PsyCap, the authors of this study developed a PsyCap scale for mothers of children with autism spectrum disorder. The PCS consists of (19) items, and it is answered using a Likert scale ranging from very much agree (4) to disagree (1). To verify the psychometric properties of the PCS, exploratory factor analysis was applied using the principal components method after verifying the analysis of sample adequacy (KMO Kaiser–Meyer–Olkin Measure), which reached (0.952). The results of the exploratory factor analysis showed that all items of the scale were loading on four factors (self-efficacy, optimism, hope, and resilience), explaining 64.78% of the total variance of PsyCap. The self-efficacy factor included five items, and their loadings were (0.836, 0.869, 0.811, 0.835, 0.877), optimism contained five items, and their loadings were (0.881, 0.894, 0.902, 0.888, 0.921), hope consisted of 5 items, and their loadings were (0.829, 0.893, 0.798, 0.856, 0.904), and the resilience factor contained four items, the loadings of which were (0.879, 0.915, 0.894, 0.906). Also, the Pearson correlation coefficients between items and the total score of the dimension and PCS were calculated. Table 3 shows the results.

The findings in Table 3 indicate that the correlation coefficients between items of the PCS with their dimensions were positive and statistically significant and ranged between (0.776 and 0.926). The Pearson correlation coefficients between items and PCS total score were positive and statistically significant ($p < 0.01$), ranging between (0.708 and 0.837). Also, the results showed that the Pearson correlation coefficients between self-efficacy, optimism, hope, and resilience and PCS total score were positive and statistically significant ($p < 0.01$): (0.697, 0.707, 0.822, 0.912), respectively. These results revealed the internal consistency of the PCS. Also, the reliability coefficients of Cronbach's alpha for the dimensions and PCS as a whole were (0.821, 0.847, 0.811, 0.829, 0.844), respectively.

Table 3. Pearson correlation coefficients between items and the total scores of their dimension and PCS.

Item	Dimension	R with Dimension	R with PCS	Item	Dimension	R with Dimension	R with PCS
1	Self-efficacy	** 0.828	** 0.779	11	Hope	** 0.809	** 0.770
2		** 0.781	** 0.753	12		** 0.902	** 0.831
3		** 0.825	** 0.733	13		** 0.917	** 0.786
4		** 0.862	** 0.739	14		** 0.926	** 0.829
5		** 0.882	** 0.736	15		** 0.888	** 0.812
6	Optimism	** 0.747	** 0.708	16	Resilience	** 0.894	** 0.837
7		** 0.840	** 0.744	17		** 0.898	** 0.768
8		** 0.776	** 0.747	18		** 0.905	** 0.779
9		** 0.882	** 0.776	19		** 0.853	** 0.785
10		** 0.813	** 0.805				

** Correlation is significant at the 0.01 level (2-tailed).

4.3. Psychological Well-Being Scale (PWBS)

In this study, the researchers prepared a scale consisting of (10) self-report statements on the PWB of autistic spectrum children's mothers, according to the literature review. Participants answer by choosing one of five alternatives that apply perfectly (5), apply to some extent (4), apply (3), do not apply (2), and do not apply at all (1). The scale's exploratory factor analysis was applied using the principal components method, after verifying the analysis of sample adequacy ($KMO = 0.937$). The results showed all items of PWBS were loading on one general factor (PWB), contributing to 79.750% of the total variance of PWB. The loadings of the items were (0.990, 0.993, 0.984, 0.915, 0.951, 0.959, 0.811, 0.579, 0.669, and 0.925). Also, the Pearson correlation coefficients between the items and PWBS as a whole were calculated, and the results found that all correlation coefficients were (0.762, 0.887, 0.820, 0.789, 0.839, 0.933, 0.897, 0.818, 0.924, 0.785), all of which are positive and statistically significant ($p < 0.01$). Reliability was also verified by calculating Cronbach's α coefficient, which was (0.908), and the reliability of Spearman–Brown's spilt-half coefficient was (0.899).

5. Results

5.1. Differences in Stress Coping Strategies, PsyCap, and PWB

5.1.1. The Differences Between Employed and Not Employed Mothers of Children with Autism Spectrum

An Independent-Samples t -test was used to calculate the differences in coping strategies, PsyCap, and PWB among employed and not employed mothers of children with autism spectrum, and the results are shown in Table 4.

Table 4. Means, standard deviations, and t -values of differences between employed and not employed mothers of autistic spectrum children.

Measurements	Employed/Not Employed	M	SD	t	Sig. (2-Tailed)
Problem-solving	Not employed	21.496	1.588	3.162	0.002
	Employed	22.075	1.179		
Avoidance	Not employed	6.234	0.487	1.973	0.05
	Employed	6.121	0.381		
Social support	Not employed	14.752	0.965	0.281	0.779
	Employed	14.785	0.869		

Table 4. Cont.

Measurements	Employed/Not Employed	M	SD	t	Sig. (2-Tailed)
Re appraisal of the problem	Not employed	14.823	0.679	0.218	0.828
	Employed	14.841	0.632		
Remorse	Not employed	11.829	0.655	0.256	0.798
	Employed	11.850	0.596		
Positive coping	Not employed	51.071	2.295	2.307	0.022
	Employed	51.701	1.889		
Negative coping	Not employed	18.064	0.864	0.885	0.377
	Employed	17.972	0.733		
Self efficacy	Not employed	21.950	2.185	3.667	0.000
	Employed	22.953	2.062		
Optimism	Not employed	22.688	1.225	0.324	0.746
	Employed	22.738	1.192		
Hope	Not employed	22.624	1.323	1.921	0.056
	Employed	22.944	1.265		
Resilience	Not employed	18.071	1.234	3.338	0.001
	Employed	18.579	1.125		
PsyCap	Not employed	85.333	5.249	2.866	0.005
	Employed	87.215	4.947		
PWB	Not employed	45.447	2.386	2.549	0.011
	Employed	46.215	2.303		

From the results in Table 4, we can conclude that there are statistically significant differences in problem-solving ($t = 3.162$, $p < 0.002$), avoidance ($t = 1.973$, $p < 0.05$), positive coping ($t = 2.307$, $p < 0.022$), self-efficacy ($t = 3.667$, $p < 0.000$), resilience ($t = 3.338$, $p < 0.001$), PsyCap ($t = 2.866$, $p < 0.005$), and PWB ($t = 2.549$, $p < 0.011$), and the differences are in favor of employed mothers of autistic spectrum children; however, there are no statistically significant differences in social support, re-appraisal of the problem, remorse, negative coping, optimism, and hope (Figure 1).

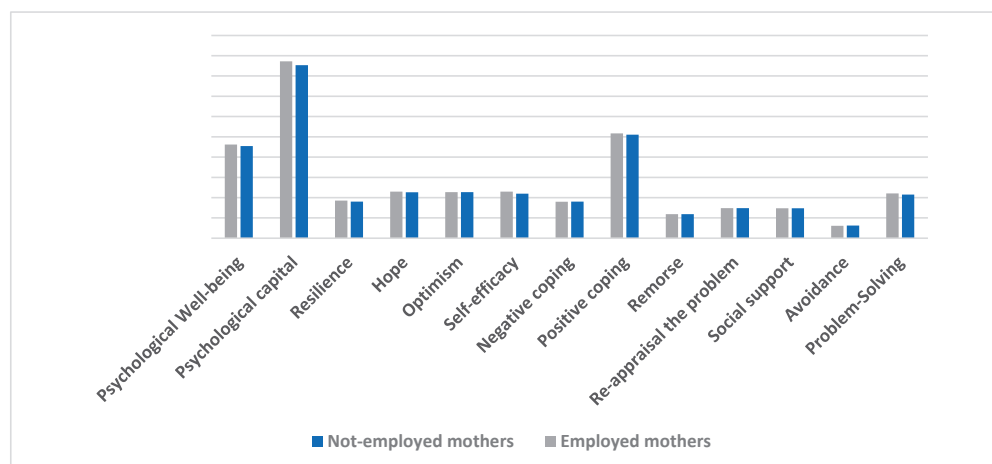


Figure 1. Differences between employed and not employed autistic spectrum children in coping strategies, PsyCap, and PWB.

5.1.2. Differences Between Mothers of Autistic Spectrum Children Due to the Number of Children

An Independent-Samples *t*-test was used to calculate the differences in coping strategies, PsyCap, and PWB among mothers of children with autism spectrum due to the number of children, and the results are shown in Table 5.

Table 5. Means, standard deviations, and *t*-values of differences in coping strategies, PsyCap, and PWB due to the variable “number of children” for autistic spectrum children’s mothers.

Measurements	Number of Children Variable	M	SD	t	Sig. (2-Tailed)
Problem-solving	Less than 4 children	21.880	1.335	1.196	0.233
	4 children and more	21.655	1.524		
Avoidance	Less than 4 children	6.230	0.529	1.289	0.198
	4 children and more	6.155	0.382		
Social support	Less than 4 children	14.790	0.769	0.334	0.739
	4 children and more	14.750	1.016		
Re-appraisal of the problem	Less than 4 children	14.860	0.5129	0.577	0.565
	4 children and more	14.811	0.741		
Remorse	Less than 4 children	11.860	0.5129	0.438	0.662
	4 children and more	11.824	0.697		
Positive coping	Less than 4 children	51.530	1.800	1.129	0.260
	4 children and more	51.216	2.352		
Negative coping	Less than 4 children	18.090	0.779	1.053	0.294
	4 children and more	17.979	0.829		
Self-efficacy	Less than 4 children	22.610	2.069	1.346	0.180
	4 children and more	22.229	2.256		
Optimism	Less than 4 children	22.890	1.1625	1.941	0.053
	4 children and more	22.588	1.228		
Hope	Less than 4 children	22.920	1.269	1.570	0.118
	4 children and more	22.655	1.323		
Resilience	Less than 4 children	18.460	1.226	1.820	0.070
	4 children and more	18.176	1.194		
PsyCap	Less than 4 children	86.880	5.036	1.840	0.067
	4 children and more	85.649	5.259		
PWB	Less than 4 children	46.100	2.245	1.760	0.080
	4 children and more	45.561	2.444		

The results shown in Table 5 clearly show that there are no statistically significant differences in coping strategies, PsyCap, and PWB according to the number of children (Figure 2).

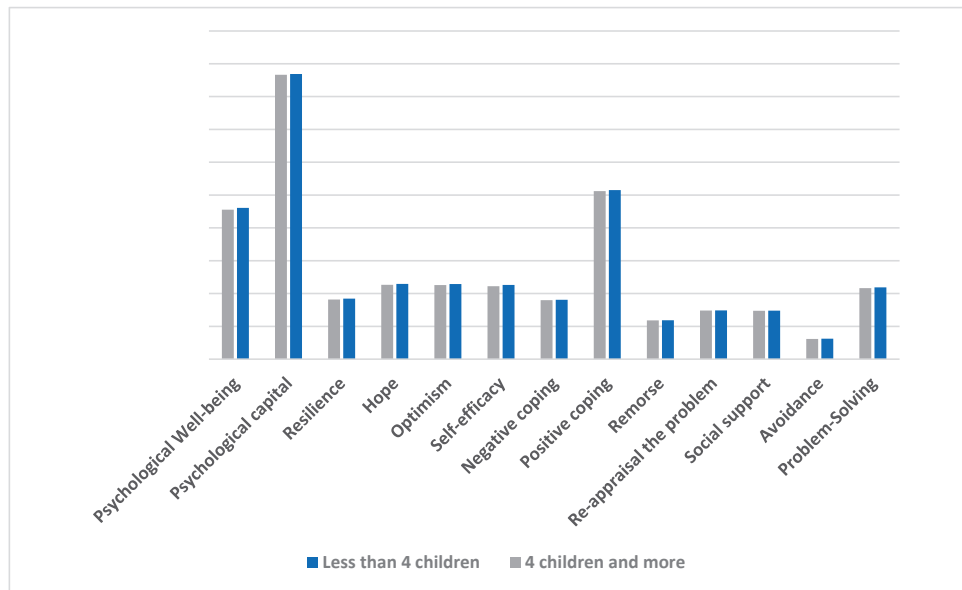


Figure 2. Differences between mothers of autistic spectrum children in coping strategies, PsyCap, and PWB due to the number of children.

5.1.3. Differences in Coping Strategies, PsyCap, and PWB Due to the Age of the Mother of Autistic Spectrum Children

An Independent-Samples *t*-test was used to calculate the differences in coping strategies, PsyCap, and PWB among mothers of children with autism spectrum due to the mother's age. The results are shown in Table 6.

Table 6. Means, standard deviations, and *t*-values for differences in coping strategies, PsyCap, and PWB due to the mother's age.

Measurements	Age of Mother	M	SD	t	Sig. (2-Tailed)
Problem-solving	Less than 40 years old	21.601	1.596	2.093	0.037
	40 years and older	22.000	1.122		
Avoidance	Less than 40 years old	6.228	0.464	1.987	0.048
	40 years and older	6.111	0.409		
Social support	Less than 40 years old	14.747	0.951	0.435	0.664
	40 years and older	14.800	0.877		
Re-appraisal of the problem	Less than 40 years old	14.810	0.697	0.650	0.516
	40 years and older	14.867	0.584		
Remorse	Less than 40 years old	11.823	0.653	0.528	0.598
	40 years and older	11.867	0.584		
Positive coping	Less than 40 years old	51.158	2.276	1.800	0.073
	40 years and older	51.667	1.872		
Negative coping	Less than 40 years old	18.051	0.851	0.681	0.497
	40 years and older	17.978	0.734		
Self-efficacy	Less than 40 years old	22.481	2.222	0.935	0.351
	40 years and older	22.211	2.123		

Table 6. Cont.

Measurements	Age of Mother	M	SD	t	Sig. (2-Tailed)
Optimism	Less than 40 years old	22.772	1.215	1.078	0.282
	40 years and older	22.600	1.197		
Hope	Less than 40 years old	22.797	1.339	0.565	0.573
	40 years and older	22.700	1.249		
Resilience	Less than 40 years old	18.373	1.218	1.433	0.153
	40 years and older	18.144	1.195		
PsyCap	Less than 40 years old	86.424	5.275	1.121	0.264
	40 years and older	85.656	5.044		
PWB	Less than 40 years old	45.892	2.398	1.003	0.317
	40 years and older	45.578	2.337		

It is clear from the results shown in Table 6 that there are statistically significant differences at the level of significance (0.05) between mothers whose age is less than 40 years and those 40 years and older in solving problems ($t = 2.093$, $p < 0.037$) in favor of mothers of the age group 40 years and older ($M = 22.00$, $SD = 1.22$), and avoidance ($t = 1.987$, $p < 0.048$) in favor of mothers under 40 years of age ($M = 6.228$, $SD = 0.464$). At the same time, there are no statistically significant differences in social support, re-appraisal of the problem, remorse, positive coping, negative coping, self-efficacy, optimism, hope, resilience, the total score of PsyCap, and PWB due to the variable of the mother's age (Figure 3).

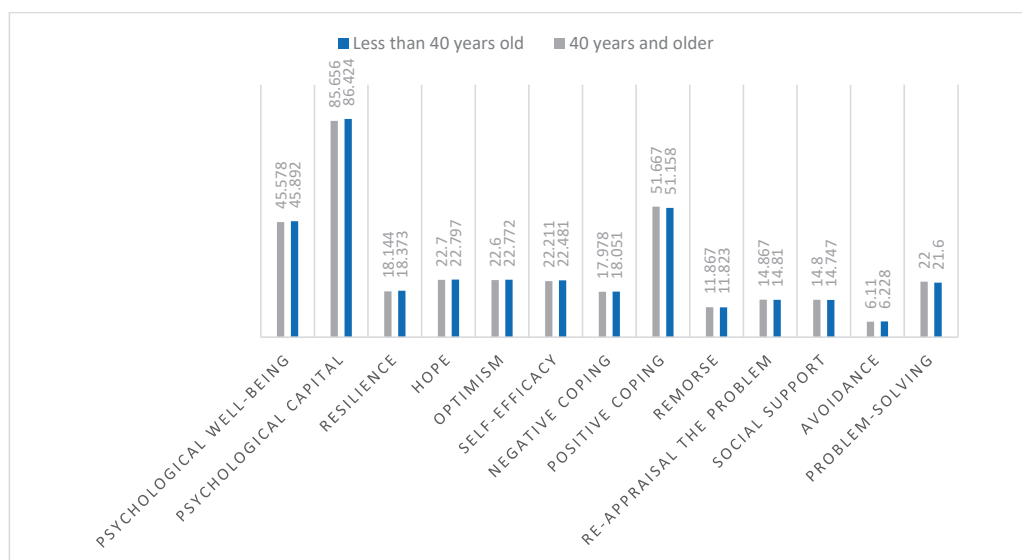


Figure 3. Differences between mothers of autistic spectrum children in coping strategies, PsyCap, and PWB due to the mother's age.

5.2. Prediction of PWB Among Mothers of Autistic Spectrum Children

To assess the predictability of coping strategies and PsyCap of autistic spectrum children's regarding mothers' PWB, Multiple Linear Regression Analysis was used, after testing for the presence of multicollinearity. The results are shown in Table 7.

Table 7. Results of Multiple Regression analysis of coping strategies and PsyCap on PWB of autistic spectrum children's mothers.

Model	R ²	Durbin–Watson	F	Independent Variables	Unstandardized Coefficients		Standardized Coefficient	t	Sig.
					B	SE	Beta		
1	0.399	1.184	40.364	Constant	13.955	4.442		3.141	0.002
				Problem-Solving	0.329	0.089	0.201	3.697	0.000
				Avoidance	−0.288	0.274	−0.054	1.050	0.295
				Remorse	−0.320	0.189	−0.085	1.689	0.092
				Optimism	1.331	0.106	0.677	12.600	0.00

The linear regression results in Table 7, with $R^2 = 0.399$, indicate that problem-solving and optimism variables can explain 39.90% of the total changes in PWB of mothers of autistic spectrum children. The ANOVA of the regression model proved to be statistically significant ($f = 40.364$, $p < 0.01$) and found that problem-solving might influence the changes in the PWB of mothers of autistic spectrum children with a regression coefficient of $b = 0.329$ ($t = 3.697$, $p < 0.01$, $VIF = 1.198 < 10$). Also, the optimism variable might influence the PWB of mothers of autistic spectrum children with a regression coefficient of $b = 1.331$ ($t = 12.600$, $p < 0.01$, $VIF = 1.169 < 10$). In contrast, the avoidance and remorse variables did not statistically significantly predict PWB among mothers of autistic spectrum children ($b = -0.288$, -0.320 , $t = 1.050$, 1.689 $p > 0.01$, $VIF = 1.076$, $1.013 < 10$), respectively. We can predict the PWB of mothers of autistic spectrum children scores from the following equation:

$$\text{PWB} = 13.955 + 1.331 \times \text{optimism} + 0.329 \times \text{problem solving}.$$

6. Discussion

The results of the current study show that there were statistically significant differences in avoidance, problem-solving, positive coping, self-efficacy, resilience, PsyCap, and well-being, and the differences were in favor of employed mothers of children with autism spectrum. At the same time, there were no statistically significant differences in social support, re-appraisal of the problem, remorse, negative coping, optimism, and hope. These results are consistent with the study of Shmaisa [62], whose results concluded that the most common strategy for coping with stress among employed mothers is problem-solving. In contrast, social support strategies are the least used. However, these results differ from Abou El-Enein's [63] study; there were no statistically significant differences in coping with stress according to the mother's employment status. The work of the mother of autism spectrum children satisfies her psychological needs, such as the need to control things, people, and ideas and make an effort to gain a prestigious position, as well as the need for appreciation, respect, and a sense of security, which increases the level of her PsyCap in terms of resilience and self-efficacy, making her strategies of coping with stress effective and positive. This improves the mother's PWB and satisfaction with her children's disability, assisting her in accepting it and enabling her to manage her life affairs with balance.

These results concur with Frech and Damaske [64], whose results indicate that mothers with part-time work with little unemployment have better health at age forty than mothers experiencing persistent unemployment. However, these findings differ from what Keldenick [65] concluded mothers who work part-time, are self-employed, are not employed, and are on maternity leave have higher affective well-being levels than full-time employee mothers. Also, Campos-Serna et al. [66] figured that the double burden role of employed mothers may put additional stress on them, which may negatively affect their mental health outcomes. Also, our results do not concur with Chua [67], found that 29% of employees may faced with well-being challenges through poor mental health. This also contradicts the findings of Al-Shibe's study [68], which found no statistically significant differences between employed and non-employed women in psychological well-being.

This conflicts with the results of previous studies on the differences between employed and non-employed mothers due to the difference in the population in each of these previous studies with the current study, and applied different self-report tools to measure psychological well-being.

These findings regarding the differences between employed and non-employed mothers of children with autism spectrum indicate the need to enhance positive coping strategies, PsyCap, self-efficacy, resilience, and psychological well-being among non-employed mothers of children with autism spectrum.

The results also found no statistically significant differences in coping strategies, PsyCap, and PWB according to the number of children. These results are consistent with the results of [64–66,69], which indicated that there were no differences in psychological stress and its response among mothers of children with autism spectrum, according to selected demographic variables, including the number of family members. Al-Shwayat and Al-Sharaa [70] mentioned that the number of members of the autistic family does not affect the psychological stress experienced by the mothers of autistic spectrum children and their coping with it. The impact of the birth of an autistic child on the mother may be more or less the same regardless of the number of family members. The sadness left by the birth of an autistic child includes all mothers regardless of the differences between them in educational qualification and the number of children. The problems found in autistic spectrum children are the same, and the needs related to home care and rehabilitation are the same regardless of the difference between mothers and families.

Mothers of autistic spectrum children, in particular, face many problems because of this stressful experience with the birth of this autistic child, regardless of the number of children in the family, including feelings of disappointment, frustration, rejection, low self-esteem, and distancing from social relationships [71]. This is because the mother is the closest person to her autistic child; she is not only faced with feelings of guilt but also helplessness, and these feelings directly affect her physical and psychological health [72,73]. Perhaps the number of disabled children in the family, whether with autism spectrum disorder or otherwise, is the most essential variable, not the number of non-disabled children in the family, as the number of disabled children in the family is what causes more stress on the parents, especially the mother.

The current study results concluded that there are statistically significant differences in stress coping strategies and PsyCap on the psychological well-being of autistic spectrum children's mothers. At the same time, there were no statistically significant differences in social support, re-appraisal of the problem, remorse, positive coping, negative coping, self-efficacy, optimism, hope, resilience, the total degree of PsyCap, and PWB due to the variable of the mother's age. These results are consistent with the study of Jawhar [74] that there are differences in the strategies for coping with stress among mothers with disabilities in favor of the age group over 40 years. The results also agree with what was indicated by [31], which is that factors that affect coping strategies include personal variables such as locus of control, self-esteem, personality type, psychological hardness, and self-efficacy. They also include demographic variables such as age, gender, and economic level.

This result is logical, as older mothers of autistic spectrum children are more experienced in their ability to deal with the problem of their children's disability and cope with it by solving the problem. In comparison, younger mothers of autistic children lack experience in dealing with their children's disability and disturbed behaviors, which makes them avoid social interaction. Therefore, older mothers of autistic spectrum children were higher in problem-solving as a coping strategy, and younger mothers were higher in using avoidance as a strategy for coping with the stress of their autistic spectrum child's disability.

These results indicate that the older mothers of children with ASD use coping strategies focused on solving the problem, dealing directly with the stressful situation, and trying to control it directly by using their resources to solve the problem and confront it through the strategy of searching for a solution of their problems, as well as social support and care through emotional, material [27]. A study conducted by Abdullahi [28] showed that

parents of autistic spectrum children use coping strategies through personal resources, support from family and friends, the availability of community resources, and religious strategies to cope with the stress resulting from their negative thoughts and evaluations of themselves and the belief that they cannot change the behavior of their autistic child. In addition, the results indicated that the youngest mothers of a child with autism use emotion-focused coping strategies such as avoidance to cope with the stress resulting from their child's disability.

The results of the current study also concur with the findings of [75–78], which indicate that there are no statistically significant differences in PsyCap due to demographic variables. Raising and caring for an autistic child is one of the most pressing problems for the mother. Due to the core characteristics of autism, the child may have meltdowns and display behaviors of concern that may lead to reduced PsyCap and a reduced ability to cope with stress in mothers, regardless of their age, the number of children in the family, and other demographic variables.

The results also indicated that the variables of optimism and problem-solving contributed 39.90% of the total variance in the PWB of autistic spectrum children's mothers. In this context, the results of Bakhsh's study [79] showed the existence of a significant relationship between the stressful dimensions of life with anxiety and depression among mothers of disabled children. These results also concur with the study of Al-Zubaidi [75], whose results showed a statistically significant correlation between PWB and stress coping strategies. Hastings et al. [80] and Benson [81] found that optimism is an important predictor of the use of coping strategies among parents with ASD. Also, Willis et al. [82] showed that the parents of children with ASD who have a low level of optimism use avoidance as a coping strategy that exceeds their depressive symptoms.

Lack of optimism and failure to solve problems affect the PWB of mothers of children with autism spectrum. Singhal [76] indicated that the failure of many individuals to face stress and deal with it negatively affects their psychological well-being, such as an increase in the level of symptoms of depression and emotional exhaustion, a decrease in PWB, and psychological burnout; this occurs especially in fathers of persons with disabilities in general. Previous studies [29,41,73] found that the parents of disabled children differ from the parents of normal children in the burdens that affect the PWB of the parents.

The results of several studies and research have confirmed that the birth of a child with a disability or the upbringing of a child with a developmental delay is an event that often has harmful effects on the mental health of parents, who often suffer from increased stress and poor PWB in the absence of effective coping mechanisms and social support [42].

It is essential to cope stress positively, such as by using coping strategies problem-centered and searching for solving it [83]. This study found that dealing with stress and solving problems instead of avoiding them can predict PWB. Many studies have proven the existence of differences in the quality of life, PWB, and happiness, depending on coping strategies, whether negative or positive [79]. Saleh [84] also found that mothers of children who are mentally disabled focused on learning and improving their quality of life.

Thus, solving problems rather than avoiding them and the ability of mothers of children with ASD to rely on their own resources and their PsyCap lead to a high level of PWB and increase their sense happiness and satisfaction with life.

The parents of children with ASD reported many problems in dealing with their child even after diagnosis, in addition to social stigma related to having a child with ASD [85], which may lead to a high level of distress and depressive symptoms compared to parents of non-disabled children [86], therefore we highlighted the importance of problem-solving and optimism-based interventions to promote the PWB of mothers of children with ASD.

7. Conclusions

The current study showed that there were statistically significant differences between employed and non-employed mothers of autistic spectrum children in solving problems, avoidance, positive coping, self-efficacy, resilience, PsyCap, and PWB. However, there were

no statistically significant differences in social support, problem reassessment, remorse, negative coping, optimism, and hope. Also, there were no statistically significant differences due to the number of children using coping strategies, PsyCap, and PWB. The results also showed there were statistically significant differences between mothers whose age was less than 40 years and those 40 years and older in solving problems in favor of mothers of the age group 40 years and older and avoidance in favor of mothers under 40 years of age. However, there were no statistically significant differences in social support, problem reassessment, remorse, positive coping, negative coping, self-efficacy, optimism, hope, resilience, the total degree of PsyCap, and well-being due to the variable of the mother's age. Also, the findings found that problem-solving and optimism might influence the PWB of mothers of autistic spectrum children; in contrast, the avoidance and remorse variables did not statistically significantly predict PWB among mothers of autistic spectrum children. These findings revealed the need to develop the ability of autistic spectrum children's mothers to solve problems and their optimism to enhance their PWB, which may have a positive impact on their autistic spectrum child.

Limitations and Future Directions

Despite the importance of the current study's findings, it has several limitations. The current study focused on the mothers of children with autism spectrum without their fathers. Therefore, a similar study can be conducted in the future on the fathers of children on the autism spectrum. Also, this study was confined only to mothers of children with autism spectrum and did not include mothers of children with different disabilities. Thus, future researchers can study the same variables in mothers and fathers of children with different disabilities. In addition, one of the limitations of the current study is the potential bias introduced by self-reported measures, which may impact the results; thus, we recommend that future researchers apply longitudinal studies, experimental designs, or qualitative analyses to explore mothers' experiences in greater depth. Also, this study used a predictive, descriptive methodology and not an interventional study on the effect of psychological counseling interventions in developing the PWB of mothers of autistic spectrum children; therefore, we need to conduct interventional studies for mothers of autistic spectrum children. In addition, because we did not include the differences in coping strategies, PsyCap, and psychological well-being due to the number of non-disabled children in the family of autistic spectrum children, future researchers can investigate these differences.

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Article

Comparative Study of the Development of Executive Functions in Children: Transition from the First Cycle to the Second Cycle of Early Childhood Education

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Abstract: Antecedents: Executive functions (EFs) are the basis for establishing a goal and working towards that goal by coordinating thoughts and actions. EFs are fundamental to several aspects of daily life, specifically for academic performance. Aim: To analyse and compare the development of EFs in the transition period between the first and second cycles of early childhood education. Methodology: Non-experimental methodology, ex post facto design, descriptive, cross-sectional evolution study. Participants: Preschoolers of different educational levels (first and second cycle of infant education). In this study, the participants were evaluated by different informants: 54.42% by parents and 45.58% by teachers. In relation to gender, 52.65% were male and 47.35% were female. In relation to age, 37.54% had a range of 2–3 years and 62.46% had a range of 4–5 years. Measurement: The instrumental development of EFs was evaluated using BRIEF-P by key informants. Results: Preschoolers in the first cycle showed significantly higher scores than preschoolers in the second cycle in BRIEF-P. Conclusions: The development of EFs is key in these first key moments, having a special impact on later development and academic performance. It is necessary to work on EFs from the first cycle of early childhood education, considering the evolutionary development of EFs.

Keywords: BRIEF-PTM; development; early childhood education; executive functions; parents; teachers

1. Introduction

Garon, Bryson, and Smith [1] consider that brain development is a continuous process of construction, organisation, and re-structuring neural connections in response to environmental inputs, thus leading to an increase in the complexity of mental structures. These changes can be associated with and linked to the development of EFs [2].

1.1. Dimensions and Development of EFs in Early Childhood

Executive functions (EFs) are the basis of the ability to set a goal and then work towards that goal while coordinating thoughts and actions [3]. EFs are, therefore, fundamental to various aspects of daily life, such as mental and physical health, academic success, and success in daily living, along with social and psychological development [4,5]. They include diverse dimensions, such as cognitive flexibility, inhibitory control, and working memory [6–8], which are essential for functioning in human society.

EFs include processes that involve intentionality in the control of other processes, such as impulse control, attention, thought, and behaviour [2,9].

For Lezak [10], EFs are essential mental capacities for carrying out effective, creative, and socially adapted behaviour. Sohlberg and Mateer [11] consider that EFs cover a series of cognitive processes, among which are anticipation, selection of objectives, planning, behaviour selection, self-regulation, self-control, and the use of feedback. Tirapu [12], for example, focuses on predicting the consequences that can lead us to anticipated solutions. Funahashi [13] postulates that they are the result of the coordination of the processes that are necessary to meet a particular objective in a flexible way. Zelazo [14] focuses on the

self-regulation skills involved in achieving a goal, which are modulated by thinking and emotion, while basically differentiating between executive and motivational executive processes or “hot EFs” and purely cognitive aspects or “cool EFs”.

The construct of EFs does not represent a unitary concept. Regarding the dimensions that constitute EFs in the early stages of development, study results are contradictory and inconclusive.

During the preschool stage, the dimensions of executive functions have been studied primarily through factor analyses (see [15]). These techniques allow for the exploration of the degree of independence or interdependence among the different components of the construct [16–18].

According to Monette, Bigras, and Lafrenière [16], results are more consistent at age 3 compared to ages 4 to 5 [19–21]. A three-factor solution suggests greater differentiation of the dimensions and appears more suitable for older children, between 8 and 13 years, or even up to around 15 years [22,23]. On the other hand, some studies indicate that the structure of EFs in children aged 3 to 5 years or 5 to 13 years may be based on two factors [23,24]. Other research supports a single-factor model for 5-year-old children [16], as well as for age ranges of 2.5 to 6 years [25] and 7 to 9 years [26]. Brydges, Fox, Reid, and Anderson [26] reviewed the literature and suggest that a single-factor model is more appropriate for children under 9 years of age.

There is no consensus on the number of factors that make up executive functions, as this construct varies throughout development. Various authors, such as [15], have used factor analyses to identify the underlying components, as detailed in the review conducted. The most recognised model is Miyake’s [2], which identified three key factors: updating, inhibition, and shifting. However, in the study by Spiegel, Lonigan, and Phillips [27], a discrepancy in the structure of the BRIEF-P was observed, with the best solutions proposed being a four-factor model and a bifactorial model.

There is growing evidence indicating that EFs are essential both for academic success and for the development of cognitive skills [28–34]. Significant improvements in EF task performance have been observed between the ages of 3 and 6 years [20,35].

The structural, functional, and neurological changes occurring in the prefrontal cortex are accompanied by changes in executive functions [15,36–38], as well as by the differentiation of executive functions throughout the lifespan, with each dimension following its own trajectory. Table 1 provides an outline of the development of EFs from 0 to 6 years, according to Zelazo and Carlson [38].

Table 1. Functional development of executive functions from 0 to 6 years (adapted from [38]).

Age	Cold EFs	Hot EFs
7–8 months	Early signs of working memory and inhibition	Able to distinguish between animate and inanimate objects
12 months	-	Focused attention
14 months	-	Social referencing
2 years	Improvements in inhibition and working memory	Understanding of pretend play situations
3 years	Improvements in inhibitory control and attention up to age 5	Enhancements in affective decision-making this year
4 years	Improvements in cognitive flexibility	Successfully completes “false belief” tasks
5 years	Gains in working memory and strategy development. Begins to plan and direct behaviour toward goals.	Aware that beliefs can be based on other beliefs
6 years	-	Theory of mind becomes as sophisticated as an adult’s

The development of EFs is a crucial aspect of cognitive growth in children, especially during the early years of life [38]. These skills, which include working memory, inhibitory control, and cognitive flexibility, play a fundamental role in children's ability to plan, solve problems, and regulate their behaviour [15]. In the context of early childhood education, analysing the development of these functions can provide valuable insights into how children progress through different educational stages.

1.2. Evolution of Cognitive and Social Development Across Early Childhood Education Cycles

In terms of cognitive and psychological development, students in the first cycle (ages 0–3) are primarily engaged in sensory exploration and motor activities [39]. Their learning is driven by direct experiences and free play, with a focus on developing basic skills such as fine and gross motor coordination, imitation, and emerging language abilities [40,41]. At this stage, children are beginning to develop self-regulation and autonomy but still depend heavily on adults for guidance and decision-making. In contrast, during the second cycle (ages 3–6), students begin to acquire more advanced cognitive skills. They develop working memory, sustained attention, and problem-solving abilities [42,43]. There is also a notable expansion in language use, allowing them to follow complex instructions and express their thoughts and emotions more clearly. Additionally, their capacity for emotional and social regulation improves, and they start engaging in more complex and cooperative social interactions [44].

The educational environment also evolves significantly between these two cycles (see [45]). In the first cycle, the learning environment is highly stimulating and designed for safety, with an emphasis on exploration and free play. Educators act as guides, facilitating learning through interactive play. By the second cycle, the environment becomes more structured, incorporating daily routines and organised activities, including guided play and group tasks. The focus shifts toward preparing children for primary school with an introduction to pre-academic skills such as letter and number recognition and the ability to follow instructions and work in groups.

In the study developed by [46], the unique features of early childhood education in Spain are explored, emphasising its internationalised educational framework, comprehensive educational objectives, and well-developed welfare system. This framework includes a focus on sensory–motor development, early socialisation, and basic language skills as key goals for the first cycle of education. The emphasis on these developmental milestones aligns with Spain's approach to fostering children's overall growth, including their foreign language proficiency and digital literacy. This comprehensive approach not only highlights Spain's educational strengths but also provides valuable insights for the development of early childhood education systems in other countries, particularly in terms of integrating socio-emotional and cognitive development with a global perspective.

The results of the systematic review by [47] emphasise the need for an interdisciplinary, play-based developmental assessment tool. This tool would support teachers in guiding developmentally appropriate teaching and learning processes, as well as contributing to research and psychopedagogy fields. Evaluation during this period is more observational, focusing on progress in these fundamental areas. In the second cycle, learning goals become more formal, aiming at preparing children for primary education. This includes a focus on initial academic skills, understanding basic concepts and working on structured tasks. Assessment methods become more formal, although still adapted to the child's age, to evaluate cognitive, linguistic and social development [48].

Sandstrom [49] explores the crucial role of the curriculum as a strategic tool to enhance the quality of early childhood education and clearly and concisely describes the structure of the early childhood education stage in Spain, highlighting its main characteristics. The first and second cycles of early childhood education represent key phases in this developmental process. While the first cycle focuses on initial exploration and the acquisition of basic skills, the second cycle is oriented towards a greater consolidation and refinement of these abilities. The transition between these two cycles can be a critical period for the development of

EFs (see [50]), marking a significant change in how children manage their cognitive and emotional skills.

Social interaction and behaviour notably change between the two cycles [51,52]. In the first cycle, social interactions are simpler, typically involving imitation and parallel play, with early development in understanding social norms and cooperative play. By the second cycle, children engage in more cooperative and group activities, showing improved understanding and adherence to social rules, as well as enhanced abilities to share and collaborate with peers.

These differences underscore a significant evolution in children's development as they advance from the first to the second cycle of early childhood education, reflecting their cognitive, social, and emotional growth.

Given the potential impact that this transition may have on the development of EFs [53], it is essential to investigate how the level of development of these skills varies between children in the first and second stages of early childhood education. Additionally, identifying the differences in development during the transition period between the two cycles is important for better understanding the needs and appropriate supports for children at this crucial stage of their development [54,55].

1.3. Aim and Research Hypotheses

Supported by Blair's study [56] on executive functions, which highlights their rapid development in early childhood and their importance for academic success, we have based our hypotheses and objectives on his work.

We set ourselves the objective of knowing, analysing, and comparing the level of development of the EFs of infants in the first cycle of infant education versus the second cycle, the age of intercycle transition (first versus second).

The transition from the first stage to the second cycle in early childhood education marks several significant changes in the developmental, educational, and behavioural aspects of students. These differences are crucial for understanding how children evolve as they move through these formative years.

How does the level of executive function development in children in the first stage of early childhood education compare to that of children in the second stage, and what differences are observed in the development of these functions during the transition period between the two stages?

It is expected that children in the second cycle of early childhood education (4–5 years) will show a higher level of development in executive functions, specifically in areas such as attention, working memory, and inhibition, compared to children in the first cycle (2–3 years), due to neurocognitive maturation and the increasing cognitive demands during this transition stage in child development.

2. Materials and Methods

We set out to create a non-experimental, ex post facto design, descriptive, cross-sectional development study.

2.1. Design

The study procedure is based on a non-experimental methodology, with an ex post facto and descriptive design, in which the evolution of executive functions in children is analysed during the transition between the first and second cycles of early childhood education. A cross-sectional study was conducted, in which participants, coming from different educational levels (the first and second cycles of early childhood education), were evaluated by key informants, specifically parents and teachers.

The instrument used for evaluating executive functions was the BRIEF-P (adapted from [57]), which provides information on self-regulation and other cognitive functions of children in an educational context. The sample includes children aged between 2 and 5 years, with a balanced distribution of gender and age, ensuring representation of both

stages of child development. The study compares the results obtained from children in the first cycle (2–3 years) with those in the second cycle (4–5 years), allowing for the identification of significant differences in the development of executive functions between the two groups.

This approach provides a clear view of the developmental differences in children's executive functions, facilitating the understanding of how these functions develop as children progress through early childhood education.

2.2. Participants

The typing sample is constituted by 1042 boys and 937 girls who are participants in the process of adaptation and validation of BRIEF-P (adapted from [57]). The inclusion criteria were to acceptance participation in the study, age range between 2 and 6 years, and no signs or indications of any type of neurodevelopmental disorder and/or disability.

In this study, the participants have been evaluated by different informants: 54.42% by parents and 45.58% by teachers. In relation to gender, 52.65% were male and 47.35% were female. In relation to age, 37.54% were in the range of 2–3 years and 62.46% were in the range of 4–5 years.

Students were grouped by education cycle and age. Table 2 shows the distribution of the participants according to educational cycle.

Table 2. Distribution of participants according to age and educational cycle (own elaboration).

Cycle	Year	Parents	Teachers	Total	%
1°	2–3 years	418	325	743	37.54%
2°	4–5 years	659	577	1236	62.46%
Subtotal		1077	902	1979	100%

Source: BRIEF-P (Spanish adaptation).

2.3. Measurement

Executive function assessment with BRIEF-P is an instrument that was recently validated in Spain by Bausela and Luque [57] with the aim of evaluating its development through the observation of key informants (teachers or other habitual caregivers of the child) (hetero research, self-investigation).

The BRIEF-P provides scores on various indices (global index of executive function, inhibitory self-control index, flexibility index, emergent metacognition index) and scales related to EFs (inhibition, flexibility, emotional control, working memory, planning and organisation).

BRIEF-P was completed by parents, legal guardians, and teachers of children with ages from 2 years to 5 years and 11 months who have had knowledge of the child for a minimum period of 6 months. The study was carried out using individual and collective applications.

The psychometric properties can be consulted in Bausela and Luque [58], where the relevant aspects related to reliability, validity, and other essential characteristics of the instrument used are detailed. For more information, see the Supplementary Materials.

2.4. Procedure

The procedure for applying the BRIEF-P by parents and teachers involves four key stages to ensure the validity and proper implementation of the test. First, collaborators must familiarise themselves with the norms, thoroughly reading them to understand the guidelines, securely storing materials, and explaining the evaluation objectives and data handling to informants. Second, participants are randomly selected from a normal sample without prior diagnoses, as are informants, including parents or teachers familiar with the child's behaviour. Third, differentiated booklets are used—one for parents and another for teachers/caregivers—and informants must complete their respective booklets while maintaining confidentiality and returning them appropriately. Finally, data are entered

into the scoring program at www.teacorrige.com, generating a graphical profile, intended as a general guide rather than a clinical diagnosis.

2.5. Analysis of Data

The data were submitted to descriptive and inferential analyses (bivariate and multivariate). Student's *t*-test was used to calculate the difference in the scales and clinical indices of BRIEF-P between the two age groups by age and educational cycle.

3. Results

The initial development includes descriptive statistical analyses, followed by inferential analyses.

Tables 3 and 4 show the distribution of the sample of participants evaluated according to the informants (parents versus teachers) in the two age groups (three years versus four years) and educational cycle (first cycle versus second cycle of early childhood education) that were evaluated.

Table 3. Distribution of the sample according to age and educational cycle by informant (parents) (only elaborated).

Parents ^(a)					
Clinical Scales/Indices		1° Cycle ECE		2° Cycle ECE	
		M	σ	M	σ
Clinical Scales	Inhibition	23.97	5.589	23.89	5.789
	Flexibility	13.96	3.363	13.17	3.05
	Emotional Control	14.67	3.538	14.36	3.661
	Working Memory	23.75	5.589	23.09	5.479
	Planning and Organisation	14.38	3.002	14.39	3.517
Indices	Inhibitory Autocontrol	38.64	8.417	38.25	8.673
	Flexibility	28.63	5.792	27.53	5.705
	Emergent Metacognition	38.13	8.126	37.48	8.578
	Global Executive Function	90.73	16.58	88.9	17.29

^(a) Parents: *n* = 1077. Source: BRIEF-P (Spanish adaptation). ECE: early childhood education.

Table 4. Distribution of the sample according to age group and educational cycle by informant (teachers) (only elaborated).

Teachers ^(a)					
Clinical Scales/Indices		1° Cycle ECE		2° Cycle ECE	
		M	σ	M	σ
Clinical Scales	Inhibition	22.77	6.255	21.42	6.193
	Flexibility	13.46	3.354	12.26	2.967
	Emotional Control	13.74	3.804	12.8	3.651
	Working Memory	23.64	6.747	21.81	6.015
	Planning and Organisation	13.82	3.919	12.76	3.235
Indices	Inhibitory Autocontrol	36.51	9.183	34.22	9.085
	Flexibility	27.2	6.238	25.06	5.604
	Emergent Metacognition	37.46	10.357	34.57	8.987
	Global Executive Function	87.44	19.278	81.05	17.43

^(a) Teachers: *n* = 902. Source: BRIEF-P (Spanish adaptation). ECE: early childhood education.

Tables 5 and 6 show the results of the Levene test of equality of variances prior to Student's *t*-test for the equality of means (or medians) of independent samples of the two informants (parents-teachers).

Table 5. Independent sample test in relation to age (first cycle versus second educational cycle of early childhood education) (version for parents) (own elaboration).

Executive Function		Parents ^(a)						
		Levene Test of Equality Variances		Student's <i>t</i> -Test for the Equality of Means				
		F	Sig. (Bilateral)	<i>t</i>	gl	Sig. (Bilateral)	Difference in Means	<i>d</i>
Clinical Scales	Inhibition	1.258	0.262 n.s.	0.215	1075	0.83 n.s.	0.077	0.000
	Flexibility	4.49	0.034 *	3.941	1075	0.000 ***	0.782	0.014
	Emotional Control	0.614	0.433 n.s.	1.373	1075	0.17 **	0.31	0.002
	Working Memory	0.005	0.941 n.s.	1.915	1075	0.056 *	0.661	0.003
	Planning and Organisation	10.234	0.001 ***	−0.047	1075	0.962 n.s.	−0.01	0.000
Indices	Inhibitory Autocontrol	0.826	0.364 n.s.	0.726	1075	0.468 n.s.	0.389	0.000
	Flexibility	0.047	0.828 n.s.	3.049	1075	0.002 **	1.094	0.009
	Emergent Metacognition	2.79	0.095 ***	1.239	1075	0.216 n.s.	0.651	0.001
	Global Executive Function	1.268	0.26 n.s.	1.714	1075	0.087 *	1.824	0.003

Source: BRIEF-P (Spanish adaptation). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, n.s. not significant. ^(a) Parents: 1° cycle early childhood education $n = 418$ /2° cycle early childhood education $n = 659$.

Table 6. Independent sample test in relation to age (first cycle versus second educational cycle of early childhood education) (version for teachers) (own elaboration).

Executive Function		Teachers ^(a)						
		Levene Test of Equality Variances		Student's <i>t</i> -Test for the Equality of Means				
		F	Sig. (Bilateral)	<i>t</i>	gl	Sig. (Bilateral)	Difference in Means	<i>d</i>
Clinical Scales	Inhibition	0.115	0.734 n.s.	3.127	900	0.002 **	1.348	0.002
	Flexibility	12.309	0.000 ***	5.565	900	0.000 ***	1.201	0.000
	Emotional Control	2.626	0.105 *	3.668	900	0.000 ***	0.943	0.000
	Working Memory	5.759	0.017 **	4.179	900	0.000 ***	1.822	0.000
	Planning and Organisation	11.969	0.001 ***	4.381	900	0.000 ***	1.062	0.000
Indices	Inhibitory Autocontrol	0.393	0.531 n.s.	3.622	900	0.000 ***	2.291	0.000
	Flexibility	8.272	0.004 ***	5.294	900	0.000 ***	2.144	0.000
	Emergent Metacognition	6.856	0.009 ***	4.377	900	0.000 ***	2.885	0.000
	Global Executive Function	3.502	0.062 *	5.08	900	0.000 ***	6.383	0.000

Source: BRIEF-P (Spanish adaptation). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, n.s. not significant. ^(a) Teachers: 1° cycle early childhood education $n = 325$ /2° cycle early childhood education $n = 577$.

The difference between first- versus second-cycle students was different depending on the informant:

- (i) When parents are informants, there are no statistically significant differences in planning and organisation, inhibitory self-control, and emergent metacognition. In all clinical scales and indices, except in planning and organisation, scores are higher in first-cycle participants compared to second-cycle participants (see Table 5). There are statistically significant differences in three clinical scales: flexibility (t [1075] = 3.94, $p = 0.000$, $d = 0.014$), emotional control (t [1075] = 1.373, $p = 0.17$, $d = 0.002$), and working memory (t [1075] = 1.915, $p = 0.056$, $d = 0.003$); and in two indices: flexibility (t [1075] = 3.049, $p = 0.002$, $d = 0.009$) and global executive performance (t [1075] = 1.714, $p = 0.087$, $d = 0.003$).
- (ii) When teachers are informants, there are statistically significant differences (see Table 6). These differences were found in all clinical scales and indices. In all clinical scales and indices, the scores are higher in participants in the first cycle compared to those in the second cycle. Statistically significant differences are obtained in:

- (a) Three clinical scales: inhibition ($t [900] = 3.127, p = 0.002, d = 0.002$), flexibility ($t [900] = 5.565, p = 0.000, d = 0.000$), emotional control ($t [900] = 3.668, p = 0.000, d = 0.000$), working memory ($t [900] = 4.179, p = 0.000, d = 0.000$), and planning and organisation ($t [900] = 4.381, p = 0.000, d = 0.000$).
- (b) All clinical indices: inhibitory self-control ($t [900] = 3.622, p = 0.000, d = 0.000$), flexibility ($t [900] = 5.249, p = 0.000, d = 0.000$), emergent metacognition ($t [900] = 4.377, p = 0.000, d = 0.000$), and global executive function ($t [900] = 5.08, p = 0.000, d = 0.000$).

Although the differences in means are significant in both groups, the effect sizes reported in parent evaluations are generally smaller, indicating that the observed differences, while statistically significant, are not substantial in practical terms. In contrast, teacher ratings show larger effect sizes, suggesting that the differences in executive functions observed by teachers are more pronounced and may have greater practical relevance. Thus, larger differences between the two educational stages are observed in the clinical working memory scale, the emergent metacognition index, and the global executive functioning index. When parents are the informants, the greatest differences reported between the two educational stages are found in the clinical flexibility index, flexibility index, and global executive functioning index.

These results suggest that, although there may be some agreement between parents and teachers regarding children's executive functions, the differences in effect sizes imply that teachers are observing more pronounced issues or skills related to executive functioning than parents. This could reflect differences in settings (home vs. school) or the nature of tasks in each context.

4. Discussion

The objective of the present study was to analyse and compare the development of EFs among schoolchildren who are in the transition period between the first and second cycles of early childhood education, in order to identify the executive dimensions that are developed in this educational period, which will mark subsequent development and academic performance.

The choice of two groups of schoolchildren with very different ages allowed us to determine whether, in these first periods of development, EFs form a segment or set, or whether, on the contrary, the dimensions that make up this construct are already differentiated according to different rhythms in their trajectory.

When the comparison is made using educational cycles, the differences increase in the number of indices and clinical scales within which there are statistically significant differences, particularly, in the case of parents, having significant differences in inhibition, flexibility (index and scale) emotional control, working memory, and global executive function. In the case of teachers, there are still statistically significant differences between schoolchildren in both cycles at all scales and clinical indices. It can be affirmed that when the comparison is made by educational level, a greater number of dimensions are obtained in which there are statistically significant differences among schoolchildren to substantiate design intervention programs aimed at the development of EFs in early childhood education.

The results obtained are in line with the results obtained by [19], who allude to the fact that at 3 years of age, more complex executive skills are developed (conflict resolution or active manipulation of information in working memory). At this same age, some 3-year-olds are flexible with respect to their attention in response to the demands of the situation and change, for example, their responses following clear verbal instructions. The foundations of planning and organisational skills have been evidenced in children aged 3 and 4 years [59].

In relation to inhibitory control, the results obtained take on the same direction as those obtained by Pérez, Carboni, and Capila [12], who conclude that in tasks requiring set

change (e.g., Wisconsin Card Sorting Test) 3-year-olds are unable to inhibit the mental set in which they are currently engaged and redirect their attentional focus to the new set.

We can consider that the stage between 3 years and 5 years of age is the period in which there is improvement of the processes of memory and inhibitory control that have arisen in early childhood (0 years of age). These basic skills will be fully developed in the school year.

Regarding cognitive flexibility, the results also confirm what Diamond [4] pointed out earlier, which is that it began to develop later in the period of 2 years and 10 weeks to 3 years of age, showing a significant increase during the school years.

Concerning self-regulation abilities, the data obtained are consistent with those that indicate that from 3 years and 6 months of age, a new stage is reached in terms of the inhibitory properties of adult speech, which is intended to be the child's own voice as the factor that achieves some voluntary control. This is achieved in children between the ages of 3 and 4 years as, during this period, the impulsive function of children's speech continues to predominate, although it slowly gives way to a semantic control that in later stages will really be determinant.

Functions of the central executive (inhibitory control, working memory, and cognitive flexibility) are especially important in this stage of early childhood education, conditioning subsequent development and access at the primary education stage. At the end of the first cycle of early childhood education, it is expected that the child will be able to initiate skills in logical/mathematical intelligence and reading/writing, among others.

In relation to the informant, we can state in general terms that parents and teachers are reliable sources for assessing development of EFs in early childhood education. However, in agreement with other authors, there are differences and similarities in their perception of the development of EFs [60,61]. These results may indicate that, when the teachers are the informants, they are more sensitive to development compared to the parents. On the other hand, children 3 years of age and in the first cycles present more difficulties with EFs, but these difficulties are reduced in the following year as a result of their own neurological maturation and their own educational intervention, which is developed in infantile education.

The obtained data indicate that when the informants are the teachers, statistically significant differences are obtained on all scales and clinical indices of BRIEF-P, both when the comparison is made by educational cycles as well as by chronological age.

When the informants are the parents, statistically significant differences are obtained on a smaller number of scales and clinical indices of BRIEF-P. Specifically, when the comparison is made by age and the informants are the parents, we obtain differences in scale and clinical index flexibility. When the comparison is made equally by age by teachers, statistically significant differences are obtained in all scales and clinical indices.

Thus, we researched how to analyse the degree of "sensitivity" that parents and teachers have toward this development, and also how to know the variable that has the greater predictive power of the performance of the EFs. The absence of statistically significant differences in the development of EFs in the two age groups (first cycle versus second cycle of early childhood education) was hypothesised in this study, since the study dimensions that configure the construct of EFs are interrelated with the first periods of development. Furthermore, it is not easy for observers (parents and teachers) to discern between the two groups of participants when comparing two groups of subjects with very similar ages, with a very small difference between the two educational cycles.

The development of EFs is analysed differently by informants (parents versus teachers), with significant differences between respondents. Thus, when the informants are teachers, statistically significant differences are obtained between the two age groups that are being analysed, whereas when the informants are the parents, there are no statistically significant differences in different clinical scales (inhibition and planning and organisation) and in clinical indices (inhibitory self-control and emerging metacognition). The differences found among the observers are in line with the results obtained by other researchers [60–63].

The obtained results allow us to acknowledge the existence of statistically significant differences according to the two age groups that were analysed, when evaluated by both parents and teachers. These data confirm that the different executive dimensions are supported by general neural circuits that mature and change throughout the life cycle, making it possible to analyse and make comparisons from the first periods of the life cycle. Our data, as well as those provided by other studies [1,64,65], suggest that as the development of typical children progresses, the children are maturing with respect to their executive competencies. This means that those children are more able to inhibit automatic responses that positively affect their attentional capacity, are more flexible, have greater emotional control, and are more capable of storing and managing information [66] in the field of mathematics [67] and in other fields of study. This typical developmental milestone will allow us to understand the difficulties that some children have in these competences, for example, children with attention deficit hyperactivity disorder [68,69], children with low birth weight (Anderson, McNamara, Andridge, and Keim, 2015) [70], children with language disorders [71] or learning disabilities [72], or children with autism spectrum disorder [73,74].

We can conclude by affirming that BRIEF-P is an instrument that is sensitive to the development of EFs and it is the informant that interacts with the child, guaranteeing a plural and diverse view depending on the development contexts (home versus school) and ecological validity of the scores. These results are in line with results obtained by other researchers [75] and justify the creation of different scales according to age groups and educational cycle. It is observed that the different dimensions evaluated (emergent metacognition, inhibitory self-control, and flexibility) follow different trajectories, being in line with the approach proposed by several researchers in relation to EFs [4,28,76–78].

These results lead to a need to proffer intervention proposals that are sensitive to these differences in development during the first stage of the life cycle, avoiding consideration of the EFs as a segment or set, since, for this first stage, evidence of differences in their development has been verified among children of age groups in the first cycle versus second cycle of early childhood education [3,79]. These results are consistent with neuroimaging studies, which confirm that the maturation of neural connections occurs by following a process, from the interconnected local regions to the regions of distributed connectivity, which works as the basis of the same function, as reflected in the maturation of cognitive abilities [80].

In the case of cognitive flexibility, the data are in line with those data provided by [3], who indicate that flexibility emerges towards the end of the third year of life, thus being at the border between the two age groups that were analysed.

The study highlights that, while there are significant differences in executive functions according to reports from parents and teachers, the effect sizes indicate that these differences are much more substantial from the teachers' perspective. However, both sources of assessment provide valuable information, and future research could explore why such discrepancies exist and whether interventions in either domain (home or school) could account for these differences.

These results also force us to include teachers and parents as evaluation agents and not to ignore their contributions. In accordance with this, the need to train and instruct parents and teachers in this construct is also estimated (for example, EFs and their relationship with basic instrumental skills, such as mathematical competence). The deep knowledge of the qualitative changes (and not limited to the quantitative aspects) of these higher-order cognitive processes are necessary to obtain a referent norm and to be able to understand all the differences and/or deviations that occur in typical development or disorders from the early stages of the life cycle (primary intervention) [81].

One of the strengths that we estimate from the present study is the sample that has been extracted from all of the national territory, which guarantees the representativeness and generalisation of the obtained results.

A potential limitation of this study is its cross-sectional design, which, although it provides a snapshot of the development of EFs at different stages of early childhood education, does not allow for the observation of longitudinal or dynamic changes over time in the same individuals. This approach may limit the ability to identify specific developmental patterns or analyse the impact of variables that evolve over time.

Nevertheless, the results obtained remain significant, as they provide a solid foundation for understanding the developmental differences between the first and second cycles and highlight the importance of fostering EFs from early childhood. Future studies could complement this work with longitudinal designs to corroborate and expand upon the conclusions presented here.

We are interested in opening new lines of research in collaboration with the Nesplora team, with the aim of analysing the concurrent validity of the BRIEF-P by comparing it with tests that assess executive functions using virtual reality technology. This collaboration will allow us to explore how virtual-reality-based assessments, which simulate dynamic and realistic environments, can complement or enrich traditional approaches to measuring executive functions. Through this comparative analysis, we aim to deepen the accuracy and applicability of assessment tools, as well as advance the development of innovative methods for studying cognitive performance in contexts closer to real-life situations [82,83].

Finally, in future lines of work, we will explore some of the factors that other authors [84,85] have investigated to explain the development of EFs. These factors include, among others, environmental influences, developmental trajectories, and individual and group differences, as well as the interactions between general cognitive abilities and specific experiences. This approach will allow us to expand our understanding of the processes underlying the development of EFs and its variability across different life stages and contexts.

5. Conclusions

In the present study, a crosscutting design has been proposed, which makes it impossible to analyse intraindividual differences in the development of EFs; it is therefore necessary to choose longitudinal designs [86] in order to analyse and compare intraindividual changes in the development of EFs.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/brainsci14121273/s1>.

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Data Availability Statement: These data have been provided to complement the information presented in the text, while fully respecting the confidentiality and privacy established as co-authors of the BRIEF-P Spain adaptation, as well as the commitments signed with TEA Ediciones Publishing. These data have been managed with due ethical consideration and in accordance with the established agreements, ensuring the protection of sensitive information.

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Article

The Association of Family Incivility with Adolescent Depression: A Moderated Mediation Model

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Abstract: Negative family interactions have an adverse impact on adolescent mental health. The present study focused on the influence of family incivility on adolescent depression. In order to examine the association of family incivility with depression, an integrated framework was constructed to explore the mediating role of self-compassion and the moderating role of sex differences. Two waves of data were collected from 999 Chinese senior high school students (43.6% males and 56.4% females), with a mean age of 16.58 ± 0.54 years. Time 1 family incivility was positively associated with depression at Time 2 ($r = 0.40, p < 0.001$). Sex differences moderated the link between family incivility and self-compassion, with their association being significant in females ($B = -0.07, SE = 0.03, p = 0.013$) but not in males ($B = 0.03, SE = 0.03, p = 0.376$). Regarding the effect of family incivility on depression, the direct effect was significant only in males ($B = 0.13, SE = 0.03, p < 0.001$), whereas the indirect effect via self-compassion was significant only in females ($B = 0.01, SE = 0.01, 95\% \text{ CI } [0.0010, 0.0232]$). The present findings revealed a positive association between family incivility and adolescent depression. Moreover, family incivility has a direct impact on depression in male adolescents and an indirect impact through self-compassion in female adolescents. These findings underscore the important role of adolescent sex differences in the impact of family incivility on adolescent depression and highlight the practical importance of developing interventions to reduce family incivility.

Keywords: family incivility; depression; adolescence; self-compassion; sex differences

1. Introduction

Depression is a prevalent health problem among adolescents [1]. Family environment plays a key role in adolescent development, with a negative family environment (e.g., less support and more conflict) increasing the risk of depression [1,2]. Negative family interactions, such as ignoring children's opinions and being condescending to them, are regarded as family incivility [3]. While previous research has revealed the impact of family incivility on cyberbullying and interpersonal adaptation among adolescents [4–6], its influence on adolescent mental health remains unclear. This study aimed to explore the relationship between family incivility and depression among adolescents. Based on expanded social information processing theory, we explored a mediating mechanism regarding the mediating role of self-compassion between family incivility and depression. Finally, we intended to further identify whether there exist some sex differences regarding the impact of family incivility on depression. An integrated framework was constructed to explore the association between family incivility and depression, with self-compassion as the mediator and sex differences as the moderator.

1.1. Influence of Family Incivility on Adolescent Depression

Family factors are robust antecedents of adolescent depression [1,2]. A cohort study found that those who experienced positive family relationships during adolescence had

lower levels of depression [1]. One of the most widely examined family factors is family support, which could satisfy adolescents' needs for belonging, love, and acceptance [7]. Several nationally representative surveys and systematic reviews have revealed the protective role of family support on adolescent mental health such as well-being and depression [2,8]. In addition, numerous studies have revealed the detrimental effect of negative family dynamics on adolescent depression [9–11]. In addition to frequently examined negative family interactions such as maltreatment, abuse, and neglect, the present study is focused on family incivility.

Family incivility refers to disrespectful behaviors that violate mutual respect between family members [3], such as ignoring each other and making demeaning comments. Compared with family aggression or abuse, family incivility tends to be subtler and more easily tolerated due to low intensity and ambiguous intentions [3,5]. Nevertheless, family incivility is harmful in the long term. Research among employees showed that retrospectively self-reported family incivility was associated with more psychological distress [3] and family–work conflicts [12]. In addition, family incivility was positively linked with hopelessness [4], negative affect [5], loneliness, and interpersonal adaption [6] among adolescents and young adults. According to Apsley and Padilla-Walker [13], when parents engage in incivility behavior such as criticism, neglect, and belittlement, adolescents will model these behaviors and become more critical and rigorous toward themselves, thus increasing the risk of depression. However, few studies have examined the influence of family incivility on adolescent psychopathology, particularly in relation to depression. By combining previous evidence on the impact of family factors on depression with empirical findings on the relationship between family incivility and mental health, we expect family incivility to be a risk factor for adolescent depression.

1.2. *Self-Compassion as a Mediator*

Self-compassion represents a positive self-construct and refers to being understanding and kind to oneself, especially when faced with personal failure or suffering. Self-compassion comprises three basic components: self-kindness, common humanity, and mindfulness [14]. Self-kindness is defined as responding to personal sufferings such as personal inadequacy or life difficulties in a supportive and kind way; common humanity refers to a cognitive understanding of these personal sufferings and treating them as part of common human experiences; and mindfulness represents a balanced awareness of these personal sufferings, i.e., neither exaggerating nor avoiding personal pains or negative feelings [15]. Based on a frequently used six-dimension assessment for self-compassion—the Self-Compassion Scale [16], both these three self-compassionate self-responding components and their counterparts—unself-compassionate components (self-judgment, isolation, and over-identification)—were included in the assessment of self-compassion.

A systematic review has found that self-compassion is negatively associated with adolescent psychopathology [17]. Specifically, self-compassion has proved to be an effective emotion regulation strategy for depression [18], and empirical research has revealed a negative predictive role of self-compassion on depression [19]. Moreover, self-compassion may play an important role in the relationship between family factors and mental health, with higher self-compassion associated with higher family support and less depressive symptoms [20]. Neff and McGehee [21] further found that self-compassion partially mediated the relationship between family factors (e.g., maternal support and family functioning) and well-being. Similarly, Jin, Liu and Miao [6] found that self-compassion mediated the impact of family incivility on interpersonal adaptation and loneliness. Based on social information processing theory, this study aimed to investigate the mediating role of self-compassion between family incivility and adolescent depression.

Social information processing theory posits that cues in the social environment activate different information processing processes that shape children's cognition, affect, and behavior [22]. Furthermore, Lau and Waters [23] proposed an expanded version of this theory for adolescent anxiety and depression, suggesting that depression and anxiety emerge

from the interplay of distal risk factors (e.g., genetics and environmental experiences) and proximal information-processing mechanisms (e.g., appraisal biases). Specifically, information-processing factors mediate the impact of distal risk factors on clinical symptoms. According to Lau and Waters [23], dysfunctional family dynamics, such as abuse and neglect, act as typical environmental risk factors. Information-processing variables, especially attention biases and appraisal biases, act as candidate mediators between distal risk factors and adolescent depression. Therefore, it may be that family incivility, acting as distal risk factor, triggers negative information processing such as attention and appraisal biases toward oneself, which then manifests as less compassionate self-responding and in turn causes depression.

1.3. Moderating Role of Adolescent Sex Differences

Considering that adolescence is a crucial developmental period and that male and female adolescents differ in their social functioning and reactions to stress [24], the present study aimed to further examine the possible sex differences in the impact of family incivility on adolescent depression. Compared to male adolescents, female adolescents are at higher risk of depression [1,25]. Moreover, according to Chen and Harris [1], compared with males, females are more likely to benefit from positive family interactions in reducing depression. However, more research is needed to clarify whether the impact of negative family interaction on adolescent depression differs between the sexes.

Empirical evidence on the sex difference in the level of experienced family incivility is inconsistent. For instance, Jin, Liu and Miao [6] found non-significant differences between male and female high school students. However, Bai, Bai, Huang, Hsueh and Wang [4] found in another adolescent sample that boys experienced higher levels of family incivility than girls, which was consistent with Jin and Miao's [5] findings among university students. Therefore, more research is needed to explore whether adolescent males and females experience different levels of family incivility.

Moreover, the relationship between the sex difference and the impact of family incivility on adolescent mental health remains unknown. A systematic review pointed out that experiencing stress during puberty and early adulthood has a stronger proximal impact on females than males because females are more sensitive and vulnerable to stress [26]. When encountering stress such as maltreatment, girls are more reactive to stress and more likely to adopt internalizing coping strategies such as rumination and self-criticism [27], thereby increasing the risk of developing internalizing disorders such as depression [28]. For instance, female adolescents reported higher levels of interpersonal stress than male adolescents and showed greater cortisol reactivity to interpersonal challenges, such as social rejection [29]. In addition, females are more reactive to emotional stimuli, especially unpleasant or threatening ones [30]. Considering that family incivility could trigger negative affect [4,5], it is reasonable to suppose a severer impact of family incivility on mental health among female adolescents than male adolescents.

As for the hypothesized mediating role of self-compassion, a previous review has revealed that males demonstrate higher levels of self-compassion than females [31]. Similar results were also obtained in various adolescent samples [32–34]. Due to hormonal changes during adolescence, females are more vulnerable to stress and adverse experiences [26], thus leading to poor hypothalamic–pituitary–adrenal axis functioning and higher cortisol activity [35]. In addition, females are more likely to overreact to emotional information, thus increasing the risk of disorder in emotion regulation [36]. Therefore, when encountering adverse events such as family incivility, female adolescents tend to appraise these experiences in a more negative way; hence, they are more likely to engage in biased information processing, manifesting as less self-compassionate self-responding. Hence, we suppose that the sex difference moderates the indirect effect of family incivility on depression via self-compassion, with the indirect effect being stronger on females than males.

1.4. The Present Study

This study aimed to examine the relationship between family incivility and adolescent depression. Building on social information processing theory, we proposed a conceptual model in Figure 1 to explain the underlying mechanism for the impact of family incivility on depression. Moreover, given the sex differences in response to stress and adverse events during adolescence and the differing impact of family interactions on adolescent depression, the present study aimed to further investigate sex as a moderator on the impact of family incivility on depression. Specifically, we proposed the following hypotheses:

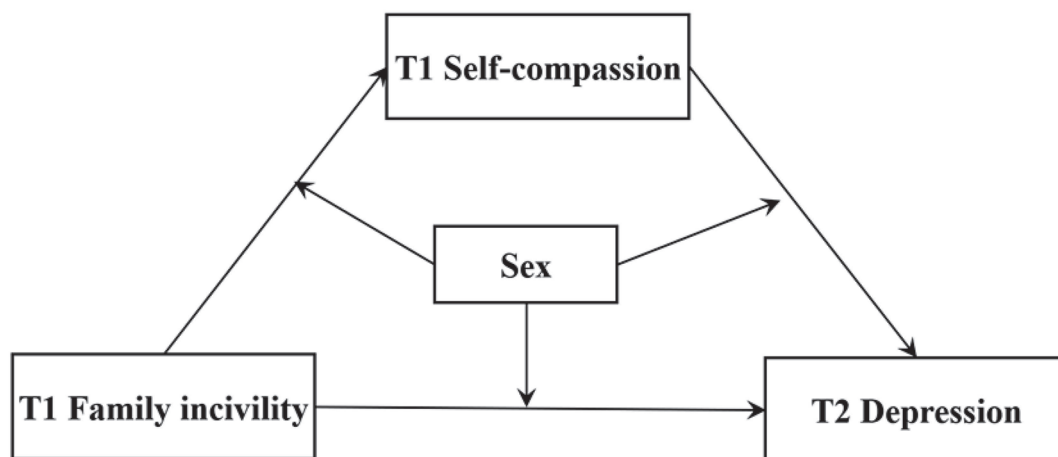


Figure 1. Hypothesized moderated mediation model. Note: Depression at T1 was included as a covariate to control for baseline depression levels, ensuring that the observed effects of family incivility on depression at T2 are not confounded by pre-existing differences in depression.

Hypothesis 1 (H1). *family incivility is positively associated with depression.*

Hypothesis 2 (H2). *self-compassion mediates the relationship between family incivility and depression.*

Hypothesis 3 (H3). *sex differences moderate the relationship between family incivility and depression such that their association is stronger in female adolescents than male adolescents.*

Hypothesis 4 (H4). *sex differences moderate the indirect effect of family incivility on depression via self-compassion, with the indirect effect being stronger on female adolescents than male adolescents.*

2. Method

2.1. Participants and Procedure

A two-wave longitudinal design was employed to examine the mediating role of self-compassion between family incivility at Time 1 (T1) and depression at Time 2 (T2). Specifically, depression was assessed at both time points to account for its baseline level. For the hypothesized mediating model, the Monte Carlo Power Analysis for Indirect Effects (https://schoemanna.shinyapps.io/mc_power_med/) (accessed on 27 November 2024) written by Alexander M. Schoemann, Aaron J. Boulton, and Stephen D. Short was used to estimate the sample size. Based on the results by Jin et al. (2023), we set the correlation between family incivility and self-compassion at 0.3, and according to Marsh, Chan and MacBeth [17], we set the correlation between self-compassion and depression at 0.52. For the correlation between family incivility and depression, we used a moderate value of 0.3. The power analysis indicated that to obtain a minimum power of 0.8, at least 90 participants were needed. Of note is that we were unable to evaluate the minimum sample size for the hypothesized moderated mediational model, since characterizing effect sizes in such

models are not clearly understood. However, we tried to recruit a large enough sample for the model analyses.

Participants were recruited through convenience sampling in a senior high school in a county in Guangdong Province, China. The questionnaires were administered in Chinese to all twenty-four classes in the senior-two grade. Two waves of data were collected one month apart. Questionnaires that displayed response patterns and failed on the infrequency/attention check item were considered invalid data. In total, 1079 and 1050 adolescents provided valid data at T1 and T2, respectively. Data from adolescents at different time points were matched through the participants' unique ID, which was generated for and in this study. Finally, data from 999 adolescents (56.4% female and 43.6% male) were matched and included in the final analyses, with their age ranging from 15 to 19 years (mean [M] = 16.58 ± 0.54). Among them, results showed that 177 (17.7%) were only-child adolescents, 821 (82.2%) had at least one sibling, and one did not report this information. Regarding parental education, since the data were collected in a remote county, 78.1% of mothers and 71.9% of fathers had an education level below senior high school. See Table 1 for detailed demographic information.

Table 1. Demographic information of the sample.

	Cases	Percentage (%)
Sex		
Female	563	56.4
Male	436	43.6
Only-child		
Yes	177	17.7
No	821	82.2
Missing value	1	0.1
Father's education		
Primary school or below	105	10.5
Junior high school	613	61.4
Senior high school	149	14.9
college	63	6.3
Bachelor or above	62	6.2
Missing value	7	0.7
Mother's education		
Primary school or below	184	18.4
Junior high school	596	59.7
Senior high school	99	9.9
college	65	6.5
Bachelor or above	44	4.4
Missing value	11	1.1

This study was approved by the ethics committee of the corresponding author's institution. Before data collection, approval for this study was obtained from the school administrator, class teachers, and adolescents' parents. All adolescents voluntarily participated in this study, and informed consent was obtained from them prior to data collection. Each survey was group tested using paper and pencils. To generate the unique IDs used to match the two waves of data, participants were required to write down their birthdays and the last four digits of their phone numbers in each survey. The participants completed the questionnaires in quiet classrooms and were given small gifts (a bookmark or a key chain) upon completion of each survey.

2.2. Measures

Family incivility was assessed at T1 using the 6-item Family Incivility Scale [3], which measures the frequency of uncivil behaviors experienced in the family. Sample items included "Put you down or was condescending to you" and "Ignored or excluded you from social activities." Responses were given on a 5-point Likert-type scale ranging from 1

to 5 (1 = not at all, 5 = most of the time). The Chinese version showed satisfactory reliability among Chinese adolescents [4]. A previous study among Chinese adolescents further tested the scale's reliability and validity. The results of confirmatory factor analysis yielded acceptable results, and both Cronbach's alpha and McDonald's Omega were satisfactory, reaching 0.92 [6]. In the current study, the Cronbach's alpha was 0.84.

Self-compassion was measured at T1 using the Chinese version of the Self-Compassion Scale [16], which comprises six subscales, namely self-kindness, common humanity, mindfulness, self-judgment, isolation, and over-identification. Responses were given on a 5-point Likert scale ranging from 1 to 5 (1 = not at all true of me, 5 = very true of me). In the present study, the Cronbach's alphas ranged from 0.59 to 0.79 for the six subscales and reached 0.88 for the total scale.

Depression was assessed at both time points with the Chinese version of the Depression Anxiety Stress Scale [37,38], which comprises three 7-item subscales: depression, anxiety, and stress. Only the depression subscale was used in the present study. Responses were given on a 4-point Likert scale ranging from 1 to 4 (1 = not applicable to me, 4 = applicable to me often or most of the time). The Cronbach's alpha was 0.82 at T1 and 0.87 at T2.

2.3. Data Analysis

SPSS version 25 was used to conduct attrition analyses, descriptive analyses, and Pearson's correlations. Then, the PROCESS macro in SPSS was used to conduct moderated mediation analyses [39]. Model 59 was used, with bootstrap samples set at 5000. The index of moderated mediation (IMM) was also calculated to examine whether the hypothesized mediation pathway was significantly moderated by sex differences [39].

3. Results

3.1. Attrition Analyses

Regarding the final sample ($N = 999$) and those who dropped out ($N = 80$), no significant differences were found in age, the father's education level, whether an only child or not, and the study variables. Nevertheless, compared with the final sample (436 males and 563 females), those who dropped out (47 males and 33 females) were more likely to be male ($\chi^2 = 6.84$, $p = 0.009$). In addition, the mother's education level was higher among those who dropped out ($M = 2.61 \pm 1.20$) than the final sample ($M = 2.18 \pm 0.96$, $t = 3.09$, $p = 0.003$, Cohen's $d = 0.44$).

3.2. Descriptive Statistics

Table 2 displays the means, standard deviations (SD), and correlations among study variables. Results showed that family incivility showed a negative association with self-compassion ($r = -0.27$, $p < 0.001$) and a positive association with depression ($r_{T1} = 0.42$, $p < 0.001$; $r_{T2} = 0.40$, $p < 0.001$). Therefore, H1 was supported. Regarding demographics, both sex and the only-child status demonstrated a low level of association with self-compassion, with females and those who have siblings demonstrating a slightly low level of self-compassion. In addition, the results of analysis of variance (ANOVA) revealed no significant differences between groups based on the father's and mother's educational levels for any of the study variables ($ps > 0.05$), including family incivility, self-compassion, and depression. Therefore, only the demographics of the only-child status was controlled in the subsequent analyses.

Table 2. Means, standard deviations, and correlations among study variables (N = 999).

	M	SD	1	2	3	4	5	6
1 Age	16.58	0.54						
2 Sex	-	-	−0.08 *					
3 Only child	-	-	0.02	0.16 **				
4 T1 family incivility	1.85	0.71	0.01	−0.02	−0.03			
5 T1 self-compassion	3.16	0.52	−0.02	−0.08 *	−0.07 *	−0.27 **		
6 T1 Depression	1.56	0.50	−0.01	0.03	0.00	0.42 **	−0.57 **	
7 T2 Depression	1.54	0.54	0.04	0.004	0.01	0.40 **	−0.51 **	0.74 **

Note: Both sex and the only-child status were binary coded (Sex: 1 = male, 2 = female; Only child: 1 = yes, 2 = no).

* $p < 0.05$. ** $p < 0.01$.

3.3. Moderated Mediation Analyses

As is shown in Table 3, the results revealed a significant moderating role of sex on the association between family incivility and self-compassion: $B = -0.09$, $SE = 0.04$, $p = 0.015$. Specifically, as can be seen in Table 4, family incivility was negatively linked to self-compassion among female adolescents, $B = -0.07$, $SE = 0.03$, $p = 0.013$, whereas their association was non-significant among male adolescents, $B = 0.03$, $SE = 0.03$, $p = 0.376$ (Figure 2A). In addition, sex also moderated the direct association between T1 family incivility and T2 depression, $B = -0.10$, $SE = 0.03$, $p = 0.004$. Specifically, the results in Table 4 showed that the direct association between family incivility and depression was significant among male adolescents, $B = 0.13$, $SE = 0.03$, $p < 0.001$, while this effect was non-significant among female adolescents, $B = 0.04$, $SE = 0.02$, $p = 0.101$ (Figure 2B). Therefore, H3 was partly supported. However, sex did not moderate the negative association between T1 self-compassion and T2 depression.

Table 3. Unstandardized regression results of the moderated mediation model.

	T1 Self-Compassion			T2 Depression		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Only child	−0.09	0.04	0.018	0.02	0.03	0.594
T1 Depression	−0.58	0.03	<0.001	0.66	0.03	<0.001
X (T1 FI)	0.12	0.06	0.059	0.23	0.05	<0.001
M (T1 self-compassion)				−0.07	0.08	0.357
W (Sex)	0.12	0.08	0.121	0.29	0.17	0.089
X × W	−0.09	0.04	0.015	−0.10	0.03	0.004
M × W				−0.04	0.05	0.327

Table 4. The results of conditional effects.

Conditional Effects	<i>B</i>	<i>SE</i>	<i>p</i>	Boot LLCI	Boot ULCI
Direct effect of family incivility on self-compassion					
Male	0.03	0.03	0.376	−0.0326	0.0861
Female	−0.07	0.03	0.013	−0.1206	−0.0140
Direct effect of family incivility on depression					
Male	0.13	0.03	<0.001	0.0810	0.1837
Female	0.04	0.02	0.101	−0.0074	0.0827
Indirect effect of family incivility on depression via self-compassion					
Male	−0.003	0.01		−0.0137	0.0055
Female	0.01	0.01		0.0010	0.0232
Index of moderated mediation	0.01	0.01		0.0010	0.0296

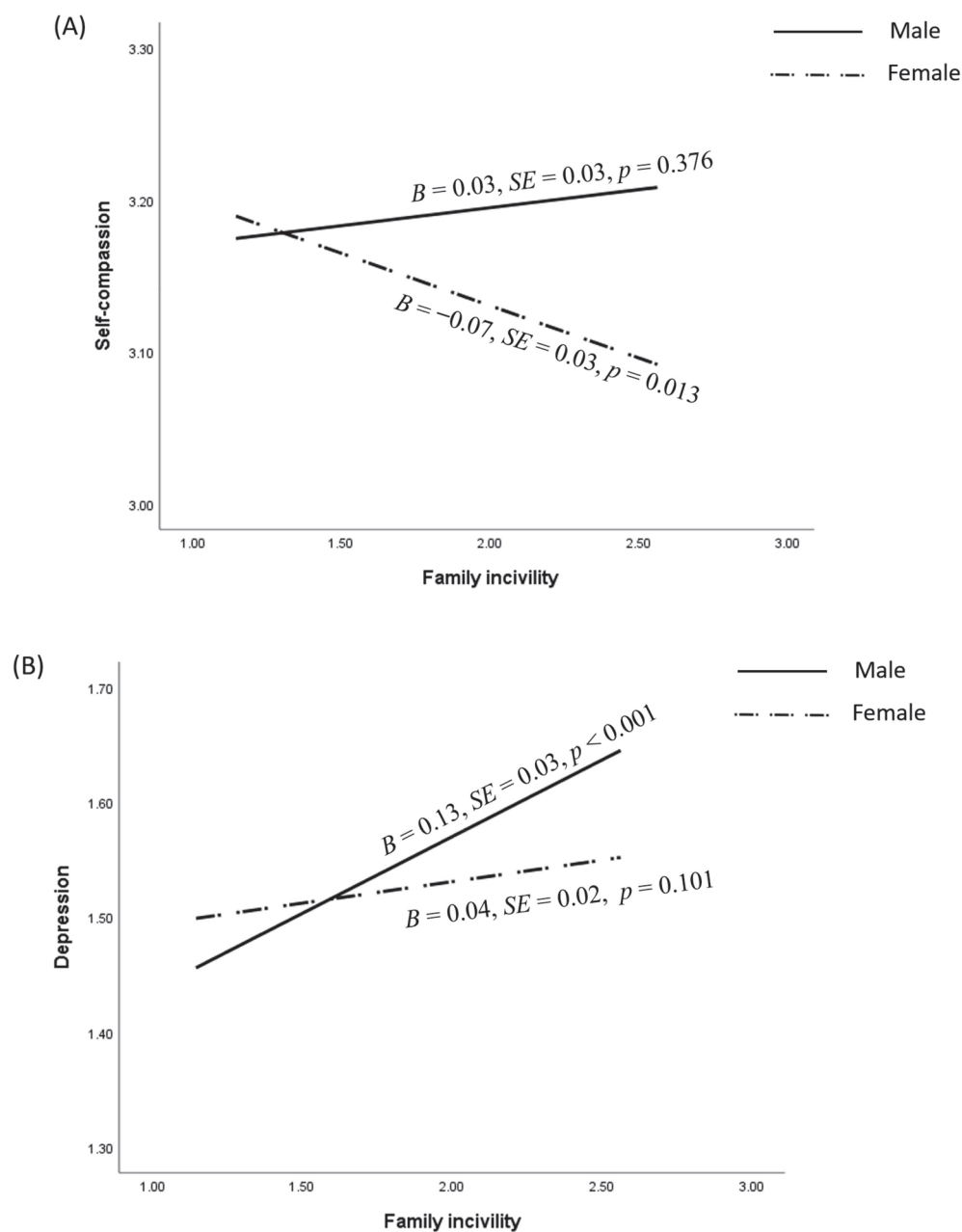


Figure 2. Moderating role of sex differences on the impact of family incivility: (A): indicates the simple slope analyses of family incivility on self-compassion; (B) indicates the simple slope analyses of family incivility on depression.

Furthermore, as is shown in Table 4, sex moderated the indirect effect of family incivility on depression via self-compassion, $IMM = 0.01, SE = 0.01, 95\% [0.0010, 0.0296]$. Specifically, the indirect effect was significant only in female adolescents ($B = 0.01, SE = 0.01, 95\% [0.0010, 0.0232]$) and not in male adolescents ($B = -0.003, SE = 0.01, 95\% [-0.0137, 0.0055]$). Therefore, H2 was supported among female adolescents, and H4 was supported.

Additionally, due to the short interval between T1 and T2, the strong autoregressive effect of depression may have reduced the coefficients of other variables on T2 depression in the model. To address this, we re-ran the moderated mediation analyses without controlling for T1 depression. The results remained consistent, with sex significantly moderating the mediating pathway from family incivility to depression via self-compassion. Detailed results are provided in the Tables S1 and S2.

4. Discussion

Family-related environmental factors have significant impact on adolescent mental health [1,40]. Regarding negative family interaction, the previous research was mainly focused on severe factors such as family aggression or abuse. However, the present study was concerned with a more subtle but common interaction—family incivility. Drawing on expanded social information processing theory [23], this study proposed the underlying mechanisms for the effect of family interaction on adolescent depression: family incivility impairs self-compassion, which further leads to depression. The results showed that the impact of family incivility varied by sex. For male adolescents, family incivility demonstrated a significant direct effect on depression, while for female adolescents, family incivility was associated with depression indirectly via self-compassion. These findings suggest that family incivility places adolescents at a high risk of developing mental health problems, such as depression, in both the male and female adolescents. In addition, it brings researchers' attention to sex differences and highlights the importance of considering these differences when developing interventions of family incivility for adolescents.

4.1. Indirect Association of Family Incivility with Depression via Self-Compassion Among Females

While previous research has revealed a close association between family factors and adolescent depression, empirical research on family incivility remains limited, despite such incivility being common in parent–adolescent interactions, often ignored by those affected by it, and having the potential to cause enduring impacts [4,5]. The present results found that T1 family incivility was positively associated with depression at both T1 and T2. Further analyses found that this association varied by sex. For female adolescents, the direct effect of T1 family incivility on T2 depression was non-significant when controlling for T1 depression. On the contrary, family incivility demonstrated an indirect effect on depression via self-compassion, which is in line with Jin and Miao's [6] findings that self-compassion mediated the relationship between family incivility and mental health (i.e., loneliness and interpersonal adaption).

From a social development perspective, social relationships play a key role in developing a positive and healthy view of the self in adolescents [22,41]. Specifically, the view of the self (e.g., self-compassion and self-esteem) is mainly based on social information, such as social relationships and feedback from social connections [41]. Hence, family incivility would destroy positive parent–adolescent relationships and generate negative feedback, thus impacting the development of a healthy view of the self, such as self-compassion. Furthermore, based on social information processing theory [23], the present findings supported the hypothesis that self-compassion acts as a proximal information-processing mechanism between distal risk factors of family incivility and adolescent depression. Dysfunctional family interactions will trigger negative view of the self, thus leading to a critical self-view, which is more likely to cause mental health problems. In contrast, less incivility and more support can foster positive and compassionate self-views because compassion and care are modeled by parents in supportive relationships [21]. When faced with personal sufferings, these adolescents are more likely to internalize a positive self-view, thus alleviating mental health problems.

4.2. Direct Association of Family Incivility with Depression Among Males

For male adolescents, the indirect effect of family incivility on depression was non-significant; instead, it showed a direct effect on depression. Specifically, contrary to the results among females, the association between family incivility and self-compassion was non-significant for males. Compared to male adolescents, female adolescents are more vulnerable to stress and show an increased risk of developing affective disorders such as anxiety and depression [42,43]. Due to the influence of sex hormones [42,43], especially during puberty, females are more likely to adopt emotional coping strategies or internalizing coping strategies such as self-criticism when encountering stress and adverse experiences, whereas males tend to engage in problem-solving strategies instead

of emotional ones [27]. Moreover, females tend to perceive life stress and maltreatment as more negative, serious, and uncontrollable than males [36]. Therefore, when parents interact with their children in an uncivil way, for instance, belittling or doubting their judgment and neglecting or excluding them, it can be particularly harmful to the emotion regulation of female adolescents. Hence, consistent with the previous empirical studies that found sex differences moderated the association of emotional abuse and neglect with difficulty in identifying feelings (with stronger impacts in females) [36], the present study found that the negative association of family incivility with self-compassion was also stronger in female adolescents than male adolescents.

However, contrary to our hypothesis that the association between family incivility and depression is higher in females than males (H3), the direct association between them was significant only in males but not females. These findings suggest that family incivility might also do harm to male adolescents' mental health and highlighted the need to further examine the underlying mechanism for them. A previous study found that parental neglect demonstrated a stronger association with hope in boys than girls [44]. Given that hope is a vulnerability factor for depression and that various research has revealed the predictive role of hope on depression [45], future research could examine whether hope could explain the impact of family incivility on depression among male adolescents. Additionally, it should be noted sex differences in response to stress and negative events and the related emotional responses might only exist during periods of significant hormonal fluctuation such as puberty, pregnancy, and menopause [26,46]; caution should be exercised when generalizing the present findings on sex differences to other groups.

4.3. Implications

This study was focused on the association between family incivility and depression, with sex differences taken into consideration. The present findings revealed that family incivility is a vulnerability factor for depression in both male and female adolescents, with the underlying mechanism varies with sex. Theoretically, our evidence conforms to previous findings and adds to the literature in three ways. First, previous studies on family risk factors for adolescent depression have mostly focused on childhood trauma (e.g., bereavement) and dysfunctional family interaction (e.g., abuse) and overlooked mild stressors, such as family incivility. The present findings highlight the negative impact of family incivility on adolescent depression. Second, this study extends social information processing theory to the field of family incivility and promotes our understanding of the mechanisms underlying the influence of family interaction on depression. Third, the present study contributes to the literature by revealing sex differences in response to family incivility, which is directly associated with depression for male adolescents but indirectly associated with depression via self-compassion for female adolescents. These findings can deepen the understanding of the psychopathological differences in the impact of negative family interaction or maltreatment between the sexes.

The present findings have practical implications for the promotion of adolescent mental health. First, it underpins the adverse effects of family incivility on adolescent depression. Family incivility is easily ignored and difficult to restrain [4], making it a risk factor for the struggles in obtaining a healthy view of the self and developing mental health problems in the long run. Therefore, parents should be educated regarding the influence of family incivility and improve their awareness and self-reflection about uncivil behaviors in parent–adolescent interactions. Interventions to promote mutual respect and strengthen supportive parent–adolescent interactions are needed. Tara, Turpyn, Fischer, Martelli, Ross, Leichtweis, Miller and Sinha [47] found that parenting-focused mindfulness interventions could increase mindful parenting and promote parent–adolescent relationships, so it might be a useful design when attempting to increase parents' mindfulness regarding their uncivil behaviors toward adolescents.

Second, the moderating role of sex differences on the direct and indirect association between family incivility and depression highlighted the importance of considering sex

differences while developing interventions for the prevention of family incivility for adolescents. Given the indirect association of family incivility with depression via self-compassion among female adolescents, in addition to parenting-focused interventions, developing self-compassion interventions might help to block the negative impact of family incivility on mental health.

4.4. Limitations and Future Directions

Some limitations of this study should be noted. First, although a two-wave design was used, the relatively short one-month interval between T1 and T2 limited the examination of long-term associations between study variables. Moreover, when controlling for baseline depression, the strong autoregressive effect likely resulted in smaller regression coefficients for other variables. Therefore, future research should collect at least three waves of data over a longer time period to assess the longitudinal relationships between family incivility, self-compassion, and depression and to better capture the influence of family incivility on changes in depression over time. Second, due to the observational nature of the study design and the use of self-report assessments, we should be cautious when drawing causal conclusions. Future researchers could adopt experimental and interventional designs to replicate the present findings. Additionally, while family incivility is usually assessed by self-report tools, such an approach makes excluding the possibility of self-report bias a difficult undertaking. The uniformity of this construct also limits the exploration of diverse forms of family incivility. Hence, scholars are encouraged to consider objective or observer-reported assessments, such as parent–child interaction observations, to address these limitations. Third, considering that participants were recruited from the same grade of a single senior high school in China, their demographics were homogeneous. Moreover, given that the majority of the adolescents' parents' education levels were below senior high school, the present sample had a relatively low socioeconomic status. More diverse samples are needed to generalize the present findings to groups of different ages, socioeconomic status levels, and cultures. Finally, given that paternal and maternal attachment has different impacts on adolescents' self-compassion and self-evaluation between the sexes [48,49], more research is needed to examine whether the impact of family incivility varies between the parent and adolescent depending on their respective sex.

5. Conclusions

The present study revealed a positive link between family incivility and adolescent depression and sex differences were observed. Specifically, the direct association between family incivility and depression was significant in males, but non-significant in females. On the contrary, the indirect effect of family incivility on depression via self-compassion was significant in females, but not in males. When developing interventions for the prevention of family incivility, sex differences should be taken into consideration.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/bs14121159/s1>, Table S1: Unstandardized regression results of the moderated mediation model without controlling for T1 depression; Table S2: The results of conditional effects without controlling for T1 depression.

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Opinion

Embracing Connection: A Review of First-Ever Clinical Guidelines on Social Isolation and Loneliness in Older Adults

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Abstract: Social isolation and loneliness are major public health concerns and are associated with morbidity and mortality. As this is an increasing issue in older adults, guidance for healthcare providers is a priority. The Canadian Coalition for Senior's Mental Health (CCSMH) has developed the first Canadian social isolation and loneliness guidelines to help providers recognize, assess, and manage social isolation and loneliness among older adults. We review and summarize these guidelines to support healthcare and social service providers to apply best practices and evidence-based care for older adults experiencing social isolation and loneliness.

Keywords: loneliness; social isolation; clinical practice guidelines; older adults

1. Introduction

Social isolation and loneliness have major public health implications and remain a challenge internationally [1,2]. Loneliness is defined as the subjective feeling of unmet social needs or the feeling of being lonely [3]. Social isolation is defined as few or infrequent social contacts or the objective lack of social contact with other individuals [3]. Older adults (generally defined as 65 years of age or greater) [4] are particularly vulnerable to loneliness and social isolation due to changes in social structures, medical comorbidities, and living settings [5–8]. Given that over 10% of the global population is aged 65 years and over [9,10], social isolation and loneliness have far-reaching impacts and consequences for older adults [11]. Further, up to 58% of Canadian adults over fifty years of age experience loneliness, and 41% are at risk of social isolation [12]. European and American prevalence estimates of loneliness have reported that this issue affects up to one third of older adults [3,13,14]. As best practices in prevention, assessment, and management of social isolation and loneliness are paramount for healthcare and social service providers, the Canadian Coalition for Senior's Mental Health (CCSMH) published the Canadian Clinical Guidelines on Social Isolation and Loneliness in Older Adults in 2024 [15]. We describe the development of these guidelines as the first clinical practice guidelines on this issue and highlight key practice points to inform healthcare providers.

2. Development of the Practice Guidelines

The Canadian Coalition for Senior's Mental Health is a not-for-profit interprofessional organization that was established in 2002 with the mandate of improving the mental health of older adults. Since then, the CCSMH has published clinical guidelines on mental health in long-term care, suicide prevention, depression, delirium, substance use disorders, behavioral and psychological symptoms of dementia, and anxiety.

The CCSMH created a Guideline Development Working Group of nine core members (including the authors of this commentary) with diversity in gender, clinical practice/expertise, professional discipline, and Canadian geographical area. These included one geriatric psychiatrist, one geriatrician, one care of the elderly family physician, two social workers, one occupational therapist, and two researchers. The CCSMH completed a rapid scoping review of reviews and identification of gray literature [16]. This was followed by a national survey to capture perspectives from healthcare providers and older adults. Due to the opportunity for many different healthcare professionals to identify and support older adults experiencing social isolation and loneliness, our aim was to provide guidance across multiple disciplines. As such, we use healthcare and social service providers (HCSSP) to broadly include all professionals who provide care for older adults.

The working group divided the sections by area of expertise for guideline drafting, later reaching consensus during teleconference meetings and subsequently voting on the guidelines. This methodology has been used in previous guidelines published by the CCSMH [17–19]. Sections of the guidelines were divided into Prevention, Screening and Assessment, and Interventions. These provide a framework for the healthcare provider across the spectrum from health promotion to management [20]. Interventions were divided by their primary intended category based on previous research [21,22]. The working group applied a modified version of the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) to assess the quality of the evidence (low, moderate, or high) for each recommendation and its available strength (weak or strong) [23]. In brief, the GRADE domains assess the risk of bias, imprecision, inconsistency, indirectness, and publication bias to rate the confidence in the available literature [23]. The modified approach further incorporates the confidence that patients will benefit from the action. Recommendations are then rated up or down, respectively, to obtain a scale from low to high. High certainty recommendations suggest a high degree of confidence in the true effect, and the opposite for low certainty recommendations.

The strength of the recommendation indicates the following: (1) the degree of confidence in which the proposed action (e.g., prevention, assessment, or intervention) has desirable effects that outweigh negative consequences; (2) uncertainty or variability in a patient's values and preferences; and (3) the resources associated with the action. The balance of these factors are used to designate the strength of the recommendation (weak or strong). Recommendations that had limited evidence but were considered best clinical practice were categorized as consensus recommendations. Assessment criteria for the quality of the evidence and the strength of the recommendations can be found in Tables 1 and 2, respectively. All recommendations were independently voted on by committee members and were adopted if they had at least 75% approval; consensus was reached on all recommendations. These guidelines were reviewed by three external academic experts to provide feedback prior to publication.

Table 1. Summary of the assessment criteria used to determine the quality of evidence.

Quality of the Evidence	Description
High	Further research is unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on the confidence in the estimate of effect and may change the estimate.
Low	Further research is very likely to have an important impact on the confidence in the estimate of effect and is likely to change the estimate.

Adapted from the CCSMH Clinical Practice Guidelines for Social Isolation and Loneliness.

Table 2. Summary of the assessment criteria used to determine the strength of the recommendation.

Strength of the Recommendation	Description
Strong	Strong recommendations indicate high confidence that the desirable consequences of the proposed course of action outweigh the undesirable consequences or vice versa. In some cases, strong recommendations are made without high-quality evidence.
Weak	Weak recommendations indicate that there is either a close balance between benefits and downsides (including adverse effects and burden of treatment), uncertainty regarding the magnitude of benefits and downsides, uncertainty or great variability in patients'/clients' values and preferences, or that the cost or burden of the proposed intervention may not be justified.

Adapted from the CCSMH Clinical Practice Guidelines for Social Isolation and Loneliness.

3. Applying the Guidelines to Clinical Practice

These guidelines are divided into sections on Prevention, Screening and Assessment, and Interventions (Table 3) and are briefly summarized below. We recommend that health-care providers apply these guidelines to all practice settings. This may include primary care offices and clinics, hospitals, and community and government agencies, amongst others.

Table 3. Summary of recommendations for Prevention, Screening and Assessment, and Interventions for social isolation and loneliness.

Recommendation	Evidence	Strength
Prevention		
1. Healthcare providers should have knowledge of risk factors for social isolation and loneliness in older adults.	Moderate	Strong
2. Education and training about loneliness and social isolation should be a part of the curriculum for healthcare and social service professionals.	Consensus	
3. Healthcare and social service professionals should use their role, as agents of change, to help inform and educate patients/clients and the general public about the association between social isolation and loneliness and poor mental and physical health, and to promote social connection.	Consensus	
Assessment and Screening Tools		
4. HCSPs should use targeted screening for those older adults who have risk factors for social isolation and loneliness.	Consensus	
5. When screening patients/clients, HCSPs should use evidence-based screening tools to identify patients/clients who are socially isolated and/or lonely, to assess the severity of the problem, and in routine follow-up to determine whether the patient's/client's social situation has changed and whether interventions are effective.	Moderate	Strong
6. When social isolation and loneliness are identified in older adults, they should be documented in the health record like other medical conditions and risk factors. Efforts should be made to collect data on social isolation and loneliness as important social determinants of health. Loneliness and social isolation may be considered "psychosocial vital signs" given their impact on health.	Consensus	
7. A thorough clinical assessment with a patient/client who is socially isolated and/or lonely should aim to explore the possible causes and identify any underlying health conditions that may be contributing factors. Other causes that may be contributing should also be identified, adopting a biopsychosocial approach. A comprehensive assessment can guide the development of an appropriate management plan. The assessment may vary according to the healthcare and social service professional's scope of practice.	Consensus	

Table 3. Cont.

Recommendation	Evidence	Strength
Interventions		
8. HCSSPs should apply several principles to help older patients/clients who are socially isolated and/or lonely, including: • Ensure initially or concurrently that treatment is provided for any underlying medical conditions identified in their assessment. • Take an individualized approach with shared decision-making. • Identify individuals' interests to determine interventions that may be the best fit, while appraising the individual and environmental resources available. • Recognize the diversity within older adult populations and, together with their patient/client, consider the incorporation of their culture and lived experience.	Consensus	
9. Social prescribing • Social prescribing should be considered to manage or alleviate social isolation and loneliness. This can include connecting individuals with suitable organizations, programming, or community resources. • Link workers and system navigators can support the assessment of an individual's needs and connect them with suitable organizations. • Community organizations and healthcare providers should collaborate and build relationships to support implementation.	Moderate	Strong
10. Social activity • HCSSPs should support, encourage, and empower individuals to engage at their optimal level of social activity.	Moderate	Strong
11. Physical activity • HCSSPs should encourage their patients/clients to engage in group and/or individual physical activity as a means to reduce social isolation and loneliness and to improve their overall health.	Moderate	Strong
12. Psychological therapies • Psychological therapies include, but are not limited to, cognitive behavioral therapy, social cognitive therapy, reminiscence therapy, and mindfulness-based stress reduction. There is greater available evidence for psychological therapies in reducing loneliness compared to social isolation.	Moderate	Strong
13. Animal-assisted therapies and animal ownership • Animal-assisted interventions and pet ownership may be helpful to some individuals although the evidence for this intervention is limited.	Low	Strong
14. Leisure skill development and leisure activities • Healthcare providers should discuss leisure skill development and activities. This can include leisure education, art therapy, horticulture, and music therapy, amongst others.	Low	Weak
15. Technology • Healthcare providers should engage patients and consider technology as a potential opportunity. This may include teleconferencing, use of the Internet/social media, and conversational agents.	Moderate	Strong
16. HCSSPs should not use pharmacological agents as treatments for social isolation and loneliness in older adults. • Due to the lack of generalizable studies in humans and the potential for harm, we recommend against pharmacotherapy.	Low	Strong
17. HCSSPs should take an individualized approach to the follow-up of social isolation and loneliness. • Due to the limited studies on serial reassessment and lack of evidence on effect sustainability, an individualized, short-term follow-up is recommended.	Consensus	

Adapted from the CCSMH Clinical Practice Guidelines for Social Isolation and Loneliness.

3.1. Prevention (Recommendations 1–3)

Healthcare providers should have knowledge of the risk factors associated with social isolation and loneliness in older adults, and these should be a core part of the educational curriculum. These risk factors include, but are not limited to: advanced age [24,25], female sex [26,27], identifying as 2SLGBTQIA+ (2S: Two-Spirit; L: Lesbian; G: Gay; B: Bisexual; T: Transgender; Q: Queer; I: Intersex; A: Asexual, and + [inclusive of people who identify as part of sexual and gender diverse communities]) [24,25,28], identifying as an ethnic minority [29], living alone, episodic mental or physical health issues [26], and being a caregiver/care partner [30]. Further, as healthcare and social service providers are an important point of contact for older adults, they should leverage their role and knowledge to educate patients and the public about social isolation and loneliness.

3.2. Screening and Assessment (Recommendations 4–7)

The CCSMH recommends targeted screening for those who have risk factors using evidence-based screening tools. These can include single-item measures [31], the UCLA Loneliness Scale [32], and the Lubben Social Isolation Scale [33], among others. Care providers should recognize that each tool may not capture loneliness and isolation in its entirety, as tools can capture components of each based on the degree of subjectivity and the degree of structure in the social relationships [3]. In those who have been identified as having social isolation and/or loneliness, a thorough review of the medical and social history, precipitating factors (e.g., life events), psychiatric symptoms, insight, and motivation for change should be prompted. When social isolation and loneliness are detected, these should be documented in health records as a social determinant of health.

3.3. Interventions (Recommendations 8–17)

Care providers should ensure that alternative etiologies are initially or concurrently managed (e.g., medical or mental health conditions). It is important that healthcare providers take an individualized approach with shared decision-making to identify interventions that balance the individual's goals and preferences with the available evidence and local resources. Interventions may include social prescribing, physical activity, psychological therapies (e.g., cognitive behavioral therapy), leisure skill development, animal therapy, and technology [21]. While these are highlighted as potential management strategies, there remains an important research gap in implementation studies, cost-effectiveness, and the duration of the effect.

3.4. Special Populations

The guideline also considers the diversity of older adults and their personal experiences. As described in the *Interventions* section, tailored interventions should account for an individual's sex, gender, culture, and personal identity. As such, this section highlights the importance of considering 2SLGBTQIA+ communities [12], Indigenous status [34], individuals who are refugees or immigrants [35], those living in long-term care [36], and dementia [37] when supporting those experiencing social isolation and loneliness. This is an area that requires further research.

4. Contextualizing the Guidelines in the Current Landscape

In 2011, the United Kingdom launched the Campaign to End Loneliness. Over a decade later, it created a legacy as one of the first multidisciplinary hubs on the topic, with far-reaching influences [38]. In 2020, the World Health Organization endorsed the United Nations Decade of Healthy Ageing [39]. That same year, the National Academies of Science, Engineering, and Medicine released a consensus report on social isolation and loneliness [3]. Since then, there have been national reports, including the U.S. Surgeon General's Advisory, calling for a national strategy to improve health and social systems [40]. Australia's report on "Ending Loneliness Together in Australia" made similar recommendations and calls to action for a national plan [41]. The CCSMH guidelines echo similar national calls to

action, in addition to providing practical tools that can be used in a point-of-care setting for the clinician and healthcare service provider. These guidelines can also be used to inform researchers and policymakers of best practices and future areas of study. While many studies have shown the association of social isolation and loneliness on negative clinical outcomes [11,42,43], there is a gap in identifying whether interventions that reduce social isolation and loneliness can improve clinical outcomes.

5. Future Directions

Healthcare and social service providers routinely witness the inequities implicit in the social determinants of health [44]. Social isolation and loneliness are closely tied to these and may be important in the causal pathway to negative clinical outcomes [45,46]. Further research is required to understand the experiences of high-risk groups, consistency in the findings from interventions, implementation strategies, and the associations to clinical outcomes upon prevention and management. Policymakers, healthcare professionals, and researchers must remain connected to the needs of the population, identifying further areas for research and health policy.

6. Conclusions

These guidelines apply the current evidence to support healthcare and social service providers and should be used as a tool to prevent, assess, and manage social isolation and loneliness. It should also be used by researchers and policymakers to guide future research and best practices.

Supplementary Materials: The guidelines can be found at the following link: <https://ccsmh.ca/areas-of-focus/social-isolation-and-loneliness/clinical-guidelines/> [47]. Further resources include: (1) For healthcare providers: <https://ccsmh.ca/areas-of-focus/social-isolation-and-loneliness/health-care-professionals/> (accessed on 1 September 2024); (2) For older adults (includes information brochures): <https://ccsmh.ca/areas-of-focus/social-isolation-and-loneliness/older-adults-and-care-partners/> (accessed on 1 September 2024); (3) Summary of our key findings, including the survey of health and social service providers and older adults: <https://ccsmh.ca/areas-of-focus/social-isolation-and-loneliness/key-findings/> (accessed on 1 September 2024).

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Article

New Psychometric Evidence of the Life Satisfaction Scale in Older Adults: An Exploratory Graph Analysis Approach

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Abstract: The objective of the present study was to analyze the psychometric properties of a life satisfaction scale in older Peruvian adults using an exploratory graph analysis (EGA) approach. A total of 407 older adults aged between 60 and 95 years ($M = 69.5$; $SD = 6.7$) from three comprehensive elderly care centers (CIAMs) in Lima, Peru, were recruited. A non-probabilistic convenience sampling was used. The Satisfaction with Life Scale (SWLS) was analyzed using EGA with the Gaussian GLASSO model to assess its dimensionality and structural consistency. The relationship with other variables was analyzed using scales such as the GAD-7 and PHQ-9. The network structure of the SWLS indicates a single dimension. Additionally, network loadings (nodes) were examined, showing high values (>0.35) for most items except item 1, which had a moderate loading (>0.25). Structural reliability showed that a single dimension was identified 100% of the time. The post hoc CFA considering the unidimensional network structure obtained through EGA showed satisfactory fit ($\chi^2/df = 3.48$, CFI = 0.96, TLI = 0.92, SRMR = 0.02, RMSEA = 0.07 [90% CI 0.05, 0.08]). Finally, internal consistency reliability was acceptable ($\omega = 0.92$). The SWLS measure is robust and consistent. These findings are a valuable reference for advancing research on aging in Peru, as they provide a practical, valid, and reliable measure.

Keywords: life satisfaction; older adults; psychometrics; exploratory graph analysis; Peru

1. Introduction

The increase in life expectancy among older adults (OAs) has driven the development of new social, economic, and health policies aimed at improving quality of life [1] and has also led to an increase in scientific research [2]. While demographic projections show a rise in the average life expectancy of older individuals, healthy life expectancy refers to the number of years of good health that an individual can expect to live at a given age [3]. In Latin America, the United Nations [4] reports that in 2022, the older adult population reached 88.6 million, representing 13.4% of the total population, with projections estimating an increase to 16.5% by 2030.

Peru also reflects this demographic trend; according to the National Institute of Statistics and Informatics [INEI] [5], people over 60 years old make up 13.6% of the country's population, and it is estimated that by 2070, the proportion of older adults will reach 30.1%. Regarding social factors, 33.8% of working older adults are affiliated with a pension system, and 26.8% of Peruvian households have at least one older adult as the head of the household [5]. Therefore, the quality of life for older adults requires continued employment until very advanced ages, and the quality of support networks is also relevant as it can be a key factor in life satisfaction. In health, despite 92.1% of people over 60 years old having some form of health insurance, there is a decreasing trend in seeking medical care due to high demand and inefficient care processes [6]. These issues have led older adults

to experience depression, anxiety, loneliness, and feelings of abandonment, significantly affecting their quality of life [7]. Among cultural factors, older adults value functional health through independence and the ability to perform daily activities; they also appreciate active participation in religious, leisure, and social integration activities [8].

These factors present challenges for social and health services in the pursuit of a satisfying life [9]. Therefore, improving the health and life satisfaction of older adults becomes crucial, as being content with one's current life is considered an indicator of healthy aging [10]. Additionally, life satisfaction, being a subjective assessment, is susceptible to contextual changes and is influenced by the perceptions and interpretations of older adults, relating to their health and the social and economic conditions of their environment [11]. In this regard, Diener [12] emphasizes the importance of the global cognitive evaluation that older adults make of their own lives. Various studies indicate a positive relationship between life satisfaction and subjective health, as well as its impact on self-esteem, motivation, overall health, and better coping strategies [13,14]. In this context, life satisfaction becomes relevant because it helps to demystify the stigmas about older adults.

Various studies have demonstrated that physical activity, mood, and family support influence life satisfaction [15]. Additionally, other research has shown that factors such as living conditions [16], neighborhood environment [17], technology use [18–20], healthy eating [21,22], transportation [23], and social service [24] positively influence life satisfaction among older adults.

Therefore, there is a need to assess life satisfaction using instruments that ensure adequate validity and reliability. The Satisfaction with Life Scale (SWLS) was developed by Diener et al. [25] and is the most widely used measure in various studies. This measure can be applied to different age groups, has been translated into more than 30 languages, and demonstrates good psychometric evidence through reliability (internal consistency and test-retest) and validity evidence (content analysis, internal structure, and convergent validity) [26]. In Latin America, the SWLS has been validated in older adults in countries such as Mexico [27], Peru [28], Chile, and Ecuador [29], focusing on exploratory, confirmatory, and invariance methods. Given that the SWLS is widely used, new validations considering cultural variation are necessary, as differences and similarities in life satisfaction judgments emerge over time due to sociocultural influences [30].

In the last decade, network models have emerged as an alternative for exploring data structures; these models also complement existing latent variable techniques such as multidimensional scaling and exploratory factor analysis [31]. In contrast to latent variable models derived from classical test theory (CTT), the determination of the internal structure of latent factors can lead to a lack of consensus in the definition and interpretation of the obtained factors [32]. An innovative way to address the relationships between items is through network analysis [33,34]. One of the challenges is the ability to visualize relationships in a diagram composed of nodes (items) and edges (partial correlations); additionally, the thickness of the edges allows for the examination of the strength of the relationships [35]. Exploratory graph analysis (EGA) is combined with a set of weighted networks [36], enabling the examination of network loadings in the node diagram, structural consistency, and facet detection algorithms [34]. In this way, EGA allows for the immediate interpretation of elements belonging to each factor through the network graph using colors, and influential relationships between items and dimensions can be observed without the need to make decisions about the type of rotation to use for the factor structure [37]. Therefore, EGA is a useful tool for exploring the factor structure and item interactions of the SWLS.

The main objective of this study is to explore the factor structure of the SWLS in older Peruvian adults using the EGA methodology. Although previous studies have analyzed the factor structure of the SWLS, these have been conducted in university samples, considering the instrument's "free domain" nature [38,39]. The SWLS has been used in more than 4000 studies to assess an individual's overall evaluation of their own life. This instrument is highly relevant and applicable, as the information provided through exploratory graph analysis (EGA) can have significant implications for clinical practice with older adults.

Understanding the dimensionality of the SWLS ensures that the scores derived from a single measure are valid and useful for assessing life satisfaction. Therefore, the SWLS can be a valuable tool for professionals in psychology, psychiatry, and geriatrics, enabling specific screening in mental health settings.

2. Materials and Methods

2.1. Design

This study is instrumental in nature [40], as it examined the internal structure of the SWLS with the aim of evaluating its validity and reliability in older Peruvian adults.

2.2. Participants

A total of 407 older adults, aged between 60 and 95 years ($M = 69.5$; $SD = 6.7$), were recruited from three comprehensive senior centers (CIAMs) in Lima, Peru. The selection was carried out through non-probabilistic purposive sampling. Among the advantages of this type of sampling are the adaptability of the design when the sample is specific and difficult to reach, the estimations can be sufficiently accurate if applied correctly, and it is useful for obtaining preliminary data. However, the disadvantages of non-probabilistic sampling, particularly concerning representativeness and generalizability, must be noted [41]. The details of the sociodemographic data are presented in Table 1.

Table 1. Characteristics of older adults ($n = 407$).

Variable	Category	Frequency	%
Age ($M \pm SD$)		69.5 ± 6.7	
Sex	Male	160	39.3
	Female	247	60.7
Living Arrangement	Lives alone	35	8.6
	Lives with spouse	106	26
	Lives with children	120	29.5
	Lives with spouse and children	112	27.5
	Single	40	9.8
Marital Status	Married	227	55.8
	Cohabiting	26	6.4
	Divorced/separated	35	8.6
	Widowed	79	19.4
Educational Level	No education	8	2
	With basic education	181	44.4
	Higher education	122	30
Employment	Yes	103	25.3
	No	304	74.7
Physical Activity	Never	16	3.9
	Rarely	78	19.2
	Sometimes	177	43.5
	Frequently	108	26.5
	Very frequently	28	6.9

Note: M = mean; SD = standard deviation.

2.3. Instruments

Data Sheet

The data sheet includes questions about age, gender, educational level, living arrangement, employment status, and physical activity practice.

Diener's Satisfaction with Life Scale (SWLS, Diener et al., 1985 [25])

This is a self-report scale composed of five items that assess general life satisfaction. For this study, the Spanish version by Atienza et al. [42] was used. Response alternatives are on a five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5),

with higher scores indicating greater satisfaction. This scale was validated in the Peruvian context in a sample of older adults by Caycho-Rodríguez et al. [28]. Among its psychometric properties, the SWLS showed a unidimensional structure with acceptable fit indices ($\chi^2 = 10.960$, $df = 5$, $p = 0.05$, $\chi^2/df = 2.192$, $GFI = 0.983$, $CFI = 0.994$, $NFI = 0.988$; $RMSEA = 0.071$ [90% CI 0.000, 0.129] and $SRMR = 0.013$) and acceptable reliability ($\omega = 0.93$).

Measures used for evidence are based on relationships with other variables.

Patient Health Questionnaire (PHQ-9)

The PHQ-9 consists of nine items that reflect depressive symptoms, evaluated over the past two weeks with Likert-type options (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day). The total score ranges from 0 to 27. Validated in the Peruvian population, the PHQ-9 shows a unidimensional model with good fit indicators ($CFI = 0.99$; $TLI = 0.987$; $SRMR = 0.048$; $RMSEA = 0.071$) and adequate reliability ($\omega = 0.861$) [43]. For this study, reliability was assessed using the omega coefficient, yielding a value of 0.89.

Generalized Anxiety Disorder Scale (GAD-7)

This is a widely used screening measure to assess generalized anxiety. It contains seven items, and respondents are asked to rate the frequency of their anxiety symptoms over the past two weeks. The GAD-7 response options range from 0 (not at all) to 3 (nearly every day). The GAD-7 was validated by Franco-Jiménez and Nuñez-Magallanes [44], showing a unidimensional model with good indices ($\chi^2 = 31.717$, $CFI = 0.995$, $TLI = 0.992$, $RMSEA = 0.056$, $SRMR = 0.026$) and high reliability ($\omega = 0.92$). For this research, reliability was calculated using the omega coefficient, achieving a value of 0.92.

2.4. Data Collection

Data collection was conducted between May and September 2023. To identify the participants, first, contact was made with four comprehensive senior centers (CIAMs) in the districts of Lima. Second, the center coordinators were contacted to inform them about this study and to schedule potential dates for data collection. Third, the researchers attended the CIAMs during the seniors' activity sessions and consulted them in advance about their availability to participate in this study. Fourth, informed consent was provided to the participants, outlining this study's objectives, confidentiality, anonymity, and voluntary participation. Fifth, once the older adults agreed to participate, they completed the questionnaires individually. For those who were illiterate, the statements and response options were read aloud to ensure accurate completion of the instruments, thereby avoiding biases related to reading and comprehension difficulties.

2.5. Data Analysis

A descriptive analysis of the SWLS was performed, obtaining measures of mean, standard deviation, skewness, and kurtosis. Additionally, response rates per item were calculated in percentages (%), considering the ordinal nature of the variable. The dimensionality of the SWLS was verified using the Gaussian GLASSO model through exploratory graph analysis (EGA) with the EGAnet library [45]. Network loadings were also calculated using the "net.loads" function, where small (0.15), moderate (0.25), and large (0.35) network values were considered [46]. Structural consistency was examined using the "bootEGA" function, which extracts dimensions derived from EGA through a Bootstrap simulator with 1000 replications. Item stability is explained by the number of times it replicates in the same dimension. A minimum threshold of 75% was used to assess the consistency and stability of the SWLS items [47].

Once the factorial structure was obtained through EGA, a post hoc confirmatory factor analysis (CFA) was performed. For the analysis of the factorial model, the weighted least squares mean and variance adjusted (WLSMV) estimation method was used, which is suitable for items with ordinal characteristics. Model fit indices were examined using

the chi-square test (χ^2), the root mean square error of approximation (RMSEA) with 90% confidence intervals, the standardized root mean square residual (SRMR), the comparative fit index (CFI), and the Tucker–Lewis index (TLI). For model fit evaluation, values less than 0.08 for RMSEA and SRMR indices and values greater than 0.90 for CFI and TLI were considered. Additionally, factor loadings were calculated, all of which were greater than 0.50 for each item.

The estimation of model reliability was obtained using McDonald’s Omega coefficient (ω) with 95% confidence intervals, considering acceptable values greater than 0.80.

Statistical analysis was performed using the RStudio environment [48].

3. Results

3.1. Preliminary Analysis of the SWLS

Descriptive measures were calculated, finding that item 3 (“I am satisfied with my life”) had the highest mean ($M = 3.70$), while item 2 (“The conditions of my life are excellent”) had the lowest mean value ($M = 3.51$). The standard deviation was higher for item 3 ($SD = 1.27$) and lower for item 2 ($SD = 1.12$). Skewness and kurtosis coefficients for all items showed values exceeding ± 1.5 , suggesting that the data do not follow a normal distribution [49]. Item–test correlations exceeded the criterion of 0.20 for all five SWLS items [50]. Response percentages for the items demonstrated a high agreement tendency in option 4 (“agree”) (view Table 2).

Table 2. Descriptive statistics, item–test correlation, and response percentages ($n = 407$).

SWLS Items	M	SD	g1	g2	Item–Test Correlation	Responses (%)				
						1	2	3	4	5
SWLS—1	3.47	1.06	−0.71	−0.01	0.74	7	10	25	45	13
SWLS—2	3.51	1.12	−0.81	−0.07	0.84	9	10	19	47	15
SWLS—3	3.70	1.27	−0.85	−0.27	0.85	11	6	19	33	32
SWLS—4	3.69	1.17	−0.76	−0.25	0.83	7	11	17	38	27
SWLS—5	3.54	1.25	−0.63	−0.56	0.78	10	10	21	33	25

Note: M = mean; SD = standard deviation; g1 = skewness; g2 = kurtosis; 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree; SWLS—1 = in most respects, my life is as I want it to be; SWLS—2 = the conditions of my life are good; SWLS—3 = I am satisfied with my life; SWLS—4 = so far I have gotten the important things I want in life; SWLS—5 = if I could live my life over, I would repeat it just the same way it has been.

3.2. Exploratory Graph Analysis

Figure 1 shows the network structure of the SWLS items using EGA, where a single dimension is evident. Additionally, network loadings (nodes) were examined, with high values (>0.35) observed in most items, except for item 1, which presented a moderate loading (>0.25). Regarding structural consistency, it was evidenced that 100% of the time, a single dimension was identified; this is verified through the stability graph, where the items were systematically identified in a single community.

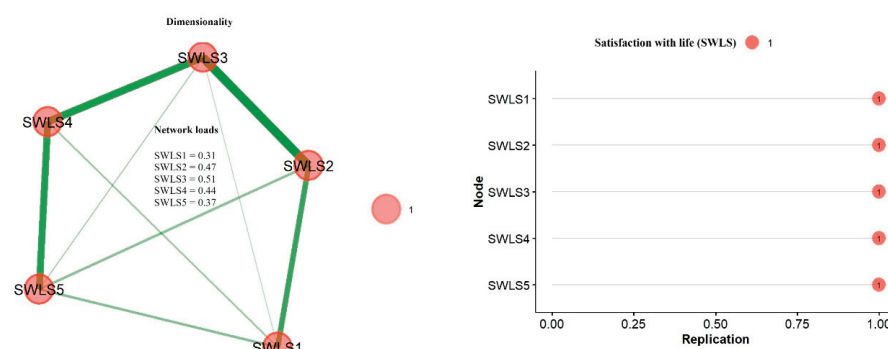


Figure 1. Dimensionality and structural stability of items.

3.3. Post Hoc Confirmatory Factor Analysis and Relationship with Other Variables

A post hoc confirmatory factor analysis (CFA) was conducted, considering the network structure obtained through EGA. The unidimensional structure demonstrated satisfactory fit ($\chi^2/df = 3.48$, CFI = 0.96, TLI = 0.92, SRMR = 0.02, RMSEA = 0.07 [90% CI 0.05, 0.08]). Factor loadings were acceptable ($\lambda > 0.5$), ensuring that the items adequately represented the construct (Figure 2). Additionally, negative correlations were found between life satisfaction scores and anxiety ($r = -0.144$) and depression ($r = -0.129$).

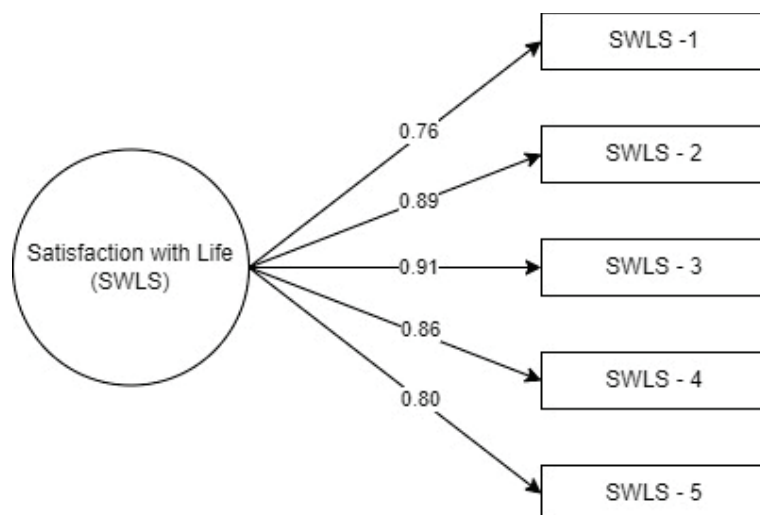


Figure 2. Factor structure of the SWLS.

Finally, reliability through internal consistency using McDonald's omega coefficient was acceptable ($\omega = 0.92$, 95% CI [0.91–0.94]).

4. Discussion

The present study aimed to validate the SWLS using a network model in older Peruvian adults. Among the findings, it was evidenced that the SWLS presents adequate evidence concerning its reliability, internal structure, and relationship with variables (anxiety and depression). Thus, the results support the unidimensional structure through EGA with precision and stability.

According to various psychometric studies, the SWLS has been validated using different factor and invariance methods in different samples, including adolescents [51], university students [38,52], clinical samples [53], and community samples [54]. However, the SWLS has not been analyzed in older adults through a psychometric network approach. Therefore, network models have proven to be superior to traditional factor analysis techniques [55,56], especially highlighting the absence of factor rotation and their intuitive nature.

EGA was used to examine the internal structure to evaluate the dimensionality and determine the number of factors present [47,57]. Thus, the unidimensional structure of the SWLS is consistent with the original model and supported by various studies with older adults [27,29,58–60]. Regarding connections within the network, item 3 (SWLS3: "I am satisfied with my life") showed the strongest node loading in relation to the direct measure of life satisfaction. The SWLS items presented adequate loadings, indicating that they are directly linked to life satisfaction and suggesting a reciprocal cause–effect relationship between the network attributes [61]. Following the exploratory graph analysis, a post hoc confirmatory factor analysis of the SWLS was conducted, obtaining acceptable indices, thus validating a unidimensional structure that functions in older adults.

Reliability was determined through structural consistency, verifying that all data were systematically organized into a single dimension from replications. These results demonstrate the stability of the reciprocal variance between items. However, no previous

study has analyzed the SWLS in older adults from a network analysis approach, but only under the framework of classical test theory. Adequate internal consistency values have been found through the estimation of Cronbach's alpha coefficients [27,29] and Omega [28]. Despite this, the use of the network model is preferred due to its incompatibility with calculation, as common covariances are eliminated, valuing item correlations; moreover, internal consistency measures do not adequately report whether items remain through a unidimensional factor in multidimensional models [34]. In addition, this study also thoroughly analyzed internal consistency reliability, obtaining acceptable measures ($\omega = 0.92$) for the SWLS.

The behavior of the SWLS with other measures found negative correlations with anxiety and depression. These results are consistent with previous studies that similarly report this association between the aforementioned variables [62,63]. This explains that the coexistence of anxiety symptoms can cause cognitive maladaptation, feelings of loneliness [64], and a decrease in quality of life [65], significantly affecting life satisfaction in older adults [66].

Among the practical implications, the use of the EGA methodology that supports the unidimensional determination of the SWLS stands out. In this way, this procedure contributes to the breadth of knowledge, as the EGA managed to identify a single dimension impartially and in congruence with what was analyzed in the literature. These findings offer a clear scope of the relationships of the items with the SWLS dimension, as well as how they position themselves within a single community. On the other hand, the internal structure of the SWLS conceptually contributes to the study of life satisfaction in samples of older adults in a Peruvian context. The use of the instrument will be useful in specific areas that support the accuracy of their evaluations, such as psychology, geriatrics, and medicine. The exploration of a single dimension is structurally in line with what is reported through various psychometric evaluation studies, with the SWLS functioning in various sociocultural contexts. Therefore, having a practical, brief, simple, and self-report measure will allow incorporating personal data on life satisfaction.

Despite the important results, this study has some limitations. First, although the sample size was moderate, it could not be subdivided to perform both validation procedures (EGA and CFA), so a post hoc CFA was conducted. For future research, it is suggested to adjust the unidimensional model of the SWLS using CFA with a similar sample. Second, the older adults recruited in comprehensive senior centers were selected through convenience sampling; therefore, they do not necessarily constitute an adequate representation of older adults in Peru. Third, the cross-sectional study does not allow for the estimation of temporal or directional relationships, limiting conclusions about causal relationships between the SWLS, depression, and anxiety. Fourth, due to non-probabilistic sampling, the sample was predominantly composed of women. Finally, self-report measures can introduce social desirability bias, as participants might present a positive image of their lives.

5. Conclusions

In conclusion, the SWLS shows satisfactory results in terms of validity and reliability, making it a suitable instrument for use and consolidation in future psychometric studies as a tool for measuring life satisfaction in older adults.

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Institutional Review Board Statement: This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethics Committee of Universidad Tecnológica del Perú (protocol code 124-2023-CEI-UTP, 1 August 2023) for studies involving humans.

Informed Consent Statement: Informed consent was received from all participants in this study.

Data Availability Statement: The data shown can be accessed by contacting the corresponding author and are available for academic and research purposes.

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Article

Understanding Kinesiophobia: Predictors and Influence on Early Functional Outcomes in Patients with Total Knee Arthroplasty

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Abstract: This observational study aimed to identify predictors of kinesiophobia and examine its correlation with early functional outcomes in TKA recipients. On the first and fifth postoperative days (POD1 and POD5), we evaluated pain using the International Pain Outcomes Questionnaire (IPO-Q) and created multidimensional pain composite scores (PCSs). The Total Pain Composite Score (PCStotal) assesses the overall impact of pain, taking into account outcomes of pain intensity, pain-related interference with function, and emotions and side effects. Functional status on POD 5 was determined by the Barthel index, 6 min walking test, and knee range of motion. Kinesiophobia was assessed on POD5 using the Tampa Scale for Kinesiophobia (TSK). Among 75 TKA patients, 27% exhibited kinesiophobia. The final regression model highlighted PCStotal on POD5 (OR = 6.2, CI = 1.9–19.9), PCStotal (OR = 2.1, CI = 1.2–3.8) on POD1, and the intensity of chronic pain before surgery (OR = 1.4, CI = 1.1–2.1) as significant kinesiophobia predictors. On POD5, those with kinesiophobia showed increased dependency, slower gait, and poorer knee extension recovery. This study emphasizes the need to identify and address kinesiophobia in TKA patients for better functional outcomes and recovery. Additionally, it is vital to assess different domains of pain, not just pain intensity, as it can lead to kinesiophobia development.

Keywords: kinesiophobia; TKA; pain; functional recovery

1. Introduction

Total knee arthroplasty (TKA) is an effective treatment option for patients with end-stage knee osteoarthritis, providing pain relief, functional improvement, and health-related quality of life. Due to increasing levels of obesity, population aging, and growth in sports-related injuries, the incidence of TKA is high [1]. Between 2000 and 2014, the estimated annual numbers of primary TKA increased by 148% in the United States. Based on this data, Sloan et al. showed that the projected growth for TKA procedures will reach 935,000 annually by 2030 in the US [2].

The primary outcomes of the procedure are to improve the patient's mobility in the postoperative period, enhance their functionality, alleviate pain significantly, and enhance self-confidence due to improved functionality [3].

However, TKA is a painful procedure. The number of patients reporting moderate to severe pain after TKA remained relatively constant, with 58% reporting moderate to severe pain on postoperative day 1 (POD1), which only decreased to 43% by postoperative

day 3 (POD3) [4]. Pain in the postoperative period affects rehabilitation and increases the risk of complications in the acute phases and of developing chronic pain after surgery. Furthermore, up to 20% of patients are dissatisfied with the results of their surgery due to persistent pain and disability [5].

Additional psychological factors, such as pain catastrophizing, pain-related fear of movement, and depression, have been identified as contributors to prolonged pain and disability in individuals with different musculoskeletal conditions [6]. Patients may delay arthroplasty surgery due to the fear of acute postoperative pain [7]. Pain catastrophizing is a term used to describe the tendency to magnify the threat value of pain stimuli and to feel helpless in the context of pain. This can lead to an inability to inhibit pain-related thoughts during or after a painful encounter [8]. Kinesiophobia, on the other hand, is an excessive and debilitating fear of physical movement and activity due to a feeling of vulnerability from a painful injury or re-injury [9]. It is gaining more attention since it can lead to illness behavior and create a vicious cycle of pain and disability [10]. High levels of kinesiophobia after TKA negatively affect short- [11–13] and long-term [6,10,13–17] functional outcomes. Investigating the presence of kinesiophobia early after surgery can help arrange personalized treatment for this vulnerable group of patients.

Despite the growing interest in the relationship between kinesiophobia and TKA, there are limited studies on the etiology and psychological pattern of kinesiophobia in the literature. To the best of our knowledge, there are only two studies that examine the risk factors for the onset of kinesiophobia following TKA. Cai et al. showed that female sex, older age, lower levels of education, negative coping styles, lower self-efficacy, and pain were predictors of kinesiophobia after surgery [18]. Degirmenci et al. demonstrated that the choice of anesthesia techniques during total knee arthroplasty (TKA) significantly influences the development of postoperative kinesiophobia [19]. This study found that patients who received regional anesthesia and deep sedation were able to recover and move more confidently during the early postoperative period, while those who received regional anesthesia and light sedation experienced anxiety and fear, which made them hesitant to move [19]. Studies have highlighted the importance of kinesiophobia as a risk factor for higher pain intensity following TKA [10,11,15–17]. However, due to the lack of standardized pain measurements and the predominant use of unidimensional pain analysis, the relationship between patient-reported outcomes (PROs) and kinesiophobia has not been thoroughly investigated in any single study to date. PROs are reports coming directly from a patient about how they feel or function about a health condition and its therapy without interpretation by healthcare professionals or anyone else. PROs can relate to symptoms, signs, functional status, perceptions, or other aspects such as convenience and tolerability. PROs are not only important when more objective measures of disease outcome are not available but also represent what is most important to patients about a condition and its treatment [20]. Gewandter et al. suggested that the inclusion of multiple domains in the outcomes can be a significant advantage as it provides a more thorough evaluation of the experiences of the individuals under study, rather than relying on a single factor that may not be sufficient in describing their overall experience [21].

This study aimed to investigate the factors associated with kinesiophobia following TKA and to examine the relationship between kinesiophobia and early functional outcomes in TKA patients.

2. Materials and Methods

2.1. Setting

This observational study was conducted at the Clinic for Orthopedic Surgery and Traumatology, University Clinical Center Serbia in Belgrade over a period of 6 months. This study followed the principles of the Helsinki Declaration and was approved by the local ethics committee (Number 2017-004244-37). The findings in this study are based on the methodology outlined by PAIN OUT (www.pain-out.eu), which provides a user-friendly online system for hospitals to gather standardized patient feedback and clinical data using

a questionnaire available in more than 20 languages. The registry offers tools to evaluate pain-related patient-reported outcomes (PROs) and management on the first day after surgery (POD1), as described in clinicaltrials.gov NCT02083835 [22,23]. Our research team was involved in creating the database used in this study, and this resource is also widely utilized by many hospitals worldwide.

Patients who had undergone TKA and who were 18 years or older, could communicate, and provided written consent were invited to participate in this study. The exclusion criteria included venous thromboembolism, neurological and musculoskeletal diseases that could affect recovery, and mental disorders. Written consent explained that the study aimed to improve pain treatment for patients after TKA in the future, and confirmed that no changes were being made to the standard medical care at the moment.

2.2. Surgical Technique, Anesthesia, Pain Management, and Postoperative Rehabilitation Program

The surgical procedure for TKA involved the insertion of tricompartmental prostheses using a standard medial parapatellar approach, with the use of cruciate-substituting designs. A femoral tourniquet at 300 mmHg was employed to achieve a bloodless surgical field. A compression bandage was applied from the toes to the mid-thigh at the end of the surgery. Spinal anesthesia with 10–15 mg levobupivacaine 0.5% or general anesthesia with propofol and fentanyl was administered during the procedure. Local infiltration anesthesia was not used in our study group. The regular protocol for pain management involved the scheduled assessment of pain and administration of non-opioid drugs (such as Paracetamol, Ketorolac, and Metamizol) and weak opioids (Tramadol) based on the severity of the pain reported by patients, and following the WHO's approach to the use of analgesics based on pain severity. The pain was assessed at least once per shift. This treatment approach was implemented from POD1 to POD5.

All patients followed a standardized postoperative rehabilitation program beginning on POD1. Assisted ambulation and regular exercise to restore strength and mobility in the operated knee were performed 2 times a day for 20–30 min.

2.3. Data Collection

Patients were evaluated on POD1 and POD5.

(1) Baseline characteristics

On POD1, patients were assessed regarding demographic and clinical data comprising gender, year of birth (age), weight and height, intensity, and location of chronic pain before surgery. Furthermore, the type of anesthesia and duration of surgery were recorded.

(2) EuroQol-5D

Health-related quality of life during the last week before TKA was rated with the use of the EuroQol-5D (EQ5D) index score on POD1. After the surgery, we evaluated the patients' overall well-being on POD5 using the same tool to determine the impact of TKA on their quality of life. An EQ5D index score of 0 indicates the worst possible health state and a value of 1 indicates full health [24].

(3) Multi-dimensional assessment of pain on POD1 and POD5

The validated International Pain Outcomes Questionnaire (IPO-Q) was used to evaluate pain-related PROs [23]. This questionnaire evaluates the following domains: intensity of pain and relief from treatments; interference of pain with physical activities in and out of bed; negative affect due to pain (anxiety and helplessness); adverse effects (AEs) (nausea, fatigue, dizziness, and itching); and perception of care (wish for more pain treatment, satisfaction with pain treatment, participation in decisions about pain treatment, and receipt of information about treatment). Pain intensity and pain-related physical and affective interference were quantified by patients using an 11-point numerical rating scale (0 = null, 10 = worst possible). The patient's perception of care was assessed with yes or no on percentage scales. The data were collected by surveyors who underwent training before

they approached patients. To reduce interviewer bias, patients completed the questionnaire independently with no assistance from family or staff. However, if a patient requested help, the surveyor could assist.

(4) Kinesiophobia on POD5

On POD5, kinesiophobia was measured with the Tampa Scale for Kinesiophobia (TSK). The TSK is a 17-item questionnaire designed to assess a patient's fear of movement or (re)injury [25]. Each point has a 4-point Likert scale, scoring alternatives from "strongly disagree" to "strongly agree". The total score on the TSK ranges from 17 to 68 [26]. We used a pre-validated cut-off score of 37 on the TSK to categorize knee replacement patients into two groups: those with no or low degrees of kinesiophobia ($TSK < 37$) and those with a high degree of kinesiophobia ($TSK \geq 37$) [25,27].

(5) Functional outcome measures on POD5

On POD5, a functional assessment was conducted, which included three tests: knee range of motion (ROM), Barthel Index, and the 6 min walking test (6-MWT). The Barthel Index is an ordinal scale used to assess a person's ability to perform ADL. It involves scoring 10 variables related to mobility and ADL, with a higher score indicating greater independence [28]. The 6-MWT measures functional walking capacity. During the test, the patients were asked to walk for 6 min, and the distance covered in meters was recorded [29]. Knee ROM was assessed using a universal goniometer, and the average peak knee flexion and extension were recorded from three trials. Health-related quality of life after TKA was rated using the EQ-5D index score.

2.4. Study Outcomes

The primary focus of this study was to identify predictors of kinesiophobia, while the secondary objective was to examine the association between kinesiophobia and functional outcomes.

2.5. Data Analysis

2.5.1. Creating Multidimensional Composite Scores

Multidimensional composite scores were created based on ratings obtained from the IPO-Q. For POD1 and POD5, continuous PROs were extracted from the questionnaires and combined to form composite scores, as described by Hofer D et al. [30]. Three subscores were generated to assess pain intensity, pain-related interference, and side effects. The Pain Composite Score (PCS) was calculated using the formula: $\text{worst pain} \times (\% \text{ time in severe pain} \times 100) + \text{least pain} \times (1 - \% \text{ time in severe pain}/100)$. The Pain Interference Total Score (PITS) was calculated as the mean of pain-related interference with activities in bed, breathing deeply/coughing, sleep, and pain-related anxiety and helplessness. The Pain Side Effects (PSE) composite score was calculated from the scores for dizziness, drowsiness, nausea, and itching [30]. The Total Pain Composite Score (PCStotal) was formulated by averaging the continuous items derived from the pain intensity, pain interference, and side effects domains of the IPO-Q [31].

2.5.2. Statistics

Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 22.0. Data were visually analyzed with histograms, Q-Q plots, and Kolmogorov–Smirnov tests for normality of distribution. Categorical and dichotomous data were presented as absolute frequencies and percentage of patients. Continuous data were presented as the median, first quartile (Q1), and third quartile (Q3), and NRS scores as a median with the interquartile range. The chi-square test was applied to test relationships between categorical variables. A two-sided independent samples *t*-test was used to compare the mean values of normally distributed data between 2 groups. Ordinal data were compared by the 2-sided Mann–Whitney U test.

Univariable and multivariable logistic regression analyses were performed to assess the factors associated with kinesiophobia. Variables with a p -value < 0.20 in the univariable analysis were retained and included in the multivariable regression, for which the backward selection method was used. Setting a threshold of 0.20 in the univariate analysis acts as an initial filter to capture a broader set of variables. This is crucial because some variables might show weak individual associations but can become significant when adjusted for other variables in a multivariable model [32–34]. In the backward method, the model started with all variables in the equation. Using criteria for removal, variables that did not contribute to the solution were removed one at a time. The variable with the smallest partial correlation was taken out first. The steps proceed until no remaining variables are qualified for removal [35].

No collinearity problem was detected for any of the models. In all instances, a p -value < 0.05 was considered statistically significant.

3. Results

3.1. Baseline Characteristics of the Study Group

A total of 81 patients were recruited for the study. During the study period, three patients declined to fill out the requested questionnaires, and three patients were excluded due to deep vein thrombosis. Therefore, 75 patients were included in the study analysis.

The patients were categorized into two groups based on their degree of kinesiophobia: a high kinesiophobia group ($n = 20$) and a low kinesiophobia group ($n = 55$).

Patient characteristics and clinical data are summarized in Table 1.

Table 1. Sample description for Continuous and Dichotomous Variables.

Variable	Mean	SD	
Age ¹	67.61	±8.102	
Variable	median	Q1	Q3
Age (y.) ²	68	63	74
Weight (kg) ²	82	70	90
BMI (kg/m ²) ²	28.4	25.3	32
Duration of surgery ²	138	120	165
Intensity of chronic pain before admission ²	6	5	8
EQ5D preoperative ^{2,a}	0.636	0.416	0.750
Total Pain Composite Score (PCStotal) POD1 ²	2.07	1.31	2.79
Total Pain Composite Score (PCStotal) POD5 ²	0.41	0.09	1.11
Variable	N	%	-
Gender ³			
Male	20	27	
Female	55	73	
Marital status ³			
Married	69	92	
Single	6	8	
Education ³			
Primary school or under	18	24	
Secondary school	44	59	
College	13	17	
Type of anesthesia ³			
General	29	39	
Spinal	46	61	

Table 1. *Cont.*

Variable	Mean	SD
Nonopioid administered (ward) ³		96
Paracetamol	71	48
Ketoprofen	36	20
Ketolac	15	43
Metamizole	32	8
	6	
Systemic opioid (ward) ³	63	85

¹ = the values are given as the mean $\pm$ standard deviation (SD); ² = the values are given as numerical rating scale scores by median with interquartile range (IQR); ³ = The values are given as the number of patients with the percentage in parentheses. ^a: EQ5D = EuroQol-5D.

3.2. Analysis of Group Differences Regarding Pain-Related Outcomes and Health-Related Quality of Life Outcomes

A significant difference in PROs at POD1 and POD5 was observed. Patients with kinesiophobia demonstrated significantly worse pain outcomes on the PCStotal of IPO-Q compared to patients without kinesiophobia on POD1 and POD5. We have provided data on the individual PROs as well. According to our findings, individuals with kinesiophobia exhibit higher scores on PCS and PITS subscales on POD1 and POD5, whereas no significant difference was observed in the results of PSE (Table 2).

Table 2. Comparison of total composite scores and subscores between TKA patients with and without kinesiophobia.

Variable ¹	Low Kinesiophobia N (55)			High Kinesiophobia (20)			<i>p</i> -Value *
	Median	Q1	Q3	Median	Q1	Q3	
POD1							
PCStotal 1 ^a	1.59	1.10	2.52	2.76	2.33	3.71	0.002
PCS 1 ^b	2.6	1.40	4.00	4.7	3.35	5.55	0.002
PITS1 ^c	1	1.00	2.00	2.00	1.00	3.75	0.039
PSE1 ^d	0.50	0.00	2.00	1.12	0.00	2.75	0.180
POD5							
PCStotal2 ^e	0.31	0.09	0.55	1.28	0.59	2.15	0.000
PCS2 ^f	0.00	0.00	0.70	2.35	0.90	3.60	0.000
PITS2 ^g	0.43	0.14	0.43	1.57	1.00	2.14	0.000
PSE2 ^h	0.00	0.00	0.00	0.00	0.00	0.50	0.166

¹ = The values are given as numerical rating scale scores by a median with interquartile range (IQR); * Mann–Whitney U test; ^a: PCStotal 1 = composite score of patient-reported outcome measures on POD1; ^b: PCStotal 1 = the Pain Composite Score on POD1; ^c: PITS1 = the Pain Interference Total Score on POD1; ^d: PSE1 = the Pain Side Effects composite score on POD1; ^e: PCStotal2 = composite score of patient-reported outcome measures on POD5; ^f: PCS2 = the Pain Composite Score on POD5; ^g: PITS2 = the Pain Interference Total Score on POD5; ^h: PSE2 = the Pain Side Effects composite score on POD5.

Patients with kinesiophobia also had a lower percentage of pain relief, wished for more analgesics, and reported more interference of pain with activities out of bed on POD5.

A statistically significant difference in EQ-5D on POD5 between the groups was also observed (Table 3).

Table 3. Comparison of PROs that are not included in composite scores between TKA patients with or without kinesiophobia.

Variable	Low Kinesiophobia N (55)			High Kinesiophobia (20)			p-Value *
	Median	Q1	Q3	Median	Q1	Q3	
Outcomes that are not included in composite scores on POD1							
Pain interfering with activities out of bed ¹	3	2	5	5	3.5	6.5	0.811
Participation in decisions regarding pain treatment ¹	9	6	10	7.5	6	10	0.355
Satisfied with the result of pain treatment ¹	9	8	10	9	7	9	0.108
	mean	SD		mean	SD		
Percentage of pain relief ²	75.82	±21.40	-	69.00	±25.11	-	0.205
	N	%		N	%		
Desire more pain treatment ³							
Yes	29	53		11	55		1.000 **
No	26	47		9	45		
Percentage of patients getting out of bed ³							
Yes	34	62		13	65		1.000 **
No	21	38		7	35		
Outcomes that are not included in composite scores on POD5							
Pain interfering with activities out of bed ¹	1	0	3	3	1	5	0.047
Participation in decisions regarding pain treatment ¹	9	9	10	9	4.25	10	0.518
Satisfied with the result of pain treatment ¹	9	9	10	9.5	8.25	10	0.644
	mean	SD		mean	SD		
Percentage of pain relief ²	86.48	±17.82	-	68.75	±18.21	-	0.001
	N	%		N	%		
Desire more pain treatment ³							
Yes	3	5		6	30		0.003 **
No	52	95		14	70		
Health-related quality of life							
	mean	SD		mean	SD		
EQ5D preoperative ^a	0.599	±0.209		0.467	±0.267		0.052
EQ5D POD5	0.674	±0.141		0.539	±0.218		0.000

¹ = the values are given as numerical rating scale scores by median with interquartile range (IQR); ² = the values are given as the mean ± standard deviation (SD); ³ = The values are given as the number of patients with percentages; * Mann–Whitney U test; ** chi-square test; ^a: EQ5D = EuroQol-5D.

3.3. Predictors of Kinesiophobia

Univariable regression analysis revealed that patients who reported higher pain intensity before surgery and had worse quality of life preoperatively were more likely to develop kinesiophobia. As far as pain-related PROs are concerned, our results revealed that higher scores of PCStotal of IPO-Q were associated with higher kinesiophobia scores. Furthermore, a lower percentage of pain relief, wish for more pain treatment, interference of pain with activities out of bed, and higher scores on EQ-5D on POD5 were also related to higher kinesiophobia scores (Table 4).

Table 4. Univariable prediction model of kinesiophobia.

	OR	95% CI	p-Value
EQ5D preoperative ^a	0.087	0.009–0.860	0.037
Intensity of chronic pain before surgery	1.359	1.016–1.817	0.038
PCStotal 1 ^b	2.183	1.289–3.696	0.004
PCStotal 2 ^c	3.051	1.546–6.022	0.001
Percentage of pain relief on POD5	0.974	0.950–0.998	0.037
Pain interfering with activities out of bed POD5	1.272	1.015–1.549	0.037
Desire more pain treatment on POD5	0.107	0.024–0.472	0.003
EQ5D POD5	0.014	0.001–0.378	0.011

^a: EQ5D = EuroQol-5D; ^b: PCStotal 1 = composite score of patient-reported outcome measure on POD1; ^c: PCStotal 2 = composite score of patient-reported outcome measures on POD5; OR: Odds ratio; 95% CI confidence interval.

Table 5 displays the results of the multivariable regression analysis. The final model included intensity of chronic pain before surgery, PCStotal on POD1 and POD5, and pain interfering with activities out of bed as significant predictors. With the independent variables added, the overall model was statistically significant ($\chi^2 = 28.286$, $p < 0.001$). The model explained 45.8% (Nagelkerkes R^2) of the variance of kinesiophobia and correctly classified 80% of cases. The strongest predictor of kinesiophobia was PCStotal on POD 5, whose odds ratio (OR) was 6.191 when adjusted for PCStotal on POD1, intensity of chronic pain before surgery, and pain interfering with activities out of bed. PCStotal on POD1 was identified as the second strongest predictor of kinesiophobia.

Table 5. Multivariable prediction model of kinesiophobia.

	OR	95% CI	p-Value
PCStotal 1 ^a	2.139	1.202–3.807	0.010
PCStotal 2 ^b	6.191	1.918–19.979	0.002
Intensity of chronic pain before surgery	1.462	1.017–2.103	0.040
Pain interfering with activities out of bed	0.692	0.444–1.080	0.105

^a: PCStotal 1 = composite score of patient-reported outcome measure on POD1; ^b: PCStotal 2 = composite score of patient-reported outcome measures on POD5; OR: Odds ratio; 95% CI confidence interval.

3.4. Influence of Kinesiophobia on Recovery after TKA

Regarding functional outcomes on POD5, patients with kinesiophobia revealed significantly higher dependency levels as expressed with the Barthel score, had a slower gait speed on the 6-MWT, and showed worse recovery of knee extension (Table 6).

Table 6. Difference between groups regarding functional outcome.

Variable	Without Kinesiophobia N (55)		With Kinesiophobia (20)		p-Value ¹
	Mean	SD	Mean	SD	
Barthel	77	11.21	66.25	13.66	0.001
6-MTW ^a	112.64	45.51	74.90	50.35	0.002
Extension	−16.64	9.33	−22.25	7.86	0.020
Flexion	65.55	17.73	63.25	14.26	0.468

^a: 6-MWT = 6 min walking test; ¹ = two-sided independent sample *t*-test.

According to the results of univariable regression analysis, a significant association was found between the presence of kinesiophobia in patients and a slower rate of recovery (Table 7).

Table 7. Univariable prediction model of functional recovery.

	B	95% CI	p-Value
6-MWT ^a	−0.340	−32.102; −13.371	0.000
BARTHEL	−0.376	−16.939; −4.561	0.000
EXTENSION	−0.270	−10.283; −0.944	0.019
FLEXION	−0.061	−11.090; 6.499	0.604

^a: 6-MWT = 6 min walking test.

4. Discussion

In this study, we observed a kinesiophobia incidence of 27%, which is close to the rates reported in earlier studies in TKA patients in Serbia (22%) [16] and China (24%) [18]. Our findings indicate that the presence of kinesiophobia might be impacted by the intensity of preoperative pain. This observation is consistent with Kroska's et al.'s postulation that fear avoidance behavior is often associated with higher pain intensity [36].

The most important finding of our study was the confirmed link between PCStotal on POD1 and POD5 and the development of kinesiophobia. To the best of our knowledge, our results are the first to highlight the relationship of both the intensity of postoperative pain and the physical and emotional interference caused by pain after TKA, as they are associated with the presence of kinesiophobia. Prior studies on TKA patients primarily relied on pain intensity and used single-dimensional measures to assess pain [16,18,19]. Moreover, research on risk factors for kinesiophobia after TKA found a direct link between high pain intensity levels within the first 24 h after surgery and increased levels of kinesiophobia [18]. Composite scores for pain, which combine pain intensity, pain-related interference, and side effects, offer a unique approach that provides a holistic view of the pain experience [21,30]. This approach provides a broader perspective compared to using a single measure [21].

To evaluate the influence of kinesiophobia on early functional outcomes, we used the 6-MTW, knee ROM, and Barthel index. Our study's findings support previous research regarding the 6-MWT and its relation to kinesiophobia. Doury-Panchout et al. demonstrated that patients without kinesiophobia walked a significantly greater distance during the 6-MWT compared to those with kinesiophobia [15]. Additionally, Guney Deniz et al. found a positive correlation between higher TSK scores and improved 2-MWT scores [12]. Similarly, Degirmenci et al. discovered that higher TSK scores were associated with better 2-MWT scores and Timed Up and Go (TUG) test results on POD 2 and POD 5 [19]. Based on our findings, it appears that there might be an inverse correlation between active knee extension and kinesiophobia, while no correlation was observed with knee flexion. However, it is important to note that not all studies align with these results. Active knee flexion was found to be correlated with TSK in several studies [12,16,19,37]. In contrast, Doury-Panchout et al. did not observe any notable disparity in maximum passive flexion and maximum active extension on the day of discharge between high-TSK and low-TSK groups [15]. Similarly, Filardo et al. found no connection between high-TSK and low-TSK groups concerning active or passive ROM [38]. In addition, our study revealed the negative relationship between higher levels of kinesiophobia and functional independence as measured with the Barthel index on POD5.

5. Study Strengths and Limitations

The main strength of our study is our innovative methodological approach. To the best of our knowledge, this is the first study to evaluate the multidimensional impact of pain on kinesiophobia. There are several limitations of our study. First, the composite scores used in our study require calculations and are therefore not appropriate as a tool in everyday

clinical routine. Second, the sample size is relatively small. Third, the participants in this study are exclusively from a single hospital in Serbia. Therefore, it remains uncertain how these findings can be extrapolated to a wider general population. Finally, the pre-surgery kinesiophobia scores were not assessed.

6. Conclusions

Our research findings reveal a high prevalence of kinesiophobia after TKA, highlighting its importance during postoperative care. Moreover, our study identifies pain as a significant predictor of kinesiophobia and highlights its impact on poor functional outcomes after surgery. Notably, composite scores for pain evaluation prove to be superior to unidimensional scales, offering a more comprehensive approach to understanding the connection between pain and kinesiophobia. By identifying individuals prone to kinesiophobia through multidimensional pain assessment, healthcare professionals can adjust strategies to improve outcomes and post-surgery recovery. Further research is expected to show the influence of improved pain treatment strategies on kinesiophobia levels in patients after TKA and to quantify the impact of individual PROs on kinesiophobia.

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Article

Dental Aesthetics and Self-Esteem of Patients Seeking Orthodontic Treatment

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Abstract: (1) Objective: This study aimed to investigate how patients' perceptions of their dental aesthetics and their sense of self-esteem are related. (2) Methods: This cross-sectional survey recruited 141 new patients seeking orthodontic treatment. Patients completed a self-administered questionnaire consisting of three parts: the Malaysian Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), Rosenberg Self-esteem Scale (RSES-M), and Aesthetics Component of the Index of Orthodontics Treatment Need (IOTN-AC). Clinical assessment comprised the Dental Health Component of the Index of Orthodontics Treatment Need (IOTN-DHC). Multiple linear regression was performed, with self-esteem as the dependent variable, while the independent variables comprised the domains of PIDAQ; IOTN-AC; IOTN-DHC; and patients' demographics, such as age, gender, and their level of education. (3) Results: The response rate was 96.5% ($n = 136$ respondents). The multiple linear regression found that, when the other predictors in the model are held constant, Social Impact, Aesthetic Concern, and Dental Self-Confidence are the factors that significantly contributed to explaining the variation in self-esteem, accounting for, 3.9%, 2.3%, and 2.0%, respectively. The entire model explained 23% of the variation in self-esteem. (4) Conclusions: Domains of the psychosocial impact of dental aesthetics act as predictors of self-esteem in orthodontic treatment-seeking patients.

Keywords: self-esteem; oral health-related quality of life; adolescents; adults; malocclusion

1. Introduction

Malocclusion, or problems with dental arrangement, is a global issue. The worldwide prevalence of malocclusion is 56%, regardless of gender [1]. There is substantial evidence regarding the epidemiological significance of malocclusion. Therefore, malocclusion is a significant oral health issue and an economic burden for both the families of affected children and public dental health services.

Orthodontic treatment has anecdotally been perceived to service the demand for addressing problems relating to dental aesthetics. Generally, treatment need for orthodontics is often evaluated by clinicians using normative need indicators [2], which often provide insufficient patient input on the effects of the dental aesthetics on their oral health, emotional, and social factors. The need for orthodontic treatment to manage malocclusion is associated with the oral health-related quality of life in children and adolescents. A systematic review has suggested two potential factors, namely gender and self-esteem, that could modify this relationship [3].

Dental aesthetics, influenced by factors like tooth color, form, and alignment [4], significantly impact adolescents' psychological well-being and self-confidence [5,6]. Patients who sought orthodontic treatment have been recorded to have a higher psychosocial impact, particularly lower self-confidence [7] than the general population [6] and those who have had orthodontic treatment. Factors that motivate patients to seek orthodontic treatment

include wanting to improve their self-image, concerns about aesthetics, and wanting to improve their confidence and to remove their negative thoughts about their teeth [8].

The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) [9] is a useful tool to assess psychosocial impact related to malocclusion that could support clinical parameters in determining the priority of treatment for patients with malocclusions [10]. Such a validated and reliable instrument could be used as the yardstick to rank patients in terms of priority and expedite treatment to patients with higher psychosocial needs and has the propensity to maintain good oral health during treatment, when the clinical need is comparable [11].

Self-esteem is the belief in our own value and is crucial for mental well-being. Dental aesthetics are potential factors that can impact self-esteem [12]. Poorly aligned teeth or an aesthetically displeasing smile can lead to self-consciousness, reduced confidence, and social anxiety. Peers and social media influence self-esteem. Self-esteem is likely to be lower among those who are unable to adjust to external pressures for personal advancement [13]. For some patients with poor dental aesthetics, an improvement in self-esteem might be anticipated as one of the benefits of orthodontic therapy [14]. However, the evidence for improvement in self-esteem following orthodontic treatment is low [15]. This systematic review also reported that the influence of patients' gender or age on self-esteem after orthodontic treatment is still not clear.

The Rosenberg Self-Esteem Scale is a recognized tool for self-esteem evaluation [16]. It has been widely used for measuring global self-esteem. The translated scale (RSES-M) has been shown to be a valid and reliable scale for measuring the level of self-esteem among Malaysians [17].

Self-perceptions of smiles and dental aesthetics have been shown to influence the self-esteem of adolescents [18]. However, a previous study found that social factors associated with dental aesthetics were found to be the only significant predictor of self-esteem [19]. The authors related this finding to their culture, wherein other people's opinion is considered more important than their own. It is unclear whether this can be extended to other populations with varying cultures. Clinical indicators such as malocclusion have been related as causes for low esteem. Adolescents with Class II and III malocclusions reported lower levels of self-esteem scores compared to Class I malocclusion. Thus, there is a need to investigate how malocclusion and other factors, such as oral health-related quality of life, affect self-esteem. The null hypothesis is that there is no significant association between the domains of psychosocial impact of dental aesthetics and the level of self-esteem of patients seeking orthodontic treatment.

Therefore, the objectives of the study were (1) to assess the prevalence, extent, and severity of PIDAQ among patients seeking orthodontic treatment, as well as the level of their self-esteem; (2) to investigate the relationship between the psychosocial impact of dental aesthetics and the self-esteem of patients seeking orthodontic treatment; and (3) to assess the predictive value of the PIDAQ domains on the level of self-esteem. Presumably, the severity of their self-perceived malocclusion and their current self-esteem can be used to identify individuals who are strongly motivated to have orthodontic treatment.

2. Materials and Methods

This was a cross-sectional study conducted among patients who were seeking orthodontic treatment at the Faculty of Dentistry, Universiti Malaya. Inclusion criteria were patients who (1) seek orthodontic treatment aged from 12 to 50 years old, (2) have not undergone any orthodontic treatment before, (3) have no language barrier and are able to comprehend English and/or Malay, and (4) have an absence of any craniofacial anomalies. The study was conducted upon ethical approval from the Medical Ethics Committee of Faculty of Dentistry, Universiti Malaya (DF PD2212/0038; 2 April 2022). Respondents were recruited from March 2022 to August 2022.

According to an a priori sample size calculator for multiple regression, at least 118 respondents were needed for an anticipated medium effect size ($f^2 = 0.15$), 10 predictors, a power level of 0.80, and a probability of 0.05 [20].

2.1. Study Instruments

Questionnaires comprising four sections were self-administered when the patients came for initial consultations at the orthodontic clinic with the postgraduates. The questionnaires were given after consent was given and before the respondents were seen for their orthodontic consultation session. The first section collected demographic information, such as name, age, gender, and education level.

The second section comprised the 22-item Malaysian version of the PIDAQ [21,22] to determine the effects on oral health-related quality of life (OHRQoL) caused by dental arrangement. It assesses three negative domains—Social Impact (SI; 8 items), Psychological Impact (PI; 6 items), and Aesthetic Concern (AC; 2 items)—in addition to a positive domain—Dental Self-Confidence (DSC; 6 items). A 5-point Likert scale, with score 0 meaning “not at all” and score 4 meaning “very strongly”, was used to record the degree of agreement on each item.

The Malaysian version of the Rosenberg Self-Esteem Scale (RSES-M) [23] was used to determine the respondents’ self-esteem score in the third section. It comprises five positive and five negative items. Respondents self-rated the 10 items on a 5-point scale, with 0 signifying “strongly disagree” and 4 signifying “strongly agree”. Respondents with scores below 20 were considered to have low self-esteem [24].

The fourth section used the Aesthetic Component of the Index of Orthodontic Treatment Need (IOTN-AC) to evaluate the respondents’ personal impression of their malocclusion severity. On a scale of one to ten, where one represented the most appealing dental appearance and ten represented the least, respondents were asked to rank their perceptions of their dental aesthetics to determine their self-perceived malocclusion (SPM) [25,26]. In addition, the orthodontic postgraduates, who had been trained on the use of the Dental Health Component of the Index of Orthodontic Treatment Need (IOTN-DHC), clinically assessed for the severity of their malocclusion and thus their need for orthodontic treatment [25]. The postgraduates undergo annual recalibration for the use of the IOTN as part of the curriculum at this institution for screening of all patients.

2.2. Data Analysis

Table 1 shows the definitions and score range for the terms used in this study [6,16,25,26]. Overall, only five respondents were removed from analysis due to incomplete demographic information.

For data analysis, the Statistical Package for the Social Sciences (version 27.0; SPSS, Chicago, IL, USA, III) and Winsteps (version 3.80.1; Winsteps, Beaverton, OR, USA) were used; statistical significance was set at $p < 0.05$.

The Shapiro–Wilk tests, Skewness, and Kurtosis distribution were used to determine whether the distribution of the data was normal. The Kruskal–Wallis and Mann–Whitney tests for multiple comparisons were conducted to compare variations in PIDAQ, self-esteem, SPM, and levels of malocclusion severity. For the IOTN-DHC, none of the respondents was rated as grade 1, while respondents with grades 4 and 5 were grouped together for analysis due to a low number of respondents with grade 5. Ordinal scales were converted to interval scales by Rasch analysis [27]. Self-esteem scores between genders were compared using an independent *t*-test, while one-way analysis of variance (ANOVA) was used to compare self-esteem scores between the age groups. The association between malocclusion severity, SPM, PIDAQ, and self-esteem were evaluated using Pearson correlation coefficient. The level of respondents’ self-esteem was tested using multiple linear regression analysis to see if the four PIDAQ domains, as well as age, gender, education level, and the IOTN-DHC and IOTN-AC, significantly predicted a certain level. The model’s multicollinearity was tested using the variance inflation and tolerance factors.

Table 1. Definitions and score range of the terms.

Term	Definition	Score Range
Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) and PIDAQ domains		
Significant impact item	Item with responses of strongly (score 3) and very strongly (score 4) for the negative SI, PI, and AC domains, and not at all (score 0) and a little (score 1) for the DSC domain.	
Prevalence	The percentage of respondents who reported having any significant impact item for each domain and overall PIDAQ.	0 to 100%
Extent	(1) The number of domains with at least one significant impact item. (2) The percentage of respondents who reported having a significant impact item on one or more PIDAQ domains.	0 to 4 0 to 100%
Severity *	(1) The severity for total PIDAQ is the total response codes for each item in the SI, PI, and AC domains and reverse scores codes for the DSC domain. (2) The severity for each PIDAQ domain is the total response codes for each item in the domain. For the DSC domain, reverse scores were used.	PIDAQ: 0 to 88 DSC: 0 to 24 PI: 0 to 24 SI: 0 to 32 AC: 0 to 8
Rosenberg Self-Esteem Scale, Malaysian Version (RSES-M)		
Scale #	Overall score is calculated by summing the scores of the five positive items and the inverted scores of the five negative items of the RSES-M scale.	0 to 40
Aesthetic Component of the Index of Orthodontic Treatment Need (IOTN-AC)		
No SPM	Respondents who rated their Self-Perceived Malocclusion (SPM) as 1 to 2 on the IOTN-AC scale.	
Slight SPM	Respondents who rated themselves as 3 to 4 on the IOTN-AC scale.	
Moderate SPM	Respondents who rated themselves as 5 to 7 on the IOTN-AC scale.	
Severe SPM	Respondents who rated themselves as 8 to 10 on the IOTN-AC scale.	
Dental Health Component of the Index of Orthodontic Treatment Need (IOTN-DHC)		
No need	Respondents who were rated as 1 on the IOTN-DHC scale.	
Little need	Respondents who were rated as 2 on the IOTN-DHC scale.	
Moderate need	Respondents who were rated as 3 on the IOTN-DHC scale.	
Great need	Respondents who were rated as 4 on the IOTN-DHC scale.	
Very great need	Respondents who were rated as 5 on the IOTN-DHC scale.	

Psychosocial Impact of Dental Aesthetics (PIDAQ), Dental Self-Confidence (DSC), Psychosocial Impact (PI), Social Impact (SI), and Aesthetic Concern (AC), * Higher scores indicate more severe psychosocial impacts, # A higher score corresponds to a greater self-esteem's scale.

3. Results

Table 2 shows the respondents' profiles. Overall, 136 patients participated in the survey (response rate, 98.6%). There were 50 (36.8%) male and 86 (63.2%) female respondents, with a mean age of 22.4 years (SD: 6.8; range: 12 to 45 years). A majority of respondents ($n = 71$; 52.2%) were between 20 and 29 years old. About a third ($n = 53$; 39.0%) self-perceived themselves as having slight malocclusion, 41 (30.1%) as having moderate malocclusion, and 15 (11.1%) as having severe malocclusion, while 27 (19.9%) did not perceive themselves as having malocclusion. In contrast, when the malocclusion severity level was assessed using IOTN-DHC, as rated by clinicians, only seven (5.1%) respondents were in grade 5 (indicating very great need). Many of the respondents ($n = 92$; 67.6%) were in grade 4 (indicating great need), followed by grade 3 (indicating moderate need) with 24 (17.6%) respondents, and 13 (9.5%) respondents were in grade 2 (indicating little need). For the highest education level among the respondents, 9 (6.6%) have postgraduate qualifications, 60 (44.1%) were degree holders, 17 (12.5%) have a diploma, 47 (34.6%) have up to a secondary-school level of education, and only 3 (2.2%) respondents have a primary level of education.

The psychosocial impact of dental aesthetics of patients seeking orthodontic treatment was highly prevalent, affecting 99.3% of respondents ($n = 135$) (Table 3). The PI was the most prevalent domain, affecting 83% of respondents ($n = 113$), followed by the DSC domain ($n = 112$; 82.4%), the SI domain ($n = 83$; 61%), and the AC domain ($n = 74$; 54.4%). In terms of severity, the mean total PIDAQ score was 52.5, whereas the mean scores for each domain were 16.8 for the DSC, 16.7 for the SI, 14.2 for the PI, and 4.8 for the AC domains.

Table 2. Respondents' profile, based on gender and age.

Index of Treatment Need	Gender <i>n</i> (%)		Age Range (Years) <i>n</i> (%)				Total <i>n</i> (%)
	Male	Female	10–19 y	20–29 y	30–39 y	40–49 y	
Aesthetic Component (Respondent Rated)							
No SPM	9 (6.6)	18 (13.2)	12 (8.8)	14 (10.3)	1 (0.7)	0	
Mild SPM	19 (14.0)	34 (25.0)	18 (13.2)	29 (21.3)	5 (3.7)	1 (0.7)	
Moderate SPM	17 (12.5)	24 (17.6)	9 (6.6)	23 (16.9)	7 (5.1)	2 (1.5)	
Severe SPM	5 (3.7)	10 (7.4)	7 (5.1)	5 (3.7)	2 (1.5)	1 (0.7)	
Dental Health Component (Clinician Rated)							
Little need	2 (1.5)	11 (8.1)	5 (3.7)	5 (3.7)	3 (2.2)	0	
Moderate need	7 (5.1)	17 (12.5)	5 (3.7)	16 (11.8)	2 (1.5)	1 (0.7)	
Great need	37 (27.2)	55 (40.4)	33 (24.3)	48 (35.3)	9 (6.6)	2 (1.5)	
Very great need	4 (2.9)	3 (2.2)	3 (2.2)	2 (1.5)	1 (0.7)	1 (0.7)	

Self-perceived malocclusion (SPM).

Table 3. Prevalence and severity scores of PIDAQ among patients seeking orthodontic treatment.

	Prevalence		Severity	
	N	%	Mean	S.D.
Total PIDAQ	136	99.3	52.5	14.9
DSC	112	82.4	16.8	4.0
PI	113	83.0	14.2	5.0
SI	83	61.0	16.7	7.2
AC	74	54.4	4.8	1.8

Psychosocial Impact of Dental Aesthetics (PIDAQ), Dental Self-Confidence (DSC), Psychosocial Impact (PI), Social Impact (SI), and Aesthetic Concern (AC).

In terms of the extent of impacts, 14% ($n = 19$) reported significant effects on all domains, 19.9% ($n = 27$) on three domains, 16.9% ($n = 23$) on two domains, 27.2% ($n = 37$) on one domain, and 22.1% ($n = 30$) reported no significant effects on any domains (Table 4). On average, respondents were affected by 1.8 domains.

Table 4. Extent of PIDAQ among patients seeking orthodontic treatment.

Frequency, N (%)					Descriptives			
0	1	2	3	4	Mean	S.D.	Range	Quartiles
30 (22.1)	37 (27.2)	23 (16.9)	27 (19.9)	19 (14.0)	1.8	1.4	0–4	(1, 2, 3)

About 22.1% of respondents had low self-esteem. The mean self-esteem score among all respondents was 24.7 (S.D. = 6.3), with a median score of 25.0 (IQR = 8.75) (Table 5). Respondents between the ages of 40 and 49 years old have the highest mean level of self-esteem (28.5) compared to those who are between 30 and 39 years old and from 20 to 29 years old, who have mean scores of 25.2 and 25.4, respectively (Table 4). Even if the mean of both age groups was almost the same, the self-esteem of respondents between the ages of 20 and 29 years old has a median of 26.0, which is slightly higher than the median of respondents between the ages of 30 and 39 years old (24.0). The age group from 10 to 19 years old had the lowest self-esteem in comparison to all the age groups, with a mean score of 23.1. However, the one-way ANOVA of the person measure values found no significant differences in the self-esteem between patients of the different age groups ($F(132, 3) = 1.793$; $p = 0.152$). The self-esteem scores between male (mean = 24.0, median = 25.0) and female respondents (mean = 25.1, median = 24.5) were almost similar (Table 5). The independent t -test showed no differences in the self-esteem scores between genders ($p > 0.05$).

Table 5. Self-esteem scores for different age groups and genders (n = 136).

Age Range			Male (n = 50)				Female (n = 86)				Independent t-Test		Overall (n = 136)			
(Years)	n (%)	Mean	S.D.	Median	Interquartile Range	n (%)	Mean	S.D.	Median	Interquartile Range	p-Value	n (%)	Mean	S.D.	Median	Interquartile Range
10–19	19 (38.0)	22.7	6.7	21.0	10.0	27 (31.4)	23.4	5.9	24.0	8.0	0.894	46 (33.8)	23.1	6.2	23.0	9.0
20–29	26 (52.0)	25.1	7.9	26.5	9.0	45 (52.3)	25.5	5.4	25.0	8.0	0.918	71 (52.2)	25.4	6.4	26.0	8.0
30–39	5 (10.0)	23.4	5.1	23	10.0	10 (11.6)	26.1	6.2	25.5	11.0	0.380	15 (11.0)	25.2	5.8	24.0	9.0
40–49	0	-	-	-	-	4 (4.7)	28.5	5.4	28.5	11.0	-	4 (3.0)	28.5	5.4	28.5	10.5
All	50 (100%)	24.0	7.2	25.0	11.0	86 (100%)	25.1	5.7	24.5	7.25	0.595	136 (100)	24.7	6.3	25.0	9.0

Figure 1 shows that individuals with moderate need (grade of 3) for treatment have a greater self-esteem level than respondents with little need (grade of 2) and severe need (grades of 4 and 5). Self-esteem did not significantly differ between PIDAQ domains and self-rated IOTN-AC assessments of SPM. The Kruskal–Wallis test found that the self-esteem of patients seeking orthodontic treatment were different in regard to the different levels of severity of malocclusion, as measured using IOTN-DHC ($p < 0.05$). A post hoc analysis by Mann–Whitney tests showed significant differences in self-esteem scores between those with little need and moderate need ($p = 0.032$) and between moderate need and severe need ($p = 0.029$) for orthodontic treatment.

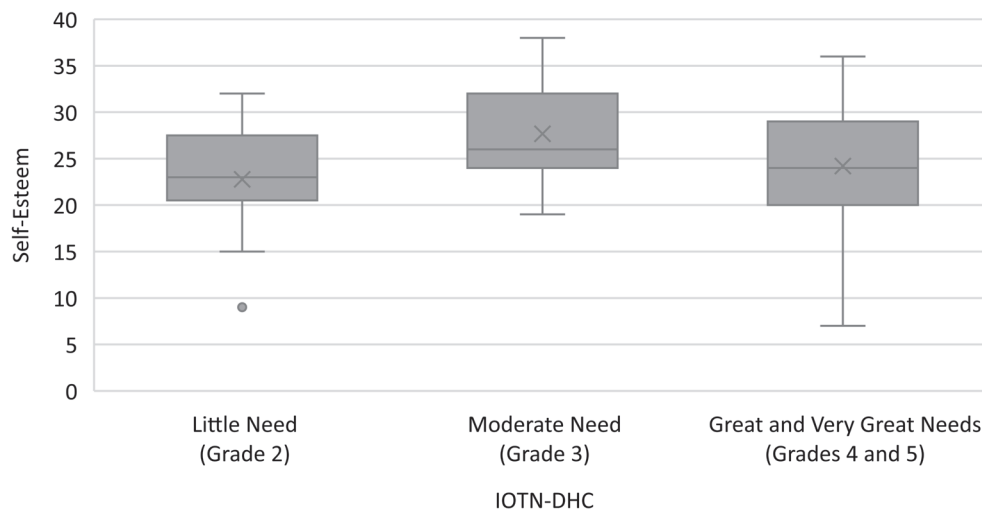


Figure 1. Comparison between self-esteem and malocclusion-severity levels, as measured by the Dental Health Component of the Index of Orthodontic Treatment Need (IOTN-DHC).

According to Pearson correlation coefficient (Table 6), self-esteem had a moderately negative correlation with SI ($r = -0.425$, $p < 0.01$), a weakly negative correlation with PI ($r = -0.321$, $p < 0.01$), a weakly negative correlation with reversed DSC ($r = -0.298$, $p < 0.01$) domains, a weakly negative correlation with education level ($r = 0.217$, $p < 0.01$), and a weakly negative correlation with age ($r = 0.185$, $p < 0.05$). On the other hand, neither gender, professionally rated IOTN-DHC, nor self-reported IOTN-AC was significantly correlated with self-esteem.

Table 6. Pearson correlations between domains of PIDAQ with age, gender, and education level.

		DSC §	SI	PI	AC	IOTN-AC	IOTN-DHC	Age	Gender	Education Level
Self-esteem	r	−0.298	−0.425	−0.321	−0.159	−0.13	−0.06	0.185 *	0.046	0.217
	p	0.000 *	0.000 *	0.000 *	0.032 *	0.065	0.246	0.015	0.297	0.006 *
DSC §	r	1	0.357	0.266	0.456	0.427	0.092	−0.116	−0.073	−0.142
	p		0.000 *	0.001 *	0.000 *	0.000 *	0.142	0.09	0.198	0.050 *
SI	r		1	0.827	0.579	0.189	−0.054	0.036	0.034	−0.026
	p			0.000 *	0.000 *	0.014 *	0.266	0.34	0.346	0.381
PI	r			1	0.598	0.281	−0.11	0.208 *	0.126	0.068
	p				0.000 *	0.000 *	0.100	0.008	0.073	0.215
AC	r				1	0.256	−0.022	0.082	0.010	−0.063
	p					0.001 *	0.399	0.17	0.453	0.235
IOTN-AC	r					1	0.168	0.133	−0.03	−0.062
	p						0.025 *	0.062	0.363	0.237
IOTN-DHC	r						1	−0.009	−0.188	0.028
	p							0.458	0.014 *	0.371
Age	r							1	0.144	0.558
	p								0.048 *	0.000 *
Gender	r								1	0.133
	p									0.061

* Correlation is significant at the 0.05 level. DSC § = reversed DSC.

According to the regression analysis (Table 7), the nine predictors explained 23% of the variance ($R^2 = 0.28$, $F(9, 126) = 5.483$, $p < 0.001$). The SI ($\beta = -0.386$, $p < 0.001$), AC ($\beta = 0.228$, $p < 0.05$), and reversed DSC ($\beta = -0.195$, $p < 0.05$) domains were found to significantly predict self-esteem. In this model, other factors, such as PI, self-rated IOTN-AC, professional-rated IOTN-DHC, age, gender, and education level, did not significantly predict self-esteem.

Table 7. Multiple linear regression for prediction of self-esteem.

Model		Unstandardized Coefficients		Standardized Coefficients	t	p	Correlations		
		B	Std. Error	Beta			Zero Order	Partial	Part
1	(Constant)	0.526	0.553		0.951	0.343			
	AC	0.088	0.040	0.228	2.203	0.029 *	−0.159	0.193	0.166
	SI	−0.254	0.096	−0.386	−2.648	0.009 *	−0.425	−0.230	−0.200
	PI	−0.079	0.094	−0.130	−0.843	0.401	−0.321	−0.075	−0.064
	Reversed DSC	−0.103	0.050	−0.195	−2.036	0.044 *	−0.298	−0.178	−0.154
	IOTN-AC	0.017	0.110	0.014	0.150	0.881	−0.130	0.013	0.011
	IOTN-DHC	−0.118	0.124	−0.075	−0.948	0.345	−0.060	−0.084	−0.072
	Age	0.016	0.016	0.097	0.997	0.321	0.185	0.088	0.075
	Gender	0.026	0.182	0.011	0.144	0.886	0.046	0.013	0.011
	Education Level	0.159	0.099	0.150	1.609	0.110	0.217	0.142	0.121
Model Summary ^b						ANOVA			
Model	R	R square	Adjusted R square	Std. error of the estimate	F	Df1	Df2	Sig.	
1	0.530 ^a	0.281	0.230	0.98460	5.483	9	126	0.000	

^a Predictors: (constant), education level, SI, IOTN-DHC(C), gender, IOTN-AC(P), DSC, age, AC, and PI. ^b Dependent variable: self-esteem. * $p < 0.05$.

4. Discussion

4.1. Prevalence, Extent, and Severity of PIDAQ among Patients Seeking Orthodontic Treatment

This study found that PIDAQ prevalence and severity were higher than in previous epidemiological studies on young adults [28] and schoolchildren [6]. Our respondents' mean PIDAQ score was similar to that in a longitudinal study assessing the PIDAQ of patients prior to fixed appliances therapy [7]. Another study assessing PIDAQ after one year of orthodontic treatment also showed similar pre-treatment scores as this current study, with a significant reduction in the mean values after one year in treatment [29]. This proves that patients who seek orthodontic treatment have a strong psychosocial impact of their malocclusion and, hence, a worse quality of life compared to individuals who perceive themselves as having no or minimal malocclusion.

The respondents of this study experienced similar impacts on both DSC and PI domains. Other studies found PI to be the most prevalent, but in terms of the extent of impact, we had similar results [6,28]. This suggests that adolescents and adults seeking orthodontic treatment are more psychologically impacted by malocclusion.

4.2. Self-Esteem and PIDAQ

Our study found an association between self-esteem and the PIDAQ domains, with SI having a moderate negative association with self-esteem ($r = -0.425$; $p < 0.05$), followed by PI ($r = -0.321$; $p < 0.05$). On the other hand, DSC and AC had a weak association with self-esteem, as found by a weak negative association between the reverse-scored DSC with self-esteem ($r = -0.298$; $p < 0.05$) and between AC with self-esteem ($r = -0.159$; $p < 0.05$). Our findings were similar to studies on the Croatian and Chinese populations [19,30]. A study among university students also reported that individuals experiencing substantial psychosocial effects due to dental aesthetics are likely to exhibit lower levels of self-esteem [31]. This suggested that, regardless of cultural differences in the Western or Eastern

community, negative social behaviors and dissatisfaction over one's own dental aesthetics might influence the subjective impressions of an individual, such as self-esteem.

SI, AC, and reverse scored DSC domains were significant predictors of self-esteem in our study based on the regression model analysis. People with higher self-esteem have lower results in the SI domain, which explains that they care less about their dental appearance in social settings. However, people with higher self-esteem have higher results in the AC domain, which means that they are more aware of their physical appearance. Additionally, people with higher self-esteem have lower results in the reversed DSC domain, depicting that satisfaction with dental appearance has a positive effect on self-esteem [19]. Although the PI domain and self-esteem are correlated, the domain did not significantly predict self-esteem in our study.

4.3. Self-Esteem and the Degree of Malocclusion

Our study found no correlation between malocclusion severity and self-esteem, with respondents with little need of treatment having the lowest self-esteem and those with moderate treatment need having the highest self-esteem levels. Research suggests that self-esteem is a complex issue that is not solely dependent on malocclusion [32–35], and contentment with one's appearance can boost self-esteem [36].

Poor dental aesthetics can increase patients' levels of anxiety, particularly those with high tendencies toward perfectionism. The constant concern over the teeth can increase their levels of depression [37]. Luo et al. (2021) suggested incorporating psychological intervention as part of patient management to properly improve the patients' aesthetic orientation, reduce their expectations, and increase their satisfaction.

Being female and having poor dental aesthetics are factors for poor self-esteem [38]. On the other hand, orthodontic treatment is an important factor that can improve the self-esteem of adolescents [38]. A study found that orthodontic treatment improves self-esteem as early as 3 months into treatment and continues to increase after a year's follow-up [39]. Other studies also similarly found patients having higher self-esteem levels post-treatment compared to pre-treatment and during treatment [40,41].

In another study, it was found that global self-esteem remains stable throughout orthodontic treatment. This study found an interaction effect between time into treatment with age and gender for certain self-esteem subscales. For the scholastic competence subscale, the values reduce in girls, while in boys, the values increase during treatment until the end of treatment. Adolescents who started orthodontic treatment at a younger age have been found to have increased levels in the physical-appearance and global self-worth subscales after one year of treatment, whereas older adolescents showed a trend toward decreased self-esteem; however, at the end of treatment, both groups had similar levels of self-esteem [42].

These findings suggest that self-esteem is influenced by various elements, such as body image, facial appearance, levels of anxiety and depression, and social acceptance.

4.4. Self-Esteem of Various Age Groups, Gender, and Education Levels

According to the findings of our research, there is a correlation between increasing age and increased level of total self-esteem, supporting the finding of a previous longitudinal study [43]. People generally become more accepting of who they are as they get older [44]. Nonetheless, it should be kept in mind that the trajectory of self-esteem change may differ across cultures [45] and the environment that one is exposed to.

The current study found no significant difference in self-esteem between genders, despite previous research showing lower self-esteem in adolescent girls [46–49] and that malocclusion had a greater impact on girls' self-esteem [47]. However, male self-esteem rises, and female self-esteem falls from early adolescence to early adulthood [50]. Another local study found that males and females in urban areas had similar PIDAQ scores, while males in sub-urban and rural areas had lower PIDAQ scores than their female counterparts [28]. This finding explained why our current study has no significant differ-

ences between the genders, as our respondents were from urban areas of Kuala Lumpur and Selangor.

Our research indicates that an individual's self-esteem increases with his or her education level, consistent with a previous study indicating higher self-esteem among those with higher education [51].

4.5. Study Limitations

The study faced limitations due to short data collection time and five missing data samples. Despite this, the final sample size was sufficient for power. A majority of the respondents were adults between 20 and 29 years old (52.2%), followed by the combination of adolescents and young adults of between 10 and 19 years old (33.8%). Despite the wide age range of the respondents, their self-esteem scores were generally stable, with no significant differences across the age groups. Therefore, the results of this study could be applied to a wide age group.

5. Conclusions

The prevalence of psychosocial impacts of dental aesthetic amongst patients seeking orthodontic treatment was 99.3%, with 22.1% showing low self-esteem. The significant predictors of self-esteem of orthodontic treatment-seeking patients were found to be Social well-being, Aesthetic Concern, and Dental Self-Confidence.

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Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and approved by the Medical Ethics Committee of Faculty of Dentistry, Universiti Malaya (DF PD2212/0038; 2 April 2022).

Informed Consent Statement: Informed consent was obtained from all respondents involved in the study.

Data Availability Statement: The data presented in this study are openly available in UM Research Repository at <http://eprints.um.edu.my/id/eprint/45074> (accessed on 26 June 2024).

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Protocol

Cope PPA—Adaptation of the Biographic-Narrative Approach for Persons with Primary Progressive Aphasia: Protocol for Clinical Trial Design

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Abstract: Persons with primary progressive aphasia (PPA) often experience limitations in their quality of life (QoL). Some studies have shown positive effects of speech and language therapy on QoL in persons with PPA. However, there is still a lack of evidence for disorder-specific approaches for this important therapeutic goal. The biographic-narrative approach (narraktiv) has been shown to significantly improve QoL in persons with post-stroke aphasia. In the planned study, the biographic-narrative approach will be adapted for persons with PPA (Cope PPA), and its efficacy will be investigated. First, a focus group interview with five persons with PPA will be conducted to identify the wishes and needs of participants. Based on the results, the narraktiv manual according to Corsten et al. (2015) will be revised. Second, an efficacy study will be conducted according to the new Cope PPA manual with 24 persons with PPA in a waiting group control design. The primary outcome, QoL, will be assessed using questionnaires (Stroke and Aphasia Quality of Life Scale-39) and semistructured interviews. Depressive symptoms, life satisfaction and cognitive/communicative functioning will also be assessed. If Cope PPA proves efficacy, this study may help to improve the treatment of persons with PPA.

Keywords: primary progressive aphasia; biographic-narrative approach; reminiscence; life review; life-review therapy; quality of life

1. Introduction

Primary progressive aphasia (PPA) is a rare clinical syndrome characterised by prominent speech disorder and an average prevalence of 3:100,000 [1,2]. It is classified into three variants (nonfluent, semantic, and logopenic) and is associated with Alzheimer's pathology or frontotemporal dementia [3,4]. As the age of onset is approximately 65 years [3], it has a devastating impact on the professional and private roles of an affected person [5]. The treatment of PPA is limited to mitigating symptoms, as no curative therapy is known to date [6]. About 40% of persons with PPA develop depression as a comorbidity during the course of the disease, which can be attributed to a perceived awareness of the individual situation and to an impaired self-image of a person with a speech disorder [7–9]. Since aphasia limits access to psychotherapeutic services [10], approaches that enhance quality of life (QoL) are increasingly being considered by speech and language therapists (SLTs). Further, QoL, which is defined by the World Health Organisation (WHO) as an individual's perception of their position in life considering cultural and personal context factors in relation to personal goals and concerns [11], is described as the “ultimate” outcome of aphasia therapy [12]. Psychoeducational group programs and participatory approaches have already been successfully applied to persons with PPA and are valued by individuals [13,14]. Counselling and communication partner training showed positive effects on

coping with illness and communication in dyads [15,16]. However, there is uncertainty in the application of QoL-related methods in persons with PPA and a lack of high-quality studies proving effects on QoL of this target group [7,17].

In a systematic review summarising rehabilitative interventions for the prevention and treatment of depression in poststroke aphasia patients, the authors refer to a mixed-methods study by Corsten et al. (2015) [18].

This study is emphasised as the one with the highest quality and level of evidence for persons with poststroke aphasia and demonstrates the effects of the biographic-narrative approach *narraktiv* [18,19]. The *narraktiv* intervention contains five individual and seven group therapy sessions in which biographic storytelling is stimulated. This approach is based on the idea that aphasia hinders the natural and daily redevelopment of identity, as the medium for identity work (communication) is impaired. Disturbed identity work leads to a negative self-image and thus reduces QoL. Supporting narration can help persons with aphasia to work on their identity and to build a sense of coherence, ultimately improving their QoL [9,20,21]. The participants in the *narraktiv* intervention were persons with poststroke aphasia who did not have depression or who exhibited early signs of depression. Significant improvements with small to medium effect sizes were observed in improvement of mood and health-related QoL, measured by the Visual Analogue Mood Scale (VAMS, [22]) and the Aachen Life Quality Inventory [23]. The effects remained stable over a period of three months after the intervention or even increased towards follow-up, as in the case of the Aachen Life Quality Inventory scores. Since many therapeutic approaches can be transferred from persons with poststroke aphasia to persons with PPA [6], it seems promising to apply the concept of the biographic-narrative approach *narraktiv* according to Corsten et al. (2015) to persons with PPA.

Comparable approaches such as ‘simple reminiscence’, ‘life-review’, or ‘life-review therapy’ [24,25] have been used successfully in patients with dementia and older persons [24,26–28]. While ‘simple reminiscence’ focuses on the recall and sharing of memories, ‘life review’ is more evaluative and aims to cover the whole life story chronologically. ‘Life-review therapy’ is a continuation of ‘life review’, in which more elements of cognitive therapy are used to give persons a more positive view of their lives [26]. Although ‘simple reminiscence’ can be conducted in a nursing home setting by counsellors with basic skills, ‘life review’ should be directed towards individuals with mild psychological distress and delivered by counsellors with advanced skills. In cases of serious psychological distress, experienced counsellors could use ‘life-review therapy’ [25]. Another way to differentiate between the approaches is to categorise them as structured or unstructured therapies [29]. The *narraktiv* intervention is most likely to be categorised between structured/unstructured approaches and combines aspects of ‘simple reminiscence’, ‘life review’, and ‘life-review therapy’. On the one hand, it is highly structured for the therapist through predetermined question types and a fixed structure of individual and group therapy sessions; on the other hand, it is nondirective. For example, participants are free to decide what they want to tell about their own lives and what personal relevance they want to have, thanks to the open-narrative stimulus. The biography does not have to be presented in every detail, neither chronologically nor in terms of content. The focus on persons with aphasia distinguishes the biographic-narrative approach from reminiscence or life-review therapy, which were developed for persons with memory deficits rather than for persons with primary aphasia [30].

Due to its person-centred focus on QoL, *narraktiv* differs from the participation- and environment-based group programmes that try to enhance QoL indirectly and have been evaluated for persons with PPA to date [13,31]. Because of the non-directive character, the approach also differs from counselling services that have been evaluated for use with persons with PPA and their caregivers [15]. As far as we are aware, there is only one case study indicating the use of *narraktiv* in a person with an advanced nonfluent variant of PPA in a palliative care setting [32]. The adjustments and effects of *narraktiv* are not described by the authors [32]. However, it seems close at hand that the original *narraktiv*

intervention which is categorised by experts as a rehabilitative care intervention [18], needs to be adapted for persons with PPA who may have other needs against the background of cognitive deficits and the progression of the disease. Participatory research enables development according to a bottom-up principle [33]. In our study, it will be used to make the approach more sustainable and acceptable.

The aim of the present study is to prove the transferability of the biographic-narrative approach to the treatment of persons with PPA. In a focus-group interview, the potential need to adapt the biographic-narrative approach narraktiv according to Corsten et al. (2015) for persons with PPA will be discussed. An efficacy study will then be conducted to evaluate the efficacy of the adapted biographic-narrative approach Cope PPA for persons with PPA and to explore the effects in individual cases.

The research questions are as follows:

1. What need for adaptation do persons with PPA see for the biographic-narrative approach narraktiv for use with persons with PPA?
2. Does the adapted biographic-narrative approach Cope PPA improve the QoL of persons with PPA?

2. Materials and Methods

In the following, the method of the planned study is reported considering the SPIRIT checklist. This international checklist contains 33 evidence-based recommended items, reflecting the minimum content of a clinical trial protocol (2013, see Additional Supplementary Materials File S1). The current study is monocentric, as it will be conducted only at the outpatient memory clinic at the Department of Psychiatry and Psychotherapy of the University Hospital Mainz (Mainz, Germany). The study complies with the General Data Protection Regulations and will be conducted in accordance with the Declaration of Helsinki. This study was approved by the Ethics Committee of the Federal Medical Association of Rhineland-Palatinate (2023-17294).

2.1. Inclusion and Exclusion Criteria

Only persons who fulfil the clinical diagnostic consensus criteria for PPA according to Gorno-Tempini (2011, [4]) will be included in both phases of the study. Persons with all variants of PPA are eligible. Although persons with all stages of PPA can be included, participants must be willing to work in a group and be able to communicate basic thoughts. People with mutism were therefore excluded from both phases of the study. According to the consensus criteria [4], persons were excluded if their speech deficits could be better explained by other neurological disorders like stroke or brain injury. Further exclusion criteria were inadequate visual acuity despite correction with a visual aid and inadequate hearing despite the use of a hearing aid.

The ability to give consent is a prerequisite for participation in both phases of the study. For persons with dementia syndromes such as PPA, there may be uncertainties in clarifying the ability to consent [34]; for this reason, the following criteria of the guideline ‘capacity to consent of persons with dementia’ are used for this purpose [35]. The consent of the participants will be obtained in detail and in an understandable form by the deputy study director (M.G.) and study doctors involved (K.G., I.H.) before the start of the study, taking into account the linguistic, cognitive, and emotional competences of each participant. Immediately before each assessment and therapy session, the ability to give consent will be reassessed and documented by the research team based on the following criteria: (1) understanding relevant information, (2) understanding the implications for one’s own situation, (3) reasoning about the information, and (4) expressing a treatment choice [34,36]. Participants will give their informed consent to participate and to be video-recorded during the assessments and the therapy sessions. The participants’ faces will be fully visible to account for the participants’ facial expressions as a form of communication. For the efficacy study, caregivers will give their informed consent for being interviewed at the end of the intervention.

Persons with pronounced cognitive deficits, corresponding to a score < 10 out of 30 points in the established cognitive screening test Mini Mental-State Examination (MMSE, [37]), will be excluded at the beginning of the efficacy study, as there are indications from the literature that more complex questionnaires cannot be answered in cases of severe cognitive impairment [38]. Individuals whose cognition deteriorates to < 10 points on the MMSE over the course of the study will not immediately be excluded. In these cases, an individual decision will be based on clinician ratings and according to the participants' wishes.

Furthermore, the presence of severe depressive symptoms (clinical diagnosis and/or severe depressive symptoms, corresponding to > 35 points on the Montgomery–Åsberg Depression Rating Scale (MADRS, [39]) is defined as an exclusion criterion at the beginning of the study because narraktiv was developed for preventing the occurrence of depression and has not been evaluated for the treatment of this condition [19]. However, due to the positive effects of participating in peer support groups on depression, persons with mild to moderate depression will not be excluded from the present study [40]. If participants show signs of depression in the course of the study (MADRS > 35 at t1–t3 or characteristics of a depressive disorder such as physical exhaustion, appetite disorders, changes in gestures/facial expressions or physiognomy during the therapy sessions), suicidal tendencies will be explored and documented in an individual setting. Questions from the national guideline “Unipolar depression” will be used for this purpose, e.g., “Have you had or do you have concrete plans to harm yourself?” and “Is there anything that keeps you alive?” [23]. If acute suicidal behaviour is suspected, an emergency psychiatric counselling will be conducted at the Department of Psychiatry and Psychotherapy of the University Hospital Mainz. If there is no acute suicidal tendency, the person will be promptly seen by a specialist in the outpatient memory clinic and the research team will plan further treatment steps if necessary. Participation in the study will be in addition to any other treatment participants may receive.

Whether persons with PPA previously received or currently receive speech and language therapy will not be a criterion for inclusion or exclusion in our study.

2.2. Identification and Recruitment of Participants

Participants will be recruited via the outpatient memory clinic as well as by cooperating practices and outpatient speech and language therapy practices. A recruitment flyer has been created in understandable, simple language to inform participants about the study. Prior to participation, potential participants will be screened through face-to-face counselling.

2.3. Design

The planned study consists of two phases using an adaptive clinical trial design. ‘Phase one’ envisages a focus-group interview in which five persons with PPA will take part. The aim of the focus-group interview is to identify specific needs of persons with PPA for adaptation of the biographic-narrative approach narraktiv for use with persons with PPA. The ‘phase one’ corresponds to a qualitative exploratory study based on the principle of a group discussion, aiming to generate data based on social interaction involving persons with PPA in the study process in the sense of participatory research [41]. In ‘phase two’, an efficacy study will be conducted with 24 persons with PPA evaluating the adapted biographic-narrative approach Cope PPA. The efficacy study will be a mixed-methods randomised controlled trial with a waiting group, which is a suitable control (compared to standard care) for the inconsistent approach in the treatment of persons with PPA (Figure 1).

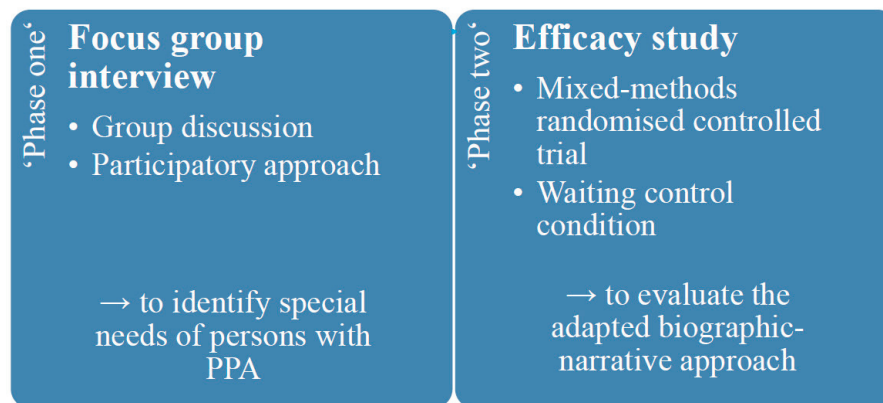


Figure 1. Study design including ‘phase one’ and ‘phase two’.

2.3.1. Blinding

Due to the nature of the intervention, blinding of the investigators and participants is not possible. In ‘phase one’, independent raters are involved in the transcription and coding of the interviews. In ‘phase two’, external judgement assessments are evaluated by independent raters who can use the video recordings as the basis for the evaluation.

2.3.2. ‘Phase One’: Focus-Group Interview

In the focus-group interview, the participants will be interviewed about their expectations/wishes for speech and language therapy and individual strategies for coping with their diagnosis (see Figure 2). Furthermore, the procedure and methods of narrativ will be introduced. Persons with PPA will be asked to assess the extent to which methods and materials (e.g., use of pictograms or photographs) appear feasible and useful. The interviewer is a trained SLT (M.G.) who has some experience in conducting group discussions with aphasic participants. Repair behaviour such as repetition, revision/reformulation and cueing [42] are used to support participants’ communication. Turn-taking is organised by the interviewer. A text card saying “We listen to each other and let each other talk” is provided as a communication rule for the interview. If necessary, the participants are reminded of this agreement. The guidelines for the focus group interviews are provided in Additional File Supplementary Materials File S2.

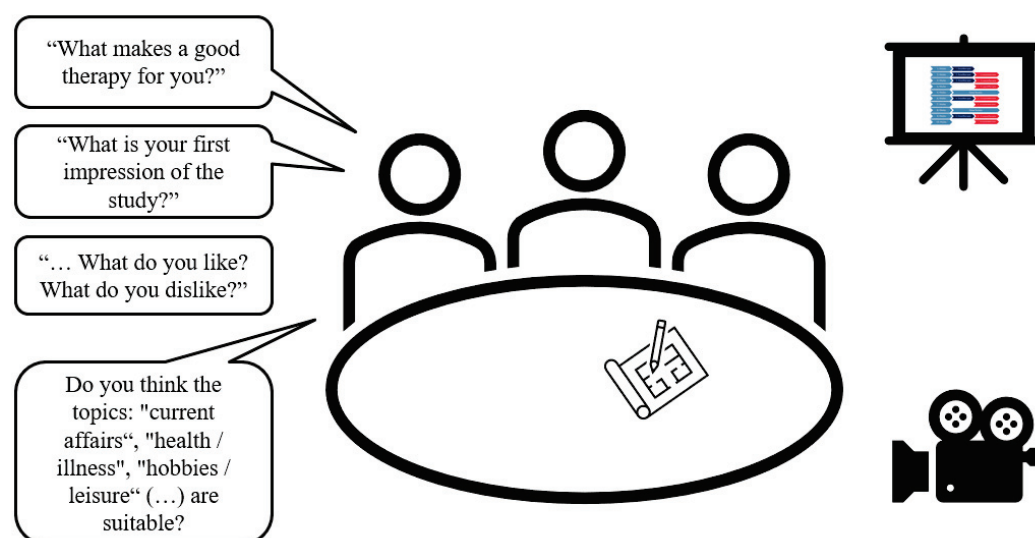


Figure 2. Focus group setting (designed by the author using PowerPoint images, Version 2401).

2.3.3. ‘Phase Two’: Efficacy Study

In ‘phase two’ of the study, participants will undergo the adapted biographic-narrative approach. Two groups will receive therapy immediately after randomisation, and participants enrolled in the waiting group will undergo therapy after an interval of 10 weeks. The first three individual therapy sessions will be based on the narrative interview format, which aims to elicit storytelling [43]. After an open initial stimulus (“Please, tell me your life story.”), participants will tell their life story without being interrupted. If necessary, the SLT will support the participant through phonological, semantic, and graphemic cues as well as paraphrasing or visual aids (pictures, pictograms, etc.). The main narrative could take up the entire first individual therapy session (90 min). It is also possible to continue the main narrative in the second to fifth individual therapy session. Basically, after the completion of the main narrative, there will be a phase of narrative-generating follow-up questions on only briefly mentioned topics (immanent questioning techniques, e.g., “You mentioned your childhood. What else comes to your mind about that time?”). After the immanent questions, new topics such as possible resources, self-theories, or ideas about the future will be made explicit (exmanent questioning techniques, e.g., “Above all your daughter helps you a lot. Why? What do you think?”). The fourth and fifth individual therapy sessions will be based on episodic interviews [44], which are more structured than narrative interviews. The episodic interview technique aims to elicit subjective definitions or arguments of personal relevance and narratives of subjectively meaningful life situations (e.g., “Are there situations that make you feel old? Please tell us.”) [44,45].

From the second week onwards, group-therapy sessions (90 min each) will be conducted in addition to the individual-therapy sessions. Topics such as current events, hobbies, friends and family, health and illness will be addressed. After the third and fifth group-therapy sessions, a one-week break will be inserted to enable the integration of narrative experiences into daily life [19]. The entire course of the intervention from a participant’s perspective is shown in Figure 3.

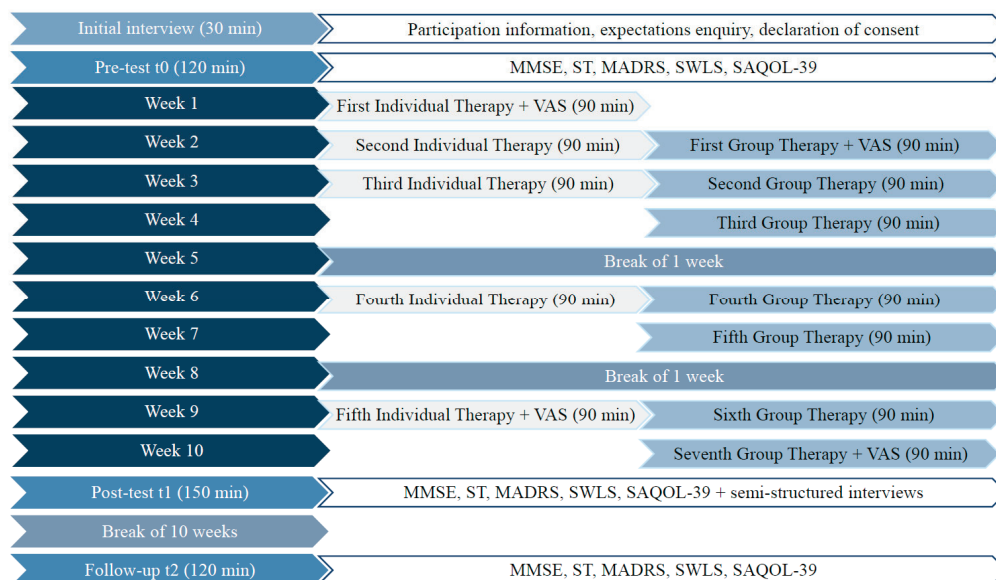


Figure 3. Efficacy study from a participant’s perspective. MMSE = Mini Mental-State Examination; ST = scenario test; MADRS = Montgomery–Asberg Depression Scale; SWLS = Satisfaction with Life Scale; SAQOL-39 = Stroke and Aphasia Quality of Life Scale-39; VAS = Visual Analog Scale.

2.3.4. Randomisation

The division of the participants into groups is necessary for conducting the efficacy study and will be carried out as a random allocation by the deputy study director (M.G.) [46]. Since the therapy groups will consist of six participants, four blocks must be formed ($N = 24$). A permutation of the four blocks will be drawn at random, with the first half

($n = 12$) of the permutation being assigned to the therapy group and the second half ($n = 12$) assigned to the waiting group (see Figure 4). Each allocation thus applies to six consecutive participants. Groups will be randomised without balancing.

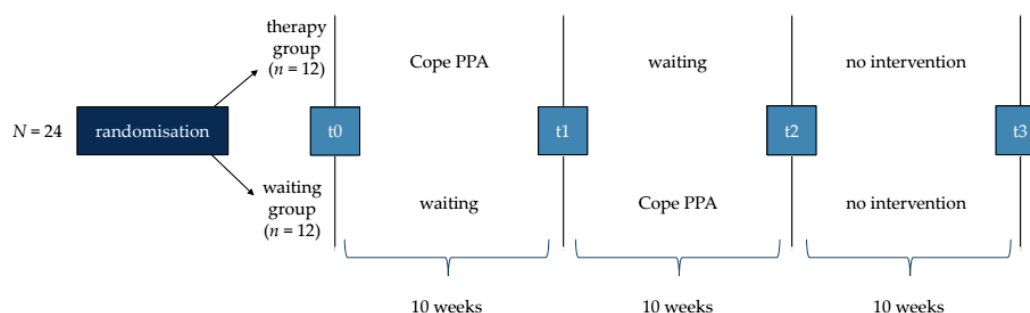


Figure 4. Procedure of ‘phase two’ containing four test points (t0, t1, t2, t3).

2.3.5. Sample Size Justification

It can be assumed that the effects in persons with PPA are comparable to the effect sizes in persons with aphasia after stroke, as the impairment patterns are similar [42], and many approaches for the treatment of poststroke aphasia are successfully transferable to PPA [6,47]. Based on the results of Corsten et al. (2015), who reported an 85.19% improvement in Complaints and an 88.89% improvement in Burden score on the Aachen Life Quality Inventory [23] from baseline to follow-up, with an overall low to moderate effect size ($d = 0.22$ to 0.58) [19], an a priori power analysis was conducted using G*Power 3.1.7. This resulted in a total sample size of 24 for an estimated effect size of $f = 0.275$ ($d = 0.55$; $\alpha = 0.05$; power = 0.8). It is assumed that with this sample size, effects can be detected in persons with PPA who are examined with the Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39, [48]). It is possible that the effect sizes in persons with PPA are even greater if persons with mild depression are included; thus, a lower baseline score for QoL can be expected.

2.4. Measurements

All participants enrolled in ‘phase two’ will be assessed through self-assessments and external assessments at four test times (t0, t1, t2, t3) every 10 weeks.

2.4.1. Measuring Instruments

The primary outcome of QoL will be measured quantitatively by using the SAQOL-39 [48]. The SAQOL-39 is a feasible, reliable and valid assessment of health-related QoL in persons with chronic poststroke aphasia [48]. There is an international consensus that this measurement tool is best-suited for assessing the QoL of persons with aphasia [49]. Furthermore, it has been used successfully in persons with PPA [50]. For the present study, the SAQOL-39 seemed more suitable than the Aachen Life Quality Inventory used by Corsten et al. (2015), as it has a higher psychometric quality in comparison.

As a secondary outcome, depression will be measured by using the MADRS [39]. With the intention of not assessing persons with PPA “to destruction” [51], the MADRS was also chosen because it is an indirect method. The MADRS is a reliable and valid instrument, with high values indicating higher levels of depression [39].

In addition, the Satisfaction With Life Scale (SWLS, [52]) will be used as a scale to measure global life satisfaction. The SWLS has been shown to have good psychometric properties, including high internal consistency, and is less influenced by positive affect [52]. As the SWLS comprises only five items, it can be carried out quickly, and so it is presumably not an additional burden for persons with PPA.

The MMSE [37] will be used to measure cognitive functioning. On the one hand, this is important to ensure the inclusion criteria, and on the other hand, the progression of PPA over the course of the study period will be monitored. In clinical and research settings, the

MMSE is the most widely used short cognitive test. It is reliable and valid with little effect on practice [37].

The scenario test (ST, [53]) measures participants' communicative abilities and consists of 18 items (e.g., shopping or visiting a doctor). Due to the facilitated role-plays, the process is very close to realistic everyday communication. Recent evidence suggests that this method is well applicable to persons with PPA [54].

The Visual Analog Scale (VAS, [55]) will be administered before and after the first and fifth individual therapy sessions as well as before and after the first and fifth group therapy sessions. In contrast to the VAMS, which was used in the study of Corsten et al. (2015), the VAS consists of a single horizontal line instead of a vertical line and is bipolar, similar to the preceding scales of Stern et al. (1997, [22]). The VAS is a widely accepted scale that was adapted for various clinical questions examining pain or the effects of interventions, with special reference to QoL. However, to the best of our knowledge, the VAS, according to Ushijima et al. (2006), has neither been validated nor used for the evaluation of mood in persons with primary progressive aphasia.

After each individual-therapy session and each group-therapy session, the SLT will fill out a fidelity checklist, which is intended to record how well the SLT adheres to the adapted biographic-narrative Cope PPA manual. The checklist contains the basic principles of the biographic-narrative approach (e.g., resource-oriented attitude/nondirective communicative behaviour). For the SLT, the fidelity checklist will serve as a self-reflection tool (see Additional Supplementary Materials File S4). All assessment appointments as well as all therapy sessions will be recorded by video to evaluate procedures such as the MADRS and the ST afterwards by an independent rater. Similar to the randomised controlled pilot study by Volkmer et al. (2023) [16,56], a random sample of 10% of the videos of the individual- and group-therapy sessions will be evaluated by an independent rater to assess fidelity too (see Additional Supplementary Materials File S5). Thus, the quality of the treatment will be recorded.

In addition to the quantitative evaluation, semistructured interviews will be conducted by an independent rater, with all participants and their caregivers asking for experiences during the intervention or results of participation. Participants' perceptions will complement the quantitative evaluation. We will use field notes to capture the content of the interviews. An overview of all measurements is given in Table 1.

Table 1. Measuring instruments, aim and time of measurement.

Measuring Instruments	Aim of Measuring	Time of Measuring
Questionnaires (filled out by participants)		
39-Item Version of the Stroke and Aphasia Quality of Life Scale (SAQOL-39, [48,57])	quality of life	t0, t1, t2, t3
Satisfaction with Life Scale (SWLS, [52,58])	satisfaction with life	t0, t1, t2, t3
Assessments (conducted by SLT, evaluated by independent rater)		
Montgomery–Asberg Depression Scale (MADRS, [39,59])	depression	t0, t1, t2, t3
Mini Mental-State Examination (MMSE, [37,60])	cognitive status	t0, t1, t2, t3
Scenario test (ST, [53,61])	communicative–pragmatic function	t0, t1, t2, t3
Visual Analog Scale (VAS, [55])	mood	before and after the first and fifth individual therapy sessions; before and after the first and fifth group therapy sessions

Table 1. Cont.

Measuring Instruments	Aim of Measuring	Time of Measuring
Interviews (conducted by independent rater with participants and caregiver)		
Semistructured interviews	views and satisfaction with the current therapy; effectiveness of the intervention	after intervention
Checklists (filled out by SLT)		
Fidelity checklist	self-reflection according to adherence to the biographic-narrative approach	after every individual and every group therapy session
Checklists (filled out by independent rater)		
Fidelity checklist	recording of quality and evaluation of adherence in a random sample of 10% of video recordings of all therapy sessions	at the end of the study

2.4.2. Data Management

All personal information will remain confidential. The data will be stored at the University Hospital Mainz only. Only members of the research team (M.G., A.L.K., K.G., I.H.) will have access. Participants will be assigned a unique code (see “Randomisation” above), which will be on the assessment sheets, in the names of the video files, and in the analysis of documents and publications. The list of participant names and their unique codes will be kept in a locked cabinet in the rooms of the outpatient memory clinic.

2.4.3. Data Analysis

Qualitative data analysis will be carried out using MAXQDA (VERBI Software, 1989–2021); quantitative data analysis will be carried out using the statistical software SPSS (version 27, IBM®) and RStudio (2023.09.1 Build 494).

The data from ‘phase one’ will be analysed via qualitative content analysis by Elo and Kyngäs (2008, [62]). The video material of the focus group interview will be transcribed according to the content semantic transcription by Dresing and Pehl (2018) by two SLTs [63]. The coding process will be carried out by two SLTs. Categories will be formed deductively. The category system for the analysis will contain categories such as ‘characteristics of good therapy’/‘Augmentative and Alternative Communication’/‘coping strategies’/‘opinion on therapy materials’.

The quantitative data of ‘phase two’ will be analysed descriptively and inferentially. Before the inferential analysis, the normal distribution will be checked in both groups using the Shapiro–Wilk test in conjunction with a Q–Q plot and values of skew and kurtosis [64]. For the primary outcome of QoL, analysis of variance (ANOVA) will be used to calculate the point and mean values (before–after and therapy–waiting group comparisons). In addition, the dependent structure of the data will be examined using the intraclass correlation coefficient (ICC). To analyse the individual cases, the critical difference between the test procedures used will be determined. Recruitment, participation, fidelity, and reasons for drop-outs or missing data will be documented using descriptive statistics.

Semistructured interviews of ‘phase two’ will also be transcribed according to the content semantic transcription by Dresing and Pehl (2018, [63]) and analysed according to the qualitative content analysis by Elo and Kyngäs (2008, [62]). The category system for the analysis will contain categories such as ‘general conditions’, ‘content’, ‘materials’, ‘evidence of improvements in QoL’, or ‘evidence of identity work’.

Quantitative analysis is performed as both a per-protocol and intention-to-treat analysis to maximise external and internal validity while minimising statistical bias to maximise external and internal validity while minimising statistical bias. Complete drop-outs will be treated differently from missing values (e.g., due to an individual’s absence in individual or group therapy sessions in which a VAS was conducted). In these individual cases, imputation is considered. There are no plans to promote the retention of participants

or intentions to follow-up in the case of individuals who drop out or deviate from the intervention protocol. There is no interim analysis planned.

2.4.4. Dissemination

Due to the fact that the research project is part of a cumulative doctorate, several publications, lectures and poster presentations are planned. Participants in the study will be informed about publications. Content will be made available in plain language (e.g., through ‘Lay Abstracts’).

2.4.5. Criteria for Success

The criteria for success of ‘phase two’ are defined as follows:

1. Significant improvement in SAQOL-39 score with a medium effect size from pre- to post-intervention.
2. Improvements in SAQOL-39 score between t0 and t1 are significantly greater in the therapy group than in the waiting group.
3. In the semistructured interviews, the participants report generally positive perceptions about the acceptability of the intervention.
4. The fidelity rate is at least 80% in the random sample evaluated by independent rater.
5. Stable values or improvements on the MADRS.
6. Stable values or improvements on the VAS.

2.4.6. Assessment and Management of Risk

Both through participation in the focus group interview and through participation in the group therapy sessions, participants might meet other persons with PPA who are more advanced in the course of the disease than they are themselves. This confrontation with other participants’ symptomatology could initially increase awareness of their own disorder. However, most of the research on this topic suggests that persons with PPA generally experience interactions with peers in a positive way [13,65]. Our own clinical experience with previous completed studies supports these findings.

The confrontation with one’s personal history in the biographic-narrative approach can also stimulate negative memories. Nevertheless, Corsten et al. (2015) provided empirical evidence that participants usually find a positive way of dealing with the experience on their own. The SLT will pay attention to spontaneous reactions of the participants, such as meta-linguistic comments, changes in facial expression, increased sighing, or zero reactions. Signs of excessive demands or discomfort will be documented and addressed in individual discussions with the participants concerned. If the deputy study director (M.G.) or the clinicians involved (I.H., K.G.) come to the conclusion that the continuation of the therapy would harm the participants, the therapy will be stopped immediately. There is no audit for the planned study.

3. Discussion

To the best of our knowledge, this is the first study including a randomised controlled trial design using a biographic-narrative approach in persons with PPA. Although reminiscence interventions have been used successfully for the treatment of dementia in general [66], only one case study known to us has mentioned the use of the biographic-narrative approach narraktiv in a person with PPA, and the effects were not described [32]. The planned sample size of 24 participants in the present study is also special for a rare disease.

The limitations of this study include the fact that the primary outcome of the study, QoL, is not well defined and is difficult to measure in persons with PPA. Formal assessments that have been used with PPA, such as the Aphasia Impact Questionnaire 21 [16,67], have not yet been translated into or validated in the German language. Thus, the SAQOL-39 will be used, an instrument that is internationally recognised and counted among the core outcome sets [49]. However, the use of an assessment that is standardised for persons with poststroke aphasia and therefore contains items that are not directly related to the

symptoms of PPA (e.g., items about mobility) remains a limitation of our study that has arisen due to the lack of German-language versions of measures tailored for persons with PPA [7]. To counteract this limitation, our study additionally utilises semi-structured interviews as qualitative assessments with the aim of gaining additional insights into the impact of our intervention. Influencing and disorder-specific factors should be identified and explored.

It is important to note that the expected improvements in QoL and mood are only potential outcomes. However, there are also challenges that could occur during intervention, e.g., it is possible that cognitive deficits impair storytelling and that the stimulation of lost memories can lead to feelings of frustration [26]. While *narraktiv* generates improvements in the QoL of persons with chronic aphasia, we must consider that persons with a progressive disease will be targeted in our study. By decreasing awareness of deficits in the course of PPA, it is conceivable that an improvement in QoL may not (only) be due to the intervention. Due to these circumstances, communicative–pragmatic and cognitive functions will be assessed.

Another limitation of the planned waiting group control design is that it cannot be ruled out that individual effects may result from other circumstances that arise during the waiting period [68]. For ethical reasons, participants are permitted to take advantage of other therapies in addition to the biographic-narrative approach of the present study. Concurrent use of, e.g., outpatient speech and language therapy could influence the results of the intervention and carry a risk of bias. As our programme is an intensive therapy (up to twice weekly sessions, 90 min each), it is unlikely that additional influences will have a large effect.

There are many reasons why a biographic-narrative approach could be quite efficient in persons with PPA. First, persons with poststroke aphasia and persons with PPA face similar biographic disruptions due to their speech disorders, which makes the transfer of such approaches reliable. Furthermore, the fact that autobiographical knowledge is retrievable for a long period of time during the course of PPA makes biography a suitable approach [69]. The fact that PPA is such a rare condition might strengthen the influence of a conducted group setting. The findings of the semistructured interviews, in which persons with PPA report what they have experienced as valuable or what they take away from the therapy, could point the way here.

Overall, this is the first study to investigate the efficacy of the biographic-narrative approach described by Corsten et al. (2015) in persons with PPA. If the biographic-narrative approach *Cope PPA* is effective, it will contribute to an enormous gain in knowledge in the field of research for persons with PPA.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/brainsci14070692/s1>, Additional Supplementary Materials File S1: SPIRIT 2013 Checklist; Additional Supplementary Materials File S2: Interview-Guide; Additional Supplementary Materials File S3: Fidelity checklist (self-rating); Additional Supplementary Materials File S4: Fidelity checklist (independent rating); Additional Supplementary Materials File S5: Consent form—Focus group interview (translated from German to English); Additional Supplementary Materials File S6: Consent form—Efficacy study (translated from German to English).

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Informed Consent Statement: Informed consent to participate will be obtained from patients.

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Article

Assessing Psychological Disorders in Turkish Adolescents with Transfusion-Dependent Thalassemia

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Abstract: We investigated depression and anxiety levels and related psychological disorders in adolescents with transfusion-dependent thalassemia (TDT) in this study. The study was conducted in two pediatric hematology outpatient clinics and included adolescents with TDT (14.8 ± 2.4 years, $n = 40$) in the study and compared them with the healthy age-matched control group (14.3 ± 2.3 years, $n = 62$). The Turkish version of the Revised Child Anxiety and Depression Scale (RCADS) was used to determine depression, anxiety, and related psychological disorders (obsession, panic disorder, social phobia). Depression, anxiety, obsession, panic disorder, and social phobia scores were significantly higher in the patient group compared with the control (all $p < 0.05$). Ferritin levels were positively correlated with total depression, general anxiety, separation anxiety, and social phobia scores, but transfusion frequency and young age were the confounding factors. Patients in early adolescence and those who require more frequent blood transfusions are at higher risk of developing psychological disorders; routine screening for mood disorders should be warranted. Serum ferritin level may be a good warning indicator for early recognition of psychological disorders in TDT patients.

Keywords: transfusion-dependent thalassemia; beta-thalassemia major; RCADS; depression; anxiety

1. Introduction

Beta-thalassemia is one of the hematological diseases that cause anemia defined in three groups: minor (carrier), intermedia (partial transfusion-dependent), and major (severe transfusion-dependent) [1]. Patients with transfusion-dependent thalassemia (TDT) need to undergo routine red-cell pack transfusions; however, this therapy may contribute to iron storage in the heart, liver, kidney, pancreas, and even in the pituitary gland, leading to chronic heart failure, chronic liver disease, diabetes, hypogonadism, and short stature [2].

Children and adolescents with chronic illnesses may have intense stress. There are studies reporting that children with chronic conditions may suffer depression and anxiety, which need psychological support [3]. Illnesses and hospitalizations might harm mental health in children, which might extend to adulthood [4]. Likewise, depression and anxiety rates are higher in patients with beta-thalassemia major, which indicates the need for psychiatric follow-up [5]. Higher depression and anxiety were reported even in patients with beta-thalassemia minor [6], which should raise mental health concerns in patients with

thalassemia. Children diagnosed with hematological disorders, especially TDT or illnesses with painful episodes like sickle cell disease, should be under psychological follow-up to prevent or treat mental disorders [7]. Depressive symptom screening is vital in TDT patients to improve psychological and emotional health [8].

In the literature, there is evidence of depression and anxiety risk in TDT adolescents. However, there is limited information about related psychological disorders, like obsession, panic disorder, social phobia, and affecting factors. In this study, we aimed to determine depression and anxiety levels and related psychologic disorders in adolescents with TDT, as well as to research the effects of gender, age, transfusion frequency, and serum ferritin levels on them.

2. Materials and Methods

The study was conducted in the Istanbul University Faculty of Medicine and Prof Dr. Cemil Taşçıoğlu City Hospital pediatric hematology outpatient clinics between February and August 2018.

2.1. Participants

The adolescents with TDT (transfusion once, twice, or three times a month) aged between 10 and 18 years old with a mean age of 14.8 ± 2.4 years and literate were invited to the study. Patients with any chronic illness (cancer, cardiac, pulmonary, neurologic, endocrinologic, gastrointestinal, hematologic, immunity, locomotor system, etc.), undergoing acute or chronic treatment (immune-suppressive, steroids, antithrombotic treatments, etc.), patients with a known psychological disease, autism spectrum disorder or intellectual disabilities, under psychiatric support or with an acute illness that may impact the scores were excluded. The age-matched control group consisted of adolescents who came to the adolescent outpatient clinic for routine check-ups. The control group consisted of healthy peers having no chronic disease, psychological disease, autism spectrum disorder, or intellectual disability, and the participants were healthy at the time they filled out the RCADS scale. A pediatrician taught the children how to complete the test, and the children performed the test in another place outside the hospital.

Participants read and filled out the RCADS scale in a separate room located outside the clinic. All the adolescents and parents were informed and gave written consent to participate in this study. The study is conducted with adherence to the Declaration of Helsinki, and the study permission was obtained from the Istanbul University Faculty of Medicine Ethical Committee (2018/192).

2.2. Instruments

The Revised Child Anxiety and Depression Scale (RCADS) was introduced as a tool for the assessment of pediatric anxiety and depression [9], of which validity was confirmed with a meta-analysis as a cross-cultural scale [10]. The validity of the RCADS was also confirmed in Turkish children [11].

The RCADS is a child self-report scale consisting of 47 items in total with six subscales, which are described as general anxiety (6 questions), separation anxiety (7 questions), panic disorder (9 questions), social phobia (9 questions), obsession (6 questions), and depression (10 questions). RCADS is a good psychometric scale and has demonstrated good reliability and validity in all sample groups [9]. Each answer has four choices: never, sometimes, often, and always (counted as 0, 1, 2, and 3 points, respectively). Scores above 70 points were defined as increased scores (at risk for the relevant scale) [9].

2.3. Statistical Analysis

Data were presented as mean $\pm$ standard deviation, median (interquartile range), and n (%). We used the Shapiro–Wilk test to assess normality and Spearman’s test to assess the correlation between two groups with non-normal data. To compare factors in multivariate analysis, a linear regression test (LR) was applied in which model the assumptions (Durbin–Watson test for autocorrelation, variance inflating factor for collinearity, and

Shapiro–Wilk test for normality) are met, otherwise we used generalized linear model (GLM). The backward elimination method was used to reveal significant confounders between dummies in multivariate analysis with multiple factors. The correlation strength of the models is given with R^2 . A type-1 error $p < 0.05$ was considered of statistical significance. Bayesian Kendall's tau test was applied to assess the null hypothesis, with a transformation to correct the skewness of the data if needed. All the calculations were performed by JAMOVI 2.3.18 with *gamlj* and *jsq* extensions.

3. Results

A total of 40 adolescents with TDT and 62 healthy peers were included in the study (mean ages: 14.8 ± 2.4 and 14.3 ± 2.3 years old, respectively; range: 10–18). The groups were similar regarding age ($p = 0.149$, Mann–Whitney U test) and gender ($p = 0.368$, chi-square test) (Table 1).

Table 1. Descriptive status of the patient and the control group regarding age.

	TDT Group			Control Group		
	Girls	Boys	Full Sample	Girls	Boys	Full Sample
Age	15.4 ± 2.6 (11–18)	15.1 ± 2.9 (11–18)	15.2 ± 2.8 (11–18)	14.6 ± 2.1 (10–18)	14.8 ± 1.9 (11–18)	14.7 ± 2.0 (10–18)

Data are presented as mean $\pm$ sd (minimum–maximum).

The subscale results regarding gender and groups are presented in Table 2.

Table 2. Subscale results of the patient and the control group regarding the group and gender.

	TDT Group		Control Group	
	Girls	Boys	Girls	Boys
General Anxiety	59.3 ± 11.7 (42–80)	63.9 ± 13.2 (44–80)	54.2 ± 4.4 (43–64)	54.7 ± 4.7 (41–65)
Separation Anxiety	61.2 ± 13.5 (42–80)	67.7 ± 12.3 (46–80)	47.5 ± 6.9 (41–66)	47.9 ± 6.1 (38–65)
Panic Disorder	63.2 ± 12.9 (41–80)	71.2 ± 12.7 (46–80)	54.1 ± 5.3 (48–78)	52.7 ± 4.8 (40–65)
Social Phobia	48.8 ± 11.9 (31–80)	57.8 ± 13.6 (35–80)	38.9 ± 10.5 (30–66)	41.5 ± 10.1 (30–66)
Obsession	61.7 ± 12.1 (43–80)	67.7 ± 11.8 (47–80)	47.2 ± 11.5 (38–77)	48.9 ± 10.6 (38–70)
Depression	60.6 ± 12.2 (41–80)	65.0 ± 13.2 (42–80)	48.6 ± 8.7 (41–73)	50.2 ± 8.2 (41–65)
Total Anxiety	59.4 ± 12.7 (40–80)	67.4 ± 13 (42–80)	47.9 ± 9.0 (40–71)	49.6 ± 8.1 (40–61)
Total Depression	60.1 ± 12.4 (42–80)	67.6 ± 12.6 (45–80)	48.8 ± 9.0 (41–73)	50.5 ± 8.3 (41–62)

Data are presented as mean $\pm$ sd (minimum–maximum).

All subscale scores were higher in the TDT group (Figure 1). The comparison of the RCADS subscale scores and the percentage of increased scores (>70 points) are presented in Table 3.

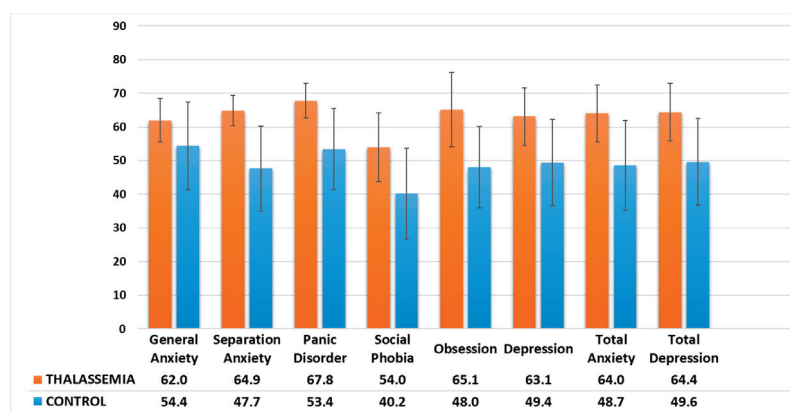


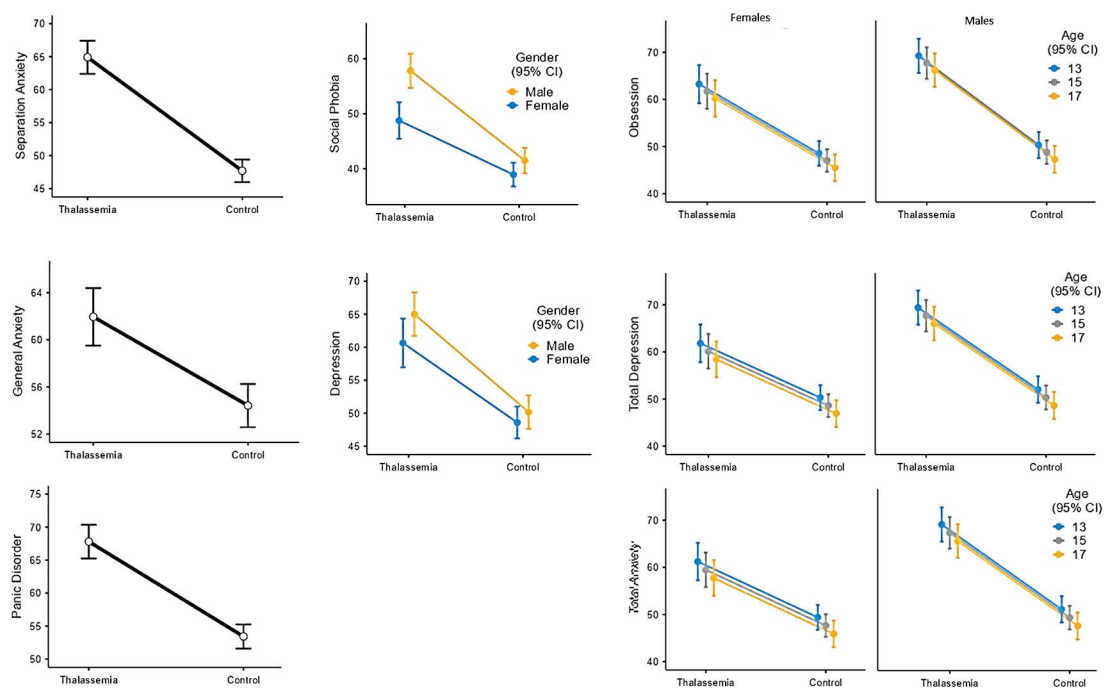
Figure 1. Comparison of the RCADS subscale scores between the adolescents with TDT and the healthy control group.

Table 3. Comparison of the RCADS subscale scores and individuals with elevated scores (70 points) between the adolescents with TDT and the healthy control group.

	RCADS Subscale Scores Mean $\pm$ SD			RCADS Elevated Score Percentage (>70 Points)		
	Patient (n = 40)	Control (n = 62)	<i>p</i>	Patient (n = 40)	Control (n = 62)	<i>p</i>
General Anxiety	62.0 $\pm$ 12.6	54.4 $\pm$ 4.5	0.003 ^M	25.0% (n = 10)	0%	<0.001 ^F
Separation Anxiety	64.9 $\pm$ 13.1	47.7 $\pm$ 6.4	<0.001 ^S	40.0% (n = 16)	0%	<0.001 ^C
Panic Disorder	67.8 $\pm$ 13.2	53.4 $\pm$ 5.1	<0.001 ^M	55.0% (n = 22)	1.6% (n = 1)	<0.001 ^F
Social Phobia	54.0 $\pm$ 13.5	40.2 $\pm$ 10.3	<0.001 ^M	12.5% (n = 5)	0%	0.008 ^F
Obsession	65.1 $\pm$ 12.1	48.0 $\pm$ 11.0	<0.001 ^M	42.5% (n = 17)	1.6% (n = 1)	<0.001 ^F
Depression	63.1 $\pm$ 12.8	49.4 $\pm$ 8.5	<0.001 ^M	32.5% (n = 13)	1.6% (n = 1)	<0.001 ^F
Total Anxiety	64.0 $\pm$ 13.3	48.7 $\pm$ 8.5	<0.001 ^M	32.5% (n = 13)	1.6% (n = 1)	<0.001 ^C
Total Depression	64.4 $\pm$ 12.9	49.6 $\pm$ 8.6	<0.001 ^M	35.0% (n = 14)	1.6% (n = 1)	<0.001 ^C

Data are presented as mean $\pm$ sd for presentation. ^M—Mann–Whitney U test, ^S—Student's *t*-test, ^F—Fisher's exact test, ^C—chi-square test.

Multivariate regression models with the patient and the control groups were built and subjected to gender and age as covariates to reveal confounders. The statistically significant confounders were analyzed using the backward elimination method. The separation anxiety, general anxiety, and panic disorder scales were not affected by age and gender. All subscale scores were higher in the patient group compared with the controls. The separation anxiety score was higher by 17.2 points (95% CI: 14.2–20.3, GLM, R^2 : 0.453), the general anxiety score was higher by 7.5 points (95% CI: 4.1–11, LR, R^2 : 0.156), panic disorder points was higher by 14.4 points (95% CI: 11.3–17.5, GLM, R^2 : 0.385) in TDT group compared with the control (Figure 2).

**Figure 2.** The RCADS subscales regarding confounders (group, age, and gender).

The social phobia and depression subscale scores were affected by gender. Social phobia score was higher by 13.1 points (95% CI: 10.3–15.9) in the TDT group and 5.8 points (95% CI: 3.0–8.6) in boys (GLM, R^2 : 0.302). The depression scale score was higher by 13.4 points (95% CI: 10.4–16.5) in the TDT group and 3.0 points (95% CI: −0.1–6.0) in boys (GLM, R^2 : 0.321) (Figure 2).

The obsession, total depression, and total anxiety scales were affected by both gender and age. Obsession scale score was higher by 16.8 points (95% CI: 13.8–19.9) in the TDT group, 3.9 points (95% CI: 0.8–6.9) in boys, and increased by 0.8 points (95% CI: 0.1–1.4) with per age decrease in years (GLM, R^2 : 0.382). Total depression score was higher by 14.4 points (95% CI: 11.4–17.5) in the TDT group, 4.6 points (95% CI: 1.6–7.7) in boys, and increased by 0.8 points (95% CI: 0.2–1.5) with per decrease in age (GLM, R^2 : 0.383). Total anxiety score was higher by 14.9 points (95% CI: 11.9–18.0) in the TDT group, 4.9 points (95% CI: 1.9–7.9) in boys, and increased by 0.9 points (95% CI: 0.2–1.5) with per age decrease in years (GLM, R^2 : 0.393) (Figure 2).

All the scores of the subscales were higher in the TDT group compared with controls. The scores of the obsession, total depression, total anxiety, social phobia, and depression subscales were higher in boys than in girls. Age was a protective factor for obsession, total depression, and total anxiety scale scores.

Assessing the Utmost Vulnerable Subpopulation among TDT Patients

The utmost vulnerable subpopulation within the TDT group was evaluated by assessing transfusion frequency, serum ferritin level, age, and gender in multivariate models. The backward elimination method was performed to reveal statistically significant confounding factors. Transfusion frequency and age were the utmost factors in the subscales in the TDT patients. The graphics and the estimated marginal mean table of the mentioned multivariate models are presented in Figure 3 and Table 4.

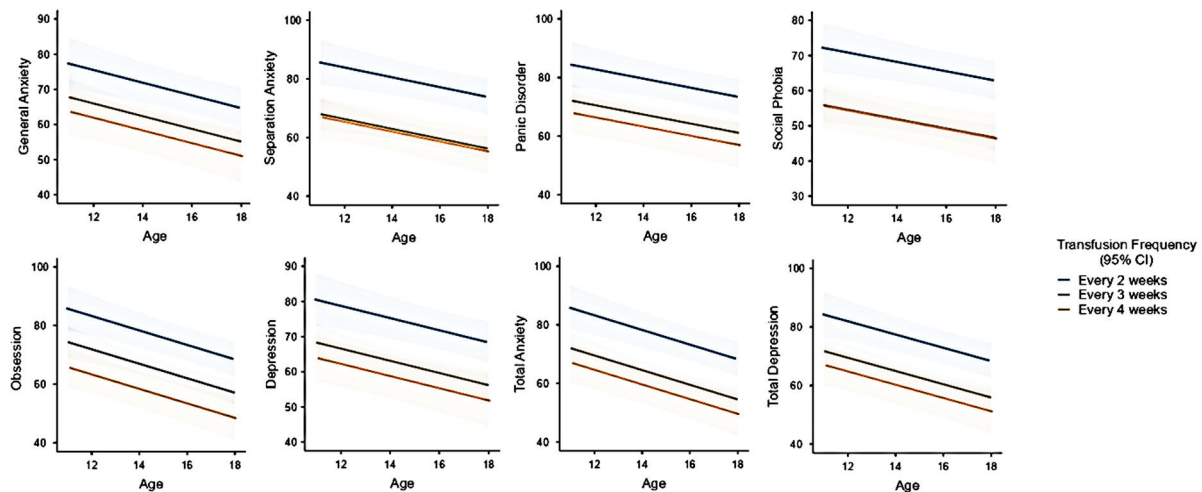


Figure 3. The associations of transfusion frequency (one, two, or three transfusions per month) with RCADS subscale scores. The lines refer to transfusion frequency and 95% CI (from top to below: every two weeks, every three weeks, and every four weeks, respectively).

Table 4. Estimated marginal means of the subscales with transfusion frequency and age.

Transfusion Frequency	Age	General Anxiety	Separation Anxiety	Panic Disorder	Social Phobia	Obsession	Depression	Total Anxiety	Total Depression
Every 2 weeks	12	75 (65–84)	83 (74–92)	82 (72–95)	70 (60–79)	82 (75–90)	78 (69–87)	82 (73–91)	81 (72–90)
	15	70 (62–78)	79 (71–86)	78 (69–86)	66 (58–75)	76 (69–82)	73 (66–81)	75 (68–83)	75 (67–82)

Table 4. Cont.

Transfusion Frequency	Age	General Anxiety	Separation Anxiety	Panic Disorder	Social Phobia	Obsession	Depression	Total Anxiety	Total Depression
Every 3 weeks	18	65 (57–74)	74 (66–82)	74 (65–82)	63 (55–72)	69 (62–75)	69 (60–77)	69 (61–77)	69 (61–77)
	12	65 (59–72)	66 (60–72)	70 (63–76)	54 (47–60)	71 (66–76)	66 (60–72)	68 (63–74)	69 (63–74)
	15	61 (56–65)	61 (57–66)	66 (61–71)	50 (46–55)	64 (60–68)	61 (57–66)	62 (57–66)	62 (58–67)
	18	56 (50–62)	57 (51–62)	62 (55–68)	47 (41–53)	57 (52–62)	56 (50–62)	55 (50–61)	56 (51–62)
Every 4 weeks	12	61 (51–71)	65 (55–74)	65 (55–76)	54 (44–64)	62 (54–70)	61 (52–71)	63 (54–72)	63 (54–73)
	15	56 (46–66)	60 (51–69)	61 (51–72)	50 (40–61)	55 (47–63)	56 (47–66)	56 (47–66)	57 (48–67)
	18	51 (40–63)	56 (45–66)	57 (45–70)	47 (35–59)	48 (39–57)	51 (40–63)	50 (39–61)	51 (40–62)

The linear regression model was applied. The results are given as rounded for presentation.

As hypothesized that ferritin level has any relation with subscale scores (H_1), Bayesian statistics is applied, and the null hypothesis was defined as ferritin has no impact on elevated scores (H_0). The obsession and depression scales resulted in anecdotal evidence, and panic disorder and total anxiety scales moderate evidence for the null hypothesis. The total depression scale resulted in anecdotal evidence; general anxiety, separation anxiety, and social phobia resulted in moderate evidence for the H_1 hypothesis (Table 5).

Table 5. Bayes factors of elevated scores of RCADS subscales regarding serum ferritin levels.

Scales	Bayesian Kendall's Tau	BF ₁₀	Evidence
General Anxiety	0.263	3.294	Moderate (H_1)
Separation Anxiety	0.292	6.291	Moderate (H_1)
Panic Disorder	0.076	0.258	Moderate (H_0)
Social Phobia	0.262	3.184	Moderate (H_1)
Obsession	0.140	0.448	Anecdotal (H_0)
Depression	0.158	0.554	Anecdotal (H_0)
Total Anxiety	0.102	0.310	Moderate (H_0)
Total Depression	0.205	1.1	Anecdotal (H_1)

Note: ferritin levels are subjected to transformation for normalization. H_1 —alternative hypothesis; H_0 —null hypothesis. Stretched beta prior width assumed 1.

4. Discussion

Chronic illnesses may cause psychological problems in childhood [3,12], and it is known that adolescents with anxiety or depression are more likely to have risky behaviors such as substance use, early pregnancy, suicide, and low educational or psychosocial functioning [8]. Moreover, depression and anxiety problems in childhood might extend to adulthood [13]. Hence, it is crucial to reveal vulnerable populations in childhood and initiate treatment on time. Thalassemia is one of the diseases that cause various complications, including physical, social, and emotional [1]. Depression and anxiety are expected problems in these patients [7,8]. Adolescence is a more sensitive period than the others, and the psychological problems related to thalassemia disease become even more obvious during this period. Youth with TDT should be followed more carefully, not only about depression and/or anxiety but also about other related psychological disorders.

Beta-thalassemia major is a devastating illness that affects the education of school-aged children at a rate of 60% [14]. Diseases that negatively affect school attendance form the basis for depression and anxiety. Chronic diseases are associated with mood disorders, as Afifi et al. [3] reported that depression and anxiety were more prevalent in TDT patients compared with hemodialysis or malignancy patients. In comparison with sickle cell anemia, the majority of patients (89.3% for depression and 93.3% for anxiety) were below the pathologic threshold in TDT patients. They did not find age or gender effect on depression or anxiety among 10–17-year-old patients. They also did not find a significant effect of pain frequency in the multivariate models [7]. However, depression symptoms were reported in 60% of patients among TDT patients [15], whereas another study reported a depression rate of 19.8% in adults diagnosed with beta-thalassemia major [16]. Similar to our results, a meta-analysis conducted with beta-thalassemia major-diagnosed adult and children studies concluded that 42% of patients had depression [17]. Anxiety levels have also been recognized as higher in this patient group, especially among adolescents and young adults [17]. Adib-Hajbaghery et al. [18] presented that 58.4% of patients with TDT (32% of whom were adolescents) had mild to severe anxiety symptoms. This vulnerable group is also at risk in this respect in the later years of life, as a study reported that TDT patients have worse life quality and more depression and anxiety presence [19]. In line with our study results and the literature, it can be offered that every adolescent with TDT should undergo psychosocial evaluation in terms of depression and anxiety symptoms.

Studies examining psychological problems other than depression and/or anxiety in TDT patients are limited. Besides depression, Messina et al. [20] reported that somatization and obsessive-compulsive disorder are also recognized more often in TDT patients. Separation anxiety is researched in only one study, which gives a rate of 4.8% [21]. In our study, elevated scores in the TDT group for obsession were 42.5%, 55% for panic disorder, 12.5% for social phobia, and 40% for separation anxiety. These rates suggest that adolescents with TDT are also at risk in terms of other related psychological problems and may need psychiatric evaluation in this regard.

Boys with severe diseases tend to have more mood disorders in the literature. A study conducted with leukemia/lymphoma patients in remission reported that boys tend to have more psychiatric diseases, such as anxiety (17%), depression (15%), separation anxiety (25%), obsessive-compulsive disorder (40%), and panic disorder (35%) [22]. Similarly, social phobia, depression, obsession, and total anxiety scores were higher in boys with TDT in this study. In fact, girls have more tendency to depression and anxiety in the normal population as publications are reporting higher depression and anxiety among 15–18-year-old students [23] and 12–17-year-old bullied girls [24]. But this tendency was reciprocated by boys in our TDT patients. Therefore, clinicians should be aware of the risk in this gender group.

Younger age (<15 years old) and frequent transfusion (biweekly), but not gender, had the statistical effect on RCADS subscales scores. The patients in early adolescence resulted in higher RCADS scores in obsession, total depression, and total anxiety subscales. During early adolescence, rapid growth, development, and the onset of pubertal symptoms are observed. Failure to achieve expected growth in TDT patients in this age group, the emergence of problems such as delayed puberty, and, of course, intensive medical treatments may explain the frequency of psychological problems in early adolescence. Transfusion frequency was an influential factor in the literature; two studies reported similar results to ours, as transfusion frequency was positively correlated with the presence of depression in TDT patients [25,26]. However, it is not known if serum ferritin levels have an effect on mood disorders. In light of this, a study suggested that iron accumulation with blood transfusions may cause an immune-inflammatory response, and both inflammation and oxidative stress toxicity might cause depression episodes [26]. As we hypothesized that serum ferritin levels might affect depression and anxiety, the multivariate analysis revealed that serum ferritin levels did not reach statistical significance if subjected to transfusion frequency, age, and gender in the TDT group. Also, obsession, depression, panic disorder, and total anxiety scales resulted favoring null hypothesis, but general anxiety, separation

anxiety, and social phobia scores resulted in moderate evidence, which means serum ferritin levels might have an impact on these subscales. In summary, transfusion frequency has a significant impact on the RCADS subscales, more than serum ferritin levels, but serum ferritin levels might have a slight effect on anxiety and social phobia disorders. The positive correlation found between ferritin level and psychological disorder scores may be due to frequent transfusion and, therefore, changes in iron storage in the body, including the brain. To reach a conclusion about this hypothesis, radiology-supported studies with large sample sizes on this issue are needed if ferritin or iron deposition in the brain has a negative effect on these psychological disorders.

This is the first study presenting data about obsession, panic disorder, social phobia, and separation anxiety, along with depression and anxiety in adolescents with TDT. However, the information about the socioeconomic status and education level of families was lacking in this study and was one of the limitations.

5. Conclusions

Adolescents with TDT have a higher risk of developing anxiety, depression, and associated psychological disorders, such as obsession, panic disorder, and social phobia, compared to healthy ones. Therefore, routine screening for mood disorders should be recommended in this patient group. Adolescents with TDT who need frequent transfusions (every two weeks) and ones in early adolescence (younger than 15) have the utmost risk for anxiety and depression; therefore, we suggest routine psychological follow-up in this subgroup. Clinicians should be aware of this psychosocial aspect, and a multidisciplinary therapeutic team approach (including adolescent medicine, social workers, psychologists, and psychiatrists) is essential. Developing a multidisciplinary approach to these patients in the early period and establishing a group culture by providing communication with similar patient groups may lead to psychosocial well-being in later ages. Further, ferritin level may be an indicator for early recognition of anxiety in TDT patients, but radiology-supported studies are needed in this field, as a longitudinal anxiety-status follow-up of a patient group might give precious data.

Limitations

We did not record the parental employment status, family situation, households, or educational situation of the children in this study.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Istanbul University Faculty of Medicine Ethical Committee (code: 2018/192, number: 239386, date: 19 February 2018).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study will be shared upon reasonable requests from the corresponding author but cannot be shared in public as authors have no permission granted by the ethical board.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

TDT	Transfusion-dependent thalassemia
RCADS	Revised Child Anxiety and Depression Scale
IQR	Interquartile range
LR	Linear regression test
GLM	Generalized linear model

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Article

Gratitude Predicts Meaning in Life in Family Caregivers of Persons with Alzheimer's Disease

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Abstract: Gratitude is a well-known and researched internal positive psychological resource. Empirical data, however, on the association between gratitude, meaning in life, and burden in family caregivers of persons with Alzheimer's disease is scant. The aims of this study were to (1) investigate the relationships among these variables in a sample of family caregivers of persons with Alzheimer's; and (2) determine if gratitude mediates the effects of perceived burden on meaning in life in this population. One-hundred and twenty-six adult family caregivers, most of whom were an intimate partner or adult child of a person with Alzheimer's, completed the Gratitude Questionnaire-Six Item, the Meaning in Life Questionnaire, the Zarit Burden Inventory, and other relevant measures. A series of OLS regression models, guided by the caregiver stress process model, were conducted. These analyses demonstrated that gratitude was a predictor of the presence of meaning in life among the caregivers in this study even when other key variables were considered. Furthermore, analyses revealed that gratitude fully mediated the effects of caregiver burden on the presence of meaning in life in this sample. Thus, clinicians should consider gratitude as an important internal resource for cultivating meaning in life in this population, especially when caregiver burden is present. Gratitude-bolstering clinical interventions should be further developed and tested as both stand-alone and complimentary additions to empirically supported psychoeducational approaches for supporting health and well-being in this population.

Keywords: Alzheimer's disease; burden; coping; dementia; family caregiving; gratitude; meaning; well-being

1. Introduction

It is well known that primary family caregivers of persons with Alzheimer's disease and other age-related progressive neurocognitive disorders can experience heightened stress which can potentially negatively impact their health and well-being [1]. However, less is known about how internal positive psychological resources, such as gratitude on the part of family caregivers, contribute to reducing burden and enhancing meaning in life in this population within the realities of their lived experiences. As background for the current study, an overview of the impacts of caregiver burden is provided. Additionally, conceptualizations of the constructs of gratitude and meaning in life are reviewed along with recent research on these constructs in family caregivers. To our knowledge, this is among the first studies to empirically examine the relationships between caregiver burden, gratitude, and meaning in life in family caregivers of persons with Alzheimer's. We hope that this study stimulates additional research on developing clinical interventions for this distinct population that leads to enhancing their health and well-being.

1.1. Caregiver Burden

In general, caregiver burden can be understood as the strain or load carried by a family caregiver of a person with a chronic or terminal health condition [2]. Higher burden levels among family caregivers of persons with Alzheimer's and other forms of progressive age-related neurocognitive diseases are associated with untoward health outcomes for caregivers and also care recipients [1]. Indeed, burdened caregivers may find it more difficult to meet the care needs of their loved ones [3] potentially leading to increased loneliness [4] and higher mortality rates [5] in persons with Alzheimer's, although the mechanisms for these outcomes are not well understood.

A range of factors may impact burden perceptions among family caregivers of persons with Alzheimer's [6] such as being a young-old versus old-old caregiver [7], identifying as female versus male [8], and identifying as sexual or gender-nonconforming versus cis-gendered [9]. There is evidence that wives experience more burden than husbands [10] and adult children experience more burden than spousal caregivers [11]. There is some evidence that caregivers who identify as Black or African American tend to have worse physical wellbeing outcomes as compared to their White counterparts, even when their overall psychological well-being may be similar or better [12]. Conversely, having greater social support [13], drawing from one's religious and spiritual beliefs and practices [14–17], and hope [18] can reduce the degree of burden experienced in family caregivers of persons with Alzheimer's.

1.2. Conceptualizations of Gratitude and Research on Gratitude in Dementia Family Caregivers

Gratitude is a positive psychological resource that has been conceptualized as a set of emotions, thoughts, and actions that can be activated and sustained by the acceptance and recognition of unearned or unanticipated benefits that promote well-being, strengthen relationships, and support personal goals [19]. Gratitude has also been described as an overall life orientation [20,21] with some individuals having what McCullough and colleagues describe as a natural tendency towards gratitude or a *grateful disposition* [22].

Gratitude has also been framed as relationship-based human strength involving a shared experience [23] between a benefactor and a beneficiary, resulting in a desired outcome [24] which leads to appreciation [25]. There is evidence that the intensity of gratitude experienced by a beneficiary may be proportional to their perceptions of sacrificial cost, intentionality, and freedom of obligation from their benefactor [26].

Recent research on family caregivers of persons with dementia, who are high in trait gratitude, suggest that they experience lower levels of burden than those who are low in trait gratitude [27]. Family caregivers of persons with dementia who have high levels of gratitude also tend to have greater psychological resilience [28] and empathy [29] than those with lower levels of gratitude. In a recent qualitative study, several themes emerged around the nature of how gratitude is experienced and manifest among caregivers of persons with early-stage Alzheimer's [30]. Overall, gratitude may be an important resource for cultivating better outcomes in this population.

1.3. Conceptualizations of Meaning in Life and Research on Meaning in Life in Dementia Family Caregivers

Victor Frankl [31] theorized that meaning making is a core human motivation. Steger [32], building upon Frankl's existential perspective, conceptualized meaning in life as having two dimensions: the presence of meaning in life and the search for meaning in life. These two aspects of meaning in life appear to be distinct [33,34]. For example, a person with a strong degree of presence of meaning in life would see themselves as having an overall purpose, a mission, or a vision for their life [32]. In contrast, people searching for meaning in life are engaging in a dynamic and active effort to find and understand their meaning, significance, and purpose [35].

Among family caregivers of persons with dementia, the presence of meaning in life has been associated with greater personal well-being [36], better mental health [37], believing

that their sacrifices have been worthwhile [38], and a reduced sense that the caregiving role is burdensome [37]. However, little is known about the mechanisms that lead to the presence of meaning in life in this unique population.

1.4. Theoretical Framework and Current Study Aims

The caregiver stress process model [39,40] which addresses the complexity of the caregiving experience, was the theoretical model utilized for variable selection and specification in this study. In this model, stress is categorized as primary or secondary. Primary stress involves the objective demands of caregiving (i.e., the amount of physical care required, the degree of cognitive impairment in the care recipient, etc.). Secondary stress accounts for sources of strain not directly related, but consequential, to the caregiving role such as the sociodemographic profiles of caregivers and care recipients and other contextual factors. In this model, gratitude would be considered a potentially positive internal psychosocial resource which may directly or indirectly contribute to reducing the untoward effects of caregiver stress which may result in a sense of burden. External resources (i.e., social support) may also mediate or moderate relationships among contextual factors, stressors, and caregiver outcomes in this model. The presence of meaning in life, among caregivers in this study, was considered a positive outcome, with gratitude serving as a possible resource for overcoming stress and burden.

The aims of the current study were to (1) investigate the relationships among gratitude, caregiver burden, and meaning in life (presence and search) in a sample of family caregivers of persons with Alzheimer's disease; and (2) determine if gratitude is a mediator between caregiver burden and the two aspects of meaning in life in this sample.

2. Materials and Methods

2.1. Study Design and Participants

A cross-sectional quantitative design was utilized in the current study with a convenience sampling strategy. The study was open to adults age of 21 years or older who self-identified as the primary family caregiver of a person diagnosed with probable Alzheimer's disease and were proficient in the English language. Exclusion criteria were significant cognitive impairment or untreated serious mental illness in caregiver participants.

Flyers about the study were distributed by staff at local medical and community organizations who served persons with Alzheimer's and their family members in a large metropolitan area in the southwestern part of the USA. An in-person appointment was scheduled for informed consent after telephone screening was conducted for eligibility. Once informed consent was obtained, participants were invited to complete a packet of self-report measures in a private office space free of distractions by a research assistant. It took on average 45 min for participants to complete the packet of measures. Participants did not receive any incentives to participate in the study.

Sample size was based on a priori power analysis to find significance with a desired power of 0.80, an α -level at 0.05, and a medium effect size of 0.15 (f^2) as recommended by Cohen [41]. A sample size of at least 97 participants was needed for multiple linear regression analysis with 6 predictor variables. Thus, the obtained sample size of 126 participants was adequate for the analyses in the current study.

2.2. Variables and Measures

Standardized measures were used to assess the variables of gratitude, caregiver burden, and meaning in life (search and presence). The variables of intensity of care, social support, and demographic/background information were assessed with investigator-developed measures. Variables and corresponding measures are described below.

2.2.1. Outcome Variables

Meaning in Life. The Meaning in Life Questionnaire (MLQ) [42] is a 10-item self-report instrument with 2 subscales measuring different aspects of meaning in life: (1) presence of

meaning in life (how much a person believes that their life has meaning in it); and (2) search for meaning in life (how a person is striving to find meaning in their life). This measure uses a 7-point Likert scale ranging from 0 (Absolutely Untrue) to 6 (Absolutely True) for each item. Good internal consistency, convergent validity, and discriminant validity have been documented for the MLQ for both subscales [42]. Adequate reliability was demonstrated for both the MLQ Presence (Cronbach $\alpha = 0.81$) and the MLQ Search (Cronbach $\alpha = 0.89$). subscales in the current study.

2.2.2. Predictor Variables

Gratitude. The Gratitude Questionnaire-Six Item (GQ-6) [22] is a self-report instrument for measuring gratitude. This instrument consists of six items (e.g., “I have so much to be thankful for.”) on a 7-point Likert scale, ranging from 0 (Strongly Disagree) to 6 (Strongly Agree). The GQ-6 has good reliability, with alphas ranging from 0.82 and 0.87 [22]. Adequate reliability was demonstrated in the current study (Cronbach $\alpha = 0.81$).

Caregiver Burden. The Zarit Burden Inventory [43] has 22 items. Response options are presented on a 5-point Likert scale, ranging from 0 (Never) to 4 (Nearly Always). This measure has demonstrated good internal consistency in other studies (Cronbach $\alpha = 0.92$; [44]). Adequate reliability was demonstrated in the current study (Cronbach $\alpha = 0.94$).

Caregiver Stress. An intensity of care index was developed by the investigators for assessing objective stress in this sample. This index was constructed by summing caregivers’ responses to two descriptive survey items: (1) the average number of hours per day spent caregiving (0 to 24 h per day); and (2) the number of people cared for (responses could range from 0 to 5). Scores on this additive index could range from 0 to 11, with higher scores reflecting a greater intensity of care responsibilities.

Social Support. The social support measure utilized in this study was composed of 4 items using a 5-point Likert scale, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). The higher the score on this measure, the greater the perceived social support. Although this social support measure is not standardized, it has been utilized as a part of the clinical protocol for the Alzheimer’s Disease and Memory Disorders Center at Baylor College of Medicine at intake and at every 6-month visit. Therefore, the accuracy of this measure has been verified by extensive clinical use. In the current study, this measure demonstrated adequate internal consistency (Cronbach $\alpha = 0.74$).

2.3. Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 27). To examine the aims of the study, descriptive statistics were calculated for each participant’s demographic and background variables. These were summarized as means and standard deviation for continuous variables and as counts and percentages for discrete variables. Second, correlations between the outcome variables (meaning in life presence and meaning in life search); the measures for objective, subjective, and secondary stressors; the measures for external and internal resources; and demographic/background variables were calculated. Diagnostic analyses were also conducted to assess for multicollinearity between the independent variables in our regression models. Variance inflation factor (VIF) scores were all below 2.0, indicating multicollinearity was not a significant issue. Third, a series of ordinary least squares (OLS) regression models was developed to determine whether gratitude independently contributed to the explanation of variance in the criterion variables when controlling for other key variables (i.e., gender, age, social support). Finally, a series of mediation models was conducted to test whether gratitude had a mediating effect on the relationship between caregiver burden and meaning in life. Multiple linear regression models were used to estimate and test the paths of c_1 , c_2 , a_1 , a_2 , b , c_1^* , and c_2^* . The criterion for statistical significance was set at $p < 0.05$ for all analyses.

3. Results

3.1. Participant Demographics

One-hundred and fifty-five family caregivers of persons with Alzheimer's participated in this study. However, for the current analyses, we have restricted the sample size to 126 to account for missing data. Their average age was 64.65 (SD = 11.22), with most caregivers identifying as female (69.8%, $n = 88$), White (96.8%, $n = 122$), and as the intimate partner (i.e., spouse) of their loved one with Alzheimer's (65.9%, $n = 83$), with a smaller number of adult child caregivers (23%, $n = 29$). See Table 1.

Table 1. Demographic information for sample.

	Mean (SD)	n (%)
Caregiver age in years (range: 22–87)	64.65 (11.22)	
Caregiver gender		
Male		38 (30.2)
Female		88 (69.8)
Caregiver education		
High school or equivalent		10 (8.0)
Undergraduate		82 (65.6)
Graduate		31 (24.8)
Other		2 (1.6)
Caregiver ethnicity		
Hispanic or Latino		4 (3.2)
Not Hispanic or Latino		122 (96.8)
Caregiver race		
Person of Color		3 (2.7)
White		122 (96.8)
Unspecified		1 (0.8)
Relationship to person with dementia		
Spouse/intimate partner		83 (65.9)
Adult child/grandchild		29 (23.0)
Other		14 (11.1)

3.2. Descriptive and Correlational Data

For the gratitude measure, participants' scores ranged from 17 to 36 ($M = 30.93$, $SD = 5.04$). For meaning in life, participants' scores on the presence subscale ranged from 8 to 30 ($M = 22.78$, $SD = 5.30$) and on the search subscale from 0 to 30 ($M = 13.53$, $SD = 8.03$). For caregiver burden, participants' scores ranged from 5 to 83 ($M = 30.92$, $SD = 15.25$). The intensity of care index ranged from 0 to 8 ($M = 3.29$, $SD = 2.31$). For social support, participants' scores ranged from 10 to 20 ($M = 17.14$, $SD = 2.54$). See Table 2 for descriptive data.

Gratitude was positively associated with social support, $r(124) = 0.461$, $p < 0.001$, and negatively associated with caregiver burden, $r(124) = -0.264$, $p < 0.001$. No significant correlation between gratitude and intensity of care, caregiver age, or caregiver gender was found.

The presence of meaning in life scale was positively associated with social support, $r(124) = 0.415$, $p < 0.001$, and negatively associated with caregiver burden, $r(124) = -0.260$, $p < 0.01$. No significant correlation between presence of meaning in life and intensity of care, caregiver age, or gender were found.

In contrast, the search for meaning in life was positively associated with caregiver burden, $r(124) = 0.214$, $p < 0.05$ and negatively associated with social support, $r(124) = -0.186$, $p < 0.05$. No significant correlation was found between the search for meaning in life and intensity of care, caregiver age, or caregiver gender. There was no significant association between the presence and search for meaning in life subscales.

Table 2. Descriptive statistics for measures.

	N	Range	Mean	SD	Cronbach's Alpha
Outcome					
Meaning in life presence	126	8–30	22.78	5.30	0.81
Meaning in life search	126	0–30	13.53	8.03	0.89
Primary Stressors					
Objective (intensity of care) *	126	0–8	3.29	2.31	N/A
Subjective (burden)	126	5–83	30.92	15.25	0.94
Secondary Stressors					
Caregiver age in years	126	22–87	64.65	11.22	N/A
Caregiver gender	126	1–2	1.70	0.46	N/A
Resources					
Social support	126	10–20	17.14	2.54	0.74
Gratitude	126	17–36	30.93	5.04	0.81

* Intensity of care is an additive index representing the sum of hours spent providing care for the persons with Alzheimer's and the total number of people cared for. Therefore, an alpha was not calculated for this index.

Correlations between gratitude and the two dimensions of meaning in life were measured. Gratitude was positively correlated with the presence of meaning in life subscale, $r(124) = 0.619, p < 0.001$. There was a small negative correlation between gratitude and the search for meaning in life subscale $r(124) = -0.180, p < 0.05$. Correlational data are presented in Table 3.

Table 3. Correlation matrix for variables.

Variable	1	2	3	4	5	6	7	8
1. Meaning in life presence	-							
2. Meaning in life search	−0.210 *	-						
3. Intensity of care	0.129	−0.131	-					
4. Caregiver burden	−0.260 **	0.214 *	0.243 **	-				
5. Social support	0.415 ***	−0.186 *	−0.076	−0.248 **	-			
6. Caregiver age	0.124	−0.089	0.133	−0.136	−0.010	-		
7. Caregiver gender	0.139	−0.142	0.052	0.262 **	0.110	−0.220 *	-	
8. Gratitude	0.619 ***	−0.180 *	0.131	−0.264 **	0.461 ***	−0.02	0.153	-

Note: * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

3.3. Independent Effects of Gratitude on Meaning in Life Presence and Search

To address the first aim of this study, a series of stepwise hierarchical regression models was developed. Results are presented in Table 4 for the presence of meaning in life subscale and Table 5 for the search for meaning in life subscale. In each table, the first model served as a base model and included measures of primary objective stress (intensity of care), primary subjective stress (caregiver burden), secondary stress (caregiver age, caregiver gender) and an external resource (social support). The second model in each table incorporated the internal caregiver resource and the primary dependent variable of interest, gratitude. To determine whether the inclusion of gratitude had a significant impact on the explained variation, the change in R^2 (ΔR^2) between the base models and second models was tested.

Table 4. Standardized OLS coefficients predicting meaning in life presence.

	Model 1	Model 2
Intensity of care	0.194 *	0.084
Caregiver burden	−0.253 **	−0.121
Caregiver age	0.108	0.131
Caregiver gender	0.181 *	0.104
Social support	0.348 ***	0.155
Gratitude		0.491 ***
Intercept	4.769	−4.096
^a F	9.057 ***	15.666 ***
^b R ²	0.27	0.44
^c ΔR ²		0.17 ***
N	126	126

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ^a Test statistics for the F -test. ^b R-squared coefficient of determination. ^c R-squared change.

Table 5. Standardized OLS coefficients predicting meaning in life search.

	Model 1	Model 2
Intensity of care	−0.186 *	−0.186 *
Caregiver burden	0.277 **	0.277 **
Caregiver age	−0.073	−0.073
Caregiver gender	−0.209 *	−0.209 *
Social support	−0.109	−0.108
Gratitude		−0.002
Intercept	26.64	26.69
^a F	3.916 **	3.236 **
^b R ²	0.14	0.14
^c ΔR ²		0.00
N	126	126

Note: * $p < 0.05$, ** $p < 0.01$. ^a Test statistics for the F -test. ^b R-squared coefficient of determination. ^c R-squared change.

The results of the base model indicated that the objective stressor, intensity of care ($\beta = 0.194$, $p < 0.05$); the secondary stressor, caregiver gender ($\beta = 0.181$, $p < 0.05$); and the external resource, social support ($\beta = 0.348$, $p < 0.001$) were all significantly and positively related to meaning in life—presence. Identifying as female, having higher levels of social support, and reporting greater care responsibilities were all correlated with higher levels of meaning in life—presence. In contrast, caregiver burden ($\beta = -0.253$, $p < 0.01$) was negatively related to the presence of meaning in life. As burden rose, scores on the criterion variable fell. Standardized betas indicated that the strongest predictor in the base model was social support.

In Model 2, we added the variable for gratitude. Regression results indicated that gratitude had a strong, significant, and positive relationship with the presence of meaning in life ($\beta = 0.491$, $p < 0.001$). Standardized betas revealed that gratitude was the strongest predictor in Model 2, and that when it was included in the model, none of the remaining variables retained their significance. Moreover, adding gratitude to the model significantly improved the overall fit of the model. There was an increase in R^2 from 0.27 to 0.44, indicating a 60.95% increase in variance explained ($\Delta R^2 = 0.167$, $p < 0.001$).

In Table 5, the results of the base model revealed that intensity of care ($\beta = -0.186$, $p < 0.05$) and caregiver gender ($\beta = -0.209$, $p < 0.05$) were negatively associated with the search for meaning in life. More specifically, identifying as female and reporting more care responsibilities were related to lower scores on the meaning in life search subscale. In

contrast, burden ($\beta = 0.277, p < 0.01$) was significantly and positively related to the meaning in life search scale. As burden increased, so did scores on the search for meaning in life subscale. Interestingly, the inclusion of gratitude in Model 2 had no significant impact on the model's overall fit. Participants' gratitude scores were not significantly related to the search for meaning in life subscale, and there was no change in the significance of the remaining variables. The strongest predictor of meaning in life—search in both Model 1 and Model 2 was burden.

3.4. Gratitude Mediation Effects on Caregiver Burden and Meaning in Life Relationship

Figure 1 illustrates the mediation model including the causal variable (burden), outcome variable (the presence of meaning in life), and proposed mediator (gratitude). The results revealed that the direct effect of caregiver burden on meaning in life was -0.033 , while the indirect effect, mediated through gratitude, was $ab = (-0.079)(0.596) = -0.047$. The indirect effect accounted for 58.75% of the total effect. The results of the Sobel test revealed that the mediation effect of gratitude on the relationship between caregiver burden and the presence of meaning in life was statistically significant ($p = 0.006$). There was no evidence of a moderation effect for gratitude on the presence of meaning in life.

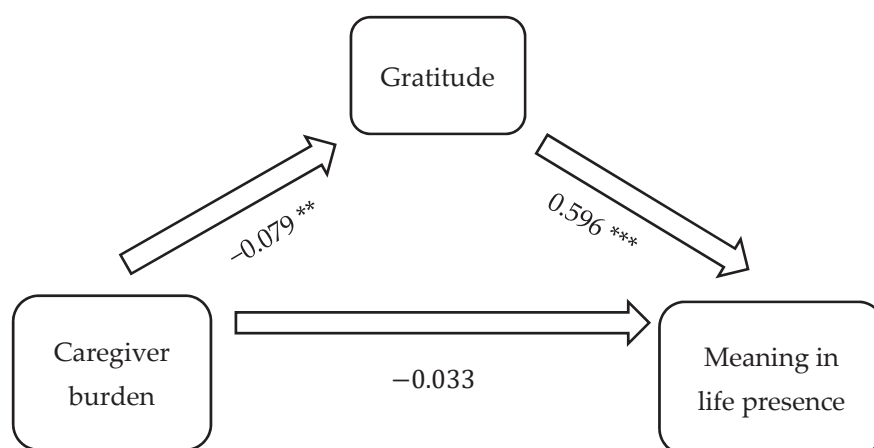


Figure 1. Gratitude mediates caregiver burden on meaning in life in family caregivers of persons with Alzheimer's disease. Note: ** $p < 0.05$, *** $p < 0.01$.

4. Discussion

In the current study, we examined relationships between gratitude, caregiver burden, and meaning in life (presence and search). Our findings suggest an interplay between these variables which may be important to the overall health and well-being of caregivers of persons with Alzheimer's disease and other age-related progressive neurocognitive conditions. This study is the first, to our knowledge, to examine the influence of gratitude on caregivers' sense of meaning in life.

Our findings provide evidence that higher levels of gratitude among family caregivers of persons with Alzheimer's is significantly associated with the greater presence of meaning in their lives even when key stressors and demographic variables were taken into consideration. Similar to our findings, previous work by Nah and colleagues [28] demonstrated that greater perceived gratitude among caregivers of adults with chronic illness or disability was associated with better psychological wellbeing. They also found that gratitude buffered the association between role overload, a concept related to caregiver burden and psychological wellbeing.

Of import, gratitude mediated the relationship between caregiver burden and the presence of meaning in life in the caregivers in this study. This finding is consistent with studies documenting the mediation effects of gratitude on meaning in life and aging [45] and time perspective [46]. The grateful response of the care recipient has been a suggested reason for the mediating effect of gratitude between caregiver burden and meaning in life.

In a study of family members who cared for an older relative, Otobe et al. [29] found that caregivers who received more expressions of gratitude from their loved one had lower rates of caregiver burden.

Algoe's [47] find-remind-and-bind theory of gratitude emphasizes gratitude as a bond of human relationships and an impetus for continuous spirals of mutuality. This was echoed in a recent qualitative study in which caregivers of persons with early-stage Alzheimer's disease expressed their gratitude for the opportunity to provide and also receive care from their loved ones [30]. While the care recipient's expressions of gratitude may be a source of grateful responses among caregivers of persons with dementia, this factor is limited by the relational realities of the dementia care trajectory. With time, the care recipient's capacity to express gratitude may diminish, and the caregiver may not be recognized by the person living with dementia. Future qualitative studies may provide the most effective method for identifying alternative stimuli for the caregiver's grateful response and enriched meaning. Overall, additional research is warranted on how gratitude among family caregivers of persons with dementia may impact the meanings they attribute to the caregiving role itself.

A possible interpretation for our discovery that gratitude strongly predicts meaning in life presence, even in the context of burden, is that gratitude functions as an internal positive psychological asset. The research literature suggests that internal psychological resources such as hope [18] and practicing positive spiritual techniques [14–17,48] impact meaning in life and one's sense of purpose in this population [48]. Gratitude's beneficial influence on meaning in life may also enhance a caregiver's coping skills, buffering the impact of caregiving challenges [37].

A sense of meaning in life can enable people to contribute to the capacity to deal with physical and psychological pain, create meaning from these experiences, and reactivate their sense of well-being [49]. Family caregivers who practice gratitude frequently may be more aware of the positive aspects of caregiving which could lead to enhanced emotion-focused coping and lower levels of distress [27].

Given the relationship between gratitude and the presence of meaning in life in the current study, it is apparent that even small incremental increases in gratitude can positively influence a caregiver's life. A better understanding of how to further cultivate and activate this positive psychological resource among family caregivers may contribute to reducing the consequences of burden and positively impact the caregiving experience.

Wood and colleagues' Life Orientation Model [20] which has been applied to general populations, provides insight into possible mechanisms between dispositional gratitude and meaning in life. First, according to this model, persons in general populations with higher levels of dispositional gratitude are more likely to perceive their lived experiences as worthy of gratitude than those with lower levels of dispositional gratitude [20]. We suggest that family caregivers who have higher levels of dispositional gratitude may be more likely to notice and reflect on their overall lived experience as gratitude-worthy and thus meaningful.

Additionally, we suggest that some family caregivers may be more inclined than others to notice with presence, awareness, and gratitude the day-to-day happenings in their lives within their caregiving role as well as the other aspects of their lives. This capacity to notice with gratitude and attribute meaning to one's life as a whole and each aspect of daily living is what we could be considered what we refer to as *mindful caregiving* and cultivated through various techniques and practiced.

Surprisingly, gratitude did not contribute to explaining variation in caregivers' searching for meaning in this study. Whether or not gratitude was included in the model, caregiver burden was the strongest predictor of searching for meaning in life. A possible explanation of this finding is that for caregivers who were seeking but not experiencing a present and viable sense of meaning, gratitude may not have been as readily available to activate meaning or reduce perceived burden. Perhaps this finding highlights the importance of developing gratitude-oriented mindfulness interventions aimed at drawing caregivers'

attention to current blessings while also acknowledging their significant life challenges, thus leading to greater presence of meaning in life.

5. Study Limitations

First, we acknowledge the findings of this study are not generalizable to the experience of caregivers of persons living with dementia internationally or even within the United States. Rather, our multivariate analyses provided insight into the relationship between gratitude and meaning in life in a mostly White sample of caregivers who primarily self-identified as women in a large metropolitan area in the United States. Second, given that the study was based on self-reporting, a social desirability bias may have been present. Likewise, participants were aware that the study was focused on positive psychological aspects of caregiving, which may have limited participation to caregivers who were interested in this topic. A longitudinal study is also necessary for understanding how gratitude informs meaning in life among caregivers over time and as dementia progresses. Further study of the benefactor and beneficiary relationship is needed, as well as the reciprocal and iterative aspects of caregiver gratitude. Likewise, qualitative and mixed-methods approaches may serve to reveal a greater depth of understanding.

6. Recommendations

Our findings suggest that gratitude is a construct worthy of consideration by researchers and those who serve family caregivers and their loved ones living with dementia as a way to enhance meaning and purpose in their lives. Three recommendations flow from the evidence provided in this study.

6.1. Develop and Test Evidence-Informed Caregiver Gratitude Assessment and Intervention Protocols

Gratitude mediated perceived burden among caregivers leading to a greater sense of meaning in their lives in this study. Therefore, we recommend including measures of these constructs in clinical assessment and research protocols for enhancing caregiver health and well-being. Including measures of positive psychological constructs, such as gratitude and meaning in life, may increase clinicians' capacities to improve care planning and assess caregiver progress over time when receiving clinical intervention(s). We advocate for the use of brief standardized measures, with adequate psychometric properties, rather than the use of lengthy protocols. This approach may allow for clinicians to gain the information they need to effectively serve caregivers while reducing the amount of effort that caregivers must out forth during clinical assessment.

The mediation finding also supports further development and clinical trial validation of gratitude interventions for this population, promoting the potential capacity of caregiver gratitude to recognize, develop, and sustain meaning making. There are several recent reviews and meta-analyses on gratitude interventions [50–52] which may guide the development of caregiver-specific gratitude-oriented interventions.

6.2. Deepen Understanding of the Caregiver Gratitude and Meaning Relationship

Nomothetic studies, such as this one, are not able to tap into the interior and day-to-day relational experiences of caregivers and their loved ones with Alzheimer's. Increased engagement with the narratives of caregivers will illuminate the complexities of the caregiver-care receiver relationship and clarify sources of caregiver gratitude and meaning. Mixed-method approaches testing the conceptual frames identified in the current research on gratitude could provide validation and in-depth understanding of the applicability of these constructs in explaining meaning-making among caregivers with persons with dementia.

6.3. Focus on Cultural, Ethnic, Gender, and Spiritual Diversity

Expressions of human gratitude are as diverse as the array of international, national, and community cultures. There is a need to take into consideration diverse cultural, spiritual, and philosophical understandings of gratitude and meaning in life. There is a particular notable dearth of published research on First Nation or indigenous caregivers—as well as immigrants and displaced persons. Effective and ethical future research will require further attention to diverse caregivers within their unique cultural, ethnic, and/or religious/spiritual contexts.

7. Conclusions

Guided by the caregiver stress process model [39,40], for variable specification, and extant research on the relationships between gratitude, caregiver burden, and meaning in life, this study provides evidence that gratitude is a key factor in caregivers' sense of the presence of meaning in life, even within the context of perceived burden. Indeed, having a grateful life orientation mediated the relationship between perceived caregiver burden and the presence of meaning in life in the context of caring for persons living with Alzheimer's in the participants in the current study. We provide implications of our findings intended to inform researchers and professionals seeking to increase caregiving meaning and reduce burden by testing, applying, and evaluating evidence-informed, culturally sensitive assessments and interventions intended to strengthen caregiver gratitude and improve outcomes for those for whom they care.

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Article

Savoring Belief, Resilience, and Meaning in Life as Pathways to Happiness: A Sequential Mediation Analysis among Taiwanese University Students

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Abstract: In recent decades, scholarly interest has grown in the psychological components of happiness. Savoring belief, or the capacity to attend to, appreciate, and enhance the positive experiences in one's life, along with resilience and meaning in life, have emerged as significant predictors of enhanced happiness among diverse populations. This research examined the interrelationships among savoring belief, resilience, meaning in life, and happiness. A sample of 561 students from 75 universities in Taiwan, comprising 361 female and 200 male participants with an average age of 20.88 years, participated in an online survey. The study employed various instruments, including the Savoring Belief Inventory, the Subjective Happiness Scale, the Brief Resilience Scale, and the Meaning in Life Questionnaire. These instruments were translated into Traditional Chinese using a back-translation method and subsequently validated for accuracy by specialists in the field. Analysis of the data using Hayes' PROCESS Model 6 revealed several key insights: (1) savoring belief positively influenced happiness, resilience, and meaning in life with resilience further enhancing happiness and meaning in life; (2) resilience served as a significant mediator in the relationship between savoring belief and happiness; (3) meaning in life significantly mediated the relationship between savoring belief and happiness; (4) a sequential mediation model illustrated the mediating effects of resilience and meaning in life on the relationship between savoring belief and happiness. This study illustrates that, much like a garden requires water, sunlight, and care to flourish, our happiness is cultivated through enhancing our ability to savor the good moments, rebound from challenges, and find deep significance in our lives. We can significantly boost well-being by fostering these qualities—savoring belief, resilience, and a sense of meaning. These findings are particularly relevant for educators, highlighting the critical need to develop these traits in students to promote greater happiness and fulfillment in their lives. Discussions included theoretical implications, educational implications, and avenues for future research.

Keywords: savoring belief; happiness; resilience; meaning in life; sequential mediation model

1. Introduction

Globally, cultivating high-quality university students is recognized as a pivotal strategy for augmenting national human capital [1]. Specifically, college-aged emerging adults navigate the complex transition to adulthood, facing various challenges across the human development spectrum, especially during early adulthood [2]. Students encounter numerous pressures and challenges throughout their university tenure, including academic stress, life transitions, and career planning. These elements can profoundly impact their mental and physical happiness, affecting their academic performance. Researchers have dedicated themselves to identifying psychological variables that significantly enhance happiness and aid in navigating life's adversities. There have been efforts to examine disparities in

happiness across nations [3] and predict happiness through advances in neurocognitive science [4]. Throughout history, happiness has fascinated philosophers, while contemporary psychologists have concentrated their research on strategies to improve individuals' quality of life and happiness [5]. Happiness is defined in various ways, ranging from fleeting positive emotions to a long-term sense of meaning [6]. Some scholars suggest it encompasses an overall assessment of positive and negative emotions and life satisfaction [7]. Central to scholarly research is understanding factors contributing to enhanced happiness, such as savoring belief, resilience, and meaning in life.

Savoring the ability to focus on positive experiences and proactively enhance the quality of life by altering thoughts and behaviors has increased happiness [8]. Research suggests that savoring can serve as a beneficial intervention for managing worry and anxiety, leading to immediate increases in positive emotions and reductions in worry, particularly for individuals with Generalized Anxiety Disorder (GAD) [9]. Resilience, defined as the capacity to withstand stress and adversity, is a dynamic capability adaptable to environmental changes [9,10]. Studies have shown a positive correlation between resilience and happiness [11,12]. Resilience is a crucial resource for coping effectively with uncertainties and changes, such as during a pandemic, and involves emotional regulation and protective factors against psychological distress [13]. Support systems, including family and community, foster student resilience [14]. Meaning in life and finding purpose and significance through life experiences significantly influence happiness, self-esteem, hope, and self-efficacy [15,16]. Research indicates that meaning in life is inversely related to psychological distress, with resilience and loneliness mediating this relationship [17]. Meaning in life predicts university students' psychological happiness, well-being, and happiness levels, and fulfilling needs for competence, autonomy, and relatedness is associated with life satisfaction through meaning in life [18,19].

Previous research has confirmed the correlation between university students' savoring beliefs and happiness [20]. It has also been found that cultivating positive emotions can enhance students' resilience, reduce negative emotions, and improve happiness [21]. Additionally, having a sense of meaning in life positively impacts the health of university students [22] and individuals with life goals tend to experience higher life satisfaction [23]. Research also indicates that savoring belief can increase positive emotions and reduce worry and anxiety. Resilience has been identified as a mediator in the relationship between meaning in life and psychological distress, suggesting that enhancing meaning in life can bolster resilience and reduce loneliness [17]. Recent studies have increasingly clarified the connections among savoring belief, subjective well-being, resilience, and meaning of life, particularly in higher education. Recent studies have explored the complex interactions between personal beliefs and psychological resilience, revealing several key insights. It has been demonstrated that social support and spirituality play crucial mediating roles in the relationship between resilience and quality of life among cancer survivors, underscoring the broader relevance of these constructs [24]. Similarly, introducing an allostatic active inference model has shed light on the role of resilience in well-being, emphasizing the importance of belief revision and action prioritization [25]. In religious contexts, the enhancement of resilience by spiritual and existential factors has been observed [26]. Additionally, the importance of optimism, hope, and spirituality as key predictors of well-being during crises has been identified, indicating their significance beyond merely aiding resilience [27]. These findings collectively highlight the interconnected nature of psychological constructs and their impact on improving life quality and resilience across various contexts.

Despite considerable research linking savoring belief to happiness, the intricate web connecting savoring belief, happiness, resilience, and meaning in life has not been thoroughly investigated. This gap signifies a missed opportunity to understand how these variables interact to shape students' psychological landscapes. Our study addresses this deficiency by constructing a theoretical model that examines the potential influence of resilience and meaning in life on savoring beliefs and happiness among university students.

By dissecting these relationships, this research seeks to enrich the academic discourse with a comprehensive framework and aspires to translate theoretical insights into practical strategies that could substantially enhance educational practices. The expected outcomes of this study include developing interventions that promote resilience and happiness, thereby contributing to more effective, evidence-based approaches in university settings.

2. Theoretical Foundation and Research Hypothesis Development

2.1. *The Relationship between Savoring Belief and Happiness*

The correlation between savoring belief and happiness has garnered extensive support from theoretical frameworks and empirical studies. Savoring belief is the ability to actively engage with the positive aspects of life's situations whereas happiness involves satisfaction with one's life and the consequent positive effects. Numerous studies have corroborated the positive relationship between savoring belief, life satisfaction, and happiness [20,28]. Furthermore, the enjoyment derived from savoring belief positive experiences has been identified as more significant than the frequency of such experiences [29]. Additionally, savoring belief has been shown to mitigate the impacts of adverse life events, such as stress, and mental health disorders, such as depression [30,31]. Recent research has highlighted savoring belief as a significant enhancer of positive emotions, happiness, and life satisfaction while reducing negative emotions [32]. Savoring belief also exhibits a strong association with psychological health [33], exerts a positive influence on the quality of intimate relationships [34], and can moderate the relationship between health-related pain and life satisfaction, ultimately leading to an elevated level of life satisfaction [33,35]. The reviewed literature forms the basis for the proposed hypothesis:

Hypothesis 1. *Savoring belief positively predicts happiness.*

2.2. *The Mediating Role of Resilience in the Relationship between Savoring Belief and Happiness*

Resilience is an individual's capacity for positive adaptation in adversity, influenced by personal traits and environmental factors, such as family and educational environments [36]. It comprises three interrelated components: adversity, outcomes, and mediating factors. Conceptually, resilience is a process leading to specific outcomes, with a significant focus on resilience research examining mediating processes. Highly resilient individuals can withstand considerable life stressors, such as poverty or family conflicts, without resorting to negative behaviors like violence or drug abuse. Instead, they often perceive challenges as opportunities for personal growth. Positive emotions contribute to enhancing resilience and happiness [37,38]. University students who possess high resilience are more adept at regulating the distress they encounter [39], effectively managing their emotions, reducing the incidence of depression [21], and experiencing reduced fatigue while learning challenging subjects. According to the poly-strengths theory (PST), resilience is a learnable skill that relies on individuals' cognitive and behavioral strategies to overcome adverse events and enhance their happiness. Positive emotions, such as interest, happiness, satisfaction, and love, bolster individuals' resilience [37]. Resilience has been shown to mediate the relationship between teacher support and adolescent mental health [40]. This literature review culminates in the proposition of the following hypotheses:

Hypothesis 2. *Savoring belief positively predicts resilience.*

Hypothesis 3. *Resilience positively predicts happiness.*

Hypothesis 4. *Resilience mediates the relationship between savoring belief and happiness.*

2.3. The Mediating Role of Meaning in Life in the Relationship between Savoring Belief and Happiness

Meaning in life typically encompasses three components: cognitive, motivational, and emotional aspects [41]. According to the mindfulness-to-meaning theory (MMT) [42], mindfulness can enhance individuals' emotional regulation abilities when faced with difficulties, promote positive emotions, and ultimately foster happiness, meaning in life, and psychological health [43]. Research has consistently demonstrated the positive influence of meaning in life on the happiness of young individuals. Those with a higher sense of meaning in life tend to exhibit lower suicidal tendencies [22,44]. Additionally, the literature has indicated that meaning in life plays a mediating role in the relationship between social support and internet gaming addiction [45]. The use of meaning in life and self-efficacy as moderators has been suggested to potentially improve the subjective happiness of bullied adolescents [46]. Regarding elderly individuals, research has found that savoring belief contributes to a more positive mindset, subsequently enhancing life satisfaction [47].

Furthermore, a positive correlation has been identified between hope, trust, and subjective well-being, which in turn contributes to enhanced life satisfaction [48]. Research focusing on university students has discovered that higher life satisfaction is associated with a reduced occurrence of nonsuicidal self-injury behaviors. From the reviewed literature emerges the proposition of the following hypotheses:

Hypothesis 5. *Savoring belief positively predicts meaning in life.*

Hypothesis 6. *Meaning in life positively predicts happiness.*

Hypothesis 7. *Meaning in life mediates the relationship between savoring belief and happiness.*

2.4. The Overall Relationship among Savoring Belief, Resilience, Meaning in Life, and Happiness

Resilience, characterized by adaptability and protective resources [13], is linked to enhanced happiness and life satisfaction [11,49]. Additionally, meaning in life is associated with psychological well-being and reduced distress, with resilience mediating this relationship [17]. Thus, resilience's role in fostering adaptability and positive coping mechanisms likely contributes to an individual's ability to find meaning in life, aligning with findings that resilient individuals experience greater life satisfaction and happiness, essential components of a meaningful life.

In exploring the relationship between savoring belief and happiness, it is essential to consider the sequential mediation of resilience and meaning in life. Savoring belief, identified as a factor that enhances happiness [47], sets the stage for this mediation process. The role of resilience, characterized by the ability to recover swiftly from adversities and promote mental health [50], becomes pivotal. Such adaptability is crucial for navigating stressful environments, influencing their happiness. Subsequently, the impact of meaning in life comes to the forefront. Moderated by positive emotions and psychological health [51], meaning in life significantly affects physical health and academic achievements [52,53]. The interplay between resilience and meaning in life is instrumental in connecting the savoring belief with enhanced happiness. This interplay aligns with the principles of Self-determination Theory (SDT), which posits that individuals actively seek challenges and new experiences [54]. Therefore, the combined effects of savoring belief, resilience, and meaning in life are critical in understanding how savoring belief influences overall happiness, highlighting their synergistic role in this mediation relationship. The building blocks of the literature pave the way for the proposition of the following hypotheses:

Hypothesis 8. *Resilience positively predicts meaning in life.*

Hypothesis 9. *Resilience and meaning in life sequentially mediate the relationship between savoring belief and happiness.*

2.5. The Present Research

Based on the literature above, this research conducted an online questionnaire survey among university students in Taiwan to investigate the hypothesized model involving savoring belief, resilience, meaning in life, and happiness, as depicted in Figure 1.

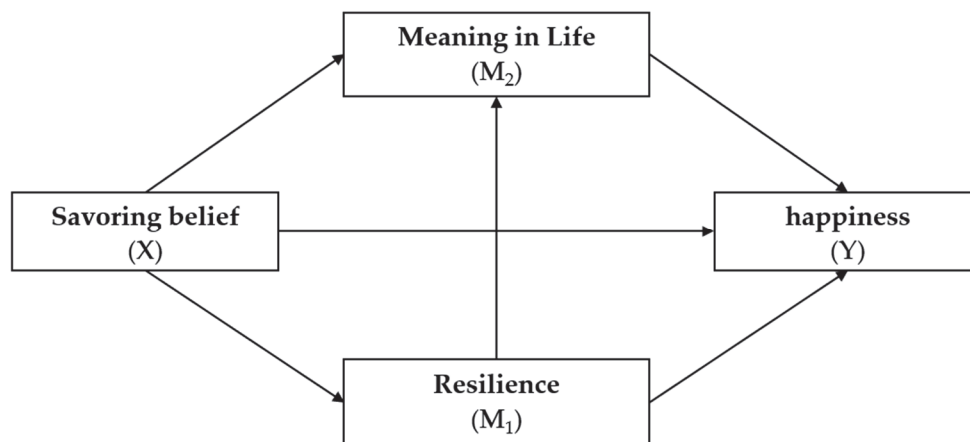


Figure 1. Hypothesized research model.

3. Materials and Methods

3.1. Participants and Procedures

The present research focused on university students in Taiwan in 2022 as the target population. Convenience sampling, a nonprobability sampling method, was employed based on participants' willingness, convenience, and accessibility [55]. The online questionnaire was disseminated through various channels, including university professors, educational communities, and course teaching platforms, from 25 April to 6 May 2022. This study conformed to the ethical principles of the 1975 Declaration of Helsinki, as revised in 2013, and met the local criteria for exemption from IRB review in certain social and behavioral research types. Written informed consent was secured from all participants, who were comprehensively informed about the study's objectives, data utilization, anonymity of responses, and potential risks, thus adhering to the ethical standards required for non-interventional studies. Measures were implemented to ensure the anonymization of personal identifiers and the careful handling of identifiable information. Moreover, all participants voluntarily participated in the research and had no conflicts of interest with the researchers. According to the statistics provided by Taiwan's Ministry of Education for 2022, there were 126 universities in Taiwan and 561 valid questionnaires were collected from 75 universities. Among the participants, 361 were females (64.4%) and 200 were males (35.6%). In terms of grade level, the distribution included 126 freshmen (22.4%), 134 sophomores (23.8%), 163 juniors (29%), and 138 seniors or above (24.8%). The age range of the students was 18 to 31 years old, with an average age of 20.88 years old.

3.2. Measures

This research employed well-documented scales in international academic journals and was often cited for measurement purposes. Five scholarly experts translated, reviewed, and refined these scales to ensure high content validity.

3.2.1. Savoring Belief Inventory (SBI)

Savoring belief was assessed using the Savoring Belief Inventory (SBI) [56]. This scale comprises three dimensions: (1) Savoring the Future with four items (e.g., "Before a good thing happens, I look forward to it in ways that give me pleasure in the present."), (2) Savoring the Present with three items (e.g., "I enjoy looking back on happy times from my past."), and (3) Savoring the Past with three items (e.g., "I know how to make the most of a good time."). Participants rated their responses on a 6-point Likert scale ranging

from 1 (strongly disagree) to 6 (strongly agree). Higher scores indicated a stronger belief in savoring. The original scale demonstrated good internal consistency, with Cronbach's α values of 0.86 for Savoring the Future, 0.84 for Savoring the Present, and 0.84 for Savoring the Past. In this research, the traditional Chinese version of the SBI had a good fit to the research data ($\chi^2 = 272.199$, $p < 0.001$, $\chi^2/DF = 8.006$, RMSEA = 0.112, GFI = 0.904, AGFI = 0.845, NNFI = 0.886, CFI = 0.914, IFI = 0.914), the overall Cronbach's α for SBI was 0.92, with values of 0.822 for Savoring the Future, 0.808 for Savoring the Present, and 0.735 for Savoring the Past, indicating good internal consistency.

3.2.2. Subjective Happiness Scale (SHS)

Happiness was evaluated by applying the Subjective Happiness Scale (SHS) [57]. This scale has been widely utilized in previous studies published in international journals [58], demonstrating good reliability and validity. The scale consists of 3 items (e.g., "In general, I consider myself: Not a very happy person/a very happy person."), and participants rated their responses on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicated higher levels of happiness. The original scale reported a Cronbach's α of 0.86; in this research, the Cronbach's α was 0.90, indicating good internal consistency.

3.2.3. Brief Resilience Scale (BRS)

Resilience was evaluated through the application of the Brief Resilience Scale (BRS) [59]. This scale has been utilized in over 5000 studies and published in various international journals, indicating its robust reliability and validity [60]. The scale comprises six items (e.g., "I tend to bounce back quickly after hard times."), with responses rated on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Higher scores indicate higher levels of resilience. The original Cronbach's α of the scale was 0.91, and in the present research, the Cronbach's α was also 0.91, indicating good internal consistency. In this research, the traditional Chinese version of the BRS had a good fit to the research data ($\chi^2 = 111.530$, $p < 0.001$, $\chi^2/DF = 12.392$, RMSEA = 0.143, GFI = 0.934, AGFI = 0.845, NNFI(TLI) = 0.914, CFI = 0.948, IFI = 0.949), the overall Cronbach's α for BRS was 0.901, indicating good internal consistency.

3.2.4. Meaning in Life Questionnaire (MLQ)

Meaning in life was evaluated by applying the Meaning in Life Questionnaire (MLQ) [61]. This scale has been employed in several studies and published in international journals, demonstrating robust reliability and validity [62]. The scale consists of 9 items (e.g., "My life is arranged in a fairly organized way r"), with responses rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Higher scores indicate a greater sense of meaning in life. The original Cronbach's α of the scale was 0.62, whereas in this research, the Cronbach's α was 0.88, indicating good internal consistency. In this research, the traditional Chinese version of the MLQ had a good fit to the research data ($\chi^2 = 583.481$, $p < 0.001$, $\chi^2/DF = 21.610$, RMSEA = 0.192, GFI = 0.799, AGFI = 0.664, NNFI(TLI) = 0.671, CFI = 0.753, IFI = 0.754), the overall Cronbach's α for MLQ was 0.862, indicating good internal consistency.

3.3. Statistical Analyses

A cross-sectional survey design was employed in this research, and data analysis and verification were conducted using SPSS 26.0 and the SPSS Hayes' macro PROCESS v4.1. Preliminary analyses included descriptive analysis, Pearson product-moment correlation analysis, collinearity diagnostic analysis, and factor analysis. Subsequently, Model 6 was utilized to test the sequential mediation model between resilience and meaning in life, with savoring belief and happiness as mediators. The direct effects between each predictor variable and its outcome variable were analyzed, and the indirect effects of the

hypothesized mediators between the predictor and outcome variables were examined to determine the nature of the relationships [63].

4. Results

4.1. Descriptive Statistics and Correlations

The skewness values for savoring belief, resilience, meaning in life, and happiness ranged from -1.631 to -0.031 , and the kurtosis values ranged from -0.905 to 4.034 , conforming to the criteria for normality as proposed by Kline (2016) [64]. Pearson correlation analysis was conducted to investigate the relationships among these variables. As shown in Table 1, the correlation coefficients among the variables were all below 0.85, indicating no severe multicollinearity [65]. Furthermore, the tolerance values in this research ranged from 0.651 to 0.864, and the variance inflation factor (VIF) values ranged from 1.214 to 1.536, suggesting no multicollinearity among the research variables [66].

Table 1. Descriptive statistics and correlations for all variables (N = 561).

	Mean	SD	(1)	(2)	(3)	(4)	Skewness	Kurtosis
(1) savoring belief	5.937	0.892	1				−0.802	0.578
(2) resilience	3.376	0.948	0.235 ***	1			−0.296	−0.232
(3) meaning in life	3.430	0.726	0.419 ***	0.504 ***	1		−0.418	0.171
(4) happiness	4.737	1.342	0.526 ***	0.517 ***	0.698 ***	1	−0.566	0.210

*** $p < 0.001$.

Table 1 displays all research variables' mean values, standard deviations, and correlations. Consistent with the literature review and research hypotheses, savoring belief exhibited a positive correlation with resilience ($r = 0.235$, $p < 0.001$), as well as positive correlations with both meaning in life and happiness ($r = 0.419$, $p < 0.001$; $r = 0.526$, $p < 0.001$). Moreover, resilience positively correlated with meaning in life and happiness ($r = 0.504$, $p < 0.001$; $r = 0.517$, $p < 0.001$). Meaning in life positively correlated with happiness ($r = 0.698$, $p < 0.001$). These findings from the correlation analysis supported the research hypotheses and provided a foundation for further investigation of the mediating effects among the variables.

4.2. Test the Extent of the Common Method Variance (CMV)

To assess the presence of common method variances (CMV), Harman's single-factor test was employed to examine the unrotated exploratory factor analysis. The results indicated that the first factor accounted for 37.058% of the variance, which was less than 50%, suggesting the absence of common method variance (CMV) issues [67].

4.3. Testing the Sequential Mediation Model and Validating the Research Hypotheses

Before testing the mediation model, a regression analysis was conducted to explore the paths of influence among the research variables. As presented in Tables 2 and 3, the total effect of savoring belief on happiness was significant ($\beta = 0.525$, $p < 0.001$), supporting Hypothesis 1. Savoring belief positively predicted resilience and meaning in life ($\beta = 0.235$, $p < 0.001$; $\beta = 0.317$, $p < 0.001$), thus supporting Hypothesis 2 and Hypothesis 5. Resilience positively predicted meaning in life and happiness ($\beta = 0.428$, $p < 0.001$; $\beta = 0.212$, $p < 0.001$), supporting Hypothesis 3 and Hypothesis 8. Meaning in life positively predicted happiness ($\beta = 0.475$, $p < 0.01$), supporting Hypothesis 6.

Table 2. Regression analysis results (N = 561).

Regression		Model Index		Coefficients	
Outcome Variables	Independent Variables	R ²	F	β	t
resilience	savoring belief	0.050	37.792 ***	0.235	5.726 ***
meaning in life	savoring belief	0.349	149.610 ***	0.317	9.045 ***
	resilience			0.428	12.201 ***
happiness	savoring belief	0.587	264.080 ***	0.276	9.231 ***
	resilience			0.212	6.727 ***

Note: *** $p < 0.001$, β = standardized coefficients. All variables were standardized.

Table 3. Total, direct, and indirect effects of savoring belief on happiness (N = 561).

Paths	Full	
	Effect	95% CI
Total effect	0.525	[0.684, 0.897]
Direct effects	0.416	[0.327, 0.505]
Indirect effect		
Total indirect effects	0.374	[0.295, 0.461]
savoring belief → resilience → happiness	0.075	[0.041, 0.115]
savoring belief → meaning in life → happiness	0.227	[0.169, 0.292]
savoring belief → resilience → meaning in life → happiness	0.072	[0.044, 0.105]

Note: Bootstrap sample size = 5000. CI = confidence interval.

The integrated findings accentuate the substantial total effect of savoring belief on happiness (effect = 0.525, 95% CI [0.684, 0.897]), reinforcing the notion that the intrinsic ability to appreciate and savor positive experiences is foundational to an individual's sense of well-being. The direct effect of savoring belief on happiness remains prominent (effect = 0.416, 95% CI [0.327, 0.505]), corroborating the premise that the capacity to savor transcends the mediating constructs to bolster happiness directly.

The mediation pathway delineates a significant indirect effect, initially through resilience (effect = 0.075, 95% CI [0.041, 0.115]), aligning with Hypothesis 4, and subsequently through meaning in life (effect = 0.227, 95% CI [0.169, 0.292]), upholding Hypothesis 7. Our analysis further validates Hypothesis 9, with the sequential mediation effect from savoring belief through resilience and meaning in life to happiness (effect = 0.072, 95% CI [0.044, 0.105]), thus confirming the full mediation model.

The sequential mediation highlights an intricate psychological cascade: savoring belief fortifies resilience, resilience, in turn, fosters a more profound sense of life's meaning, and together, they elevate happiness. The indirect effects explicate that while savoring belief independently predicts happiness, its impact is magnified through the intermediary roles of resilience and meaning in life, offering a richer understanding of the interdependencies among these constructs.

4.4. Comparison of Differences in Gender, Grade, and Major on the Measures

Table 4 offers a comparative analysis across gender, grade level, and major subjects along four dimensions: savoring belief, happiness, resilience, and meaning in life. The study identified significant gender differences in mechanisms of psychological adaptability. Specifically, women exhibited higher scores on the Savoring Belief Inventory (SBI) with a mean (M) of 5.990 and a standard deviation (SD) of 0.822, surpassing men who scored an M of 5.833 (SD = 0.822). Conversely, men scored higher on the Brief Resilience Scale (BRS) with an M of 3.597 (SD = 0.823) compared to women who recorded an M of 3.224 (SD = 0.935), with t-values of 2.169, $p < 0.05$ and -4.735 , $p < 0.001$, respectively, illustrating a significant gender impact on these adaptive processes. Nevertheless, gender differences were not significant on the Subjective Happiness Scale (SHS) and the Meaning in Life Questionnaire (MLQ) (SHS: $t = 0.251$, $p > 0.05$; MLQ: $t = 0.727$, $p > 0.05$).

Table 4. Differences in measure scores among the research sample based on demographic variables. (N = 561).

Demographic Variables	N	Savoring Belief Inventory (SBI)			Subjective Happiness Scale (SHS)			Brief Resilience Scale (BRS)			Meaning in Life Questionnaire (MLQ)		
		M	SD	F/t	M	SD	F/t	M	SD	F/t	M	SD	F/t
Gender													
1. Female	358	5.990	0.822	2.169 *	4.713	1.239	0.251	3.224	0.935	−4.735 ***	3.417	0.669	0.727
2. Male	203	5.833	0.822		4.685	1.348		3.597	0.823		3.373	0.691	
Grade													
1. Freshman	121	5.798	0.862		4.490	1.360		3.252	0.856		3.306	0.737	
2. Sophomore	128	5.984	0.677	1.565	4.709	1.213	1.537	3.303	0.942	1.554	3.358	0.638	1.712
3. Junior Year	158	5.935	0.630		4.785	1.238		3.474	0.960		3.471	0.641	
4. Senior Year	154	5.997	0.641		4.782	1.298		3.371	0.878		3.439	0.688	
Major													
1. A	209	5.902	0.790	−0.688	4.651	1.268	−0.744	3.434	0.905	1.499	3.335	0.693	−1.782
2. B	352	5.952	0.846		4.734	1.284		3.314	0.917		3.440	0.665	

Note: *** $p < 0.001$, * $p < 0.05$; A: natural sciences, engineering, and medical fields; B: humanities, social sciences, business management fields, other fields, and miscellaneous fields.

Analysis regarding the impact of grade levels indicated no significant differences across the scales, suggesting that grade level does not significantly influence university students' responses concerning savoring belief, happiness, resilience, and meaning in life (SBI: $F = 1.565$, $p > 0.05$; SHS: $F = 1.537$, $p > 0.05$; BRS: $F = 1.554$, $p > 0.05$; MLQ: $F = 1.712$, $p > 0.05$). This points to individual differences, rather than academic progression, influencing variations in psychological adaptability among college students.

Further examination of the influence of students' major subjects revealed no statistically significant differences in the measured dimensions (SBI: $t = -0.688$, $p > 0.05$; SHS: $t = -0.744$, $p > 0.05$; BRS: $t = 1.499$, $p > 0.05$; MLQ: $t = -1.782$, $p > 0.05$). These results imply that differences in psychological adaptability among university students are driven by individual difference factors rather than their field of study, highlighting the complex interplay of personal characteristics in psychological adaptation within higher education.

5. Discussion

5.1. Investigating the Positive Correlation between Savoring Belief and Happiness

The sequential mediation model of this research is illustrated in Figure 2. The model confirms a positive link between savoring belief and happiness, aligning with existing studies [68]. The literature consistently showed that savoring belief positively affected happiness across different demographics [34] and reduced negative emotions such as stress and depression [31]. Savoring beliefs are increasingly acknowledged for their capacity to enhance positive emotions and alleviate worries and anxiety immediately. Directed savoring activities deliver significant emotional advantages compared to tasks lacking a savoring component. This emphasizes the role of savoring in breaking cycles of worry and fostering emotional resilience, which are crucial for enhancing students' well-being. Integrating savoring strategies into mental health interventions in educational settings could significantly benefit student outcomes. This investigation confirmed that university students could improve their happiness by fostering savoring belief capabilities.

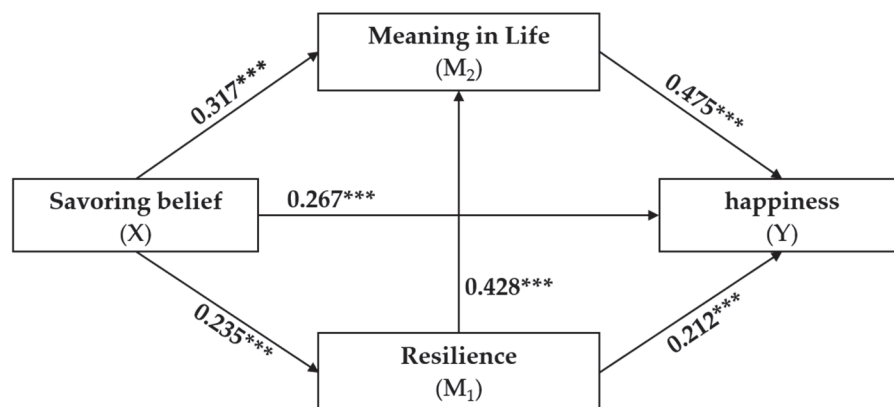


Figure 2. The sequential mediation model of this research. *** $p < 0.001$.

5.2. Exploring the Mediating Role of Resilience in the Relationship between Savoring Belief and Happiness

The findings aligned with Hypothesis 4, demonstrating resilience's significant mediating role between savoring belief and happiness, echoing insights from resilience theory (RT) and poly-strengths theory (PST). As both a process and an acquirable skill, resilience enables individuals to overcome adversity and enhance happiness. This research solidified resilience's mediating role in the savoring belief-happiness nexus among university students, a notion supported by prior work [12]. Additionally, Savoring belief is a potent intervention for elevating positive emotions and alleviating anxiety, thus bolstering happiness. Scholars have elucidated the protective role of resilience against psychological distress, underscoring its value within strategies for confronting adversity [13]. These findings highlight the integral role of resilience in psychological happiness.

5.3. Examining the Mediating Role of Meaning in Life in the Savoring Belief-Happiness Nexus

This research sought to explore the pathway delineated in Hypothesis 7, and the findings corroborated that meaning in life acts as a mediator in the relationship between savoring and well-being. Meaning in life functions as a mechanism that not only mitigates the experience of negative emotions but also fosters positive emotions, such as satisfaction and happiness, thereby bolstering the resilience of university students in the face of adversity [69]. Additionally, research by Wolfram (2023) explored the pivotal role of meaning in life as a mediator in enhancing well-being through savoring, indicating the importance of meaning in life in mental health interventions for university students [17].

5.4. Assessing the Sequential Mediation of Resilience and Meaning in Life in the Context of Savoring Belief and Happiness

The sequential mediation model demonstrated that resilience and meaning in life sequentially mediated the relationship between savoring and well-being, supporting Hypothesis 9. Prior research involving university students has demonstrated that resilience markedly enhanced well-being [70], with further studies evidencing a positive association between meaning in life and favorable outcomes, including positive emotions and academic success [71]. Savoring has been identified as a factor that augments resilience, culminating in heightened well-being and life satisfaction [49]. These results aligned with and bolstered the findings of related research.

5.5. Analyzing the Impact of Savoring Belief on Happiness: Differences in Gender, Grade, and Major

This study examined psychological adaptability among university students, focusing on the impacts of gender, grade levels, and majors across four dimensions: savoring belief, happiness, resilience, and meaning in life. It identified significant gender differences in specific adaptability mechanisms: women exhibited higher savoring beliefs, whereas men

demonstrated greater resilience. These findings highlight a distinct gender influence on these adaptive processes.

No significant differences were found in subjective happiness or meaning in life related to gender. Similarly, the study revealed that grade level had a minimal impact on all psychological adaptability dimensions, indicating that academic progression does not substantially influence these traits.

Further analysis of the influence of students' majors also indicated no significant differences, suggesting that individual differences, rather than academic or disciplinary factors, predominantly drive psychological adaptability. This underlines the complex role of personal characteristics in the psychological adaptation of college students within the higher education setting.

In summary, this research validated a sequential mediation model, which outlined six direct and three indirect paths, supporting the sequential mediating roles of resilience and meaning in life between savoring belief and happiness.

6. Implications

6.1. Theoretical Implications

This research presented several theoretical implications. Firstly, it was found that increased savoring belief among university students enhanced their happiness, corroborating the mindfulness-to-meaning theory (MMT) posited by Garland et al. (2015) [42]. This theory delineates a positive psychological cycle encompassing decentering, attentional broadening, reappraisal, and savoring belief [72]. It suggests that mindfulness during adversity helps construct meaning and personal growth, influencing happiness.

Secondly, this research demonstrated that resilience strengthens the relationship between savoring belief and happiness; individuals with higher resilience enhanced their happiness more effectively through savoring belief. This finding supports Kumpfer's resilience framework, which indicates the mediating role of resilience between stress and outcomes [73]. It suggests that enhancing resilience after facing difficulties can improve happiness, with support systems such as family and community playing a pivotal role [19].

Thirdly, the findings revealed that perceiving a high meaning in life enhances the relationship between savoring belief and happiness. Supporting the self-determination theory proposed by Deci and Ryan (1985), the satisfaction of psychological needs—autonomy, competence, and relatedness—links meaning in life to happiness [54,74]. Understanding the intrinsic motivations of university students elucidates the environmental and societal influences [75].

Finally, the research confirmed savoring belief's impact on happiness and identified significant mediating effects of resilience and meaning in life in the happiness model. This underscores the importance of understanding and enhancing university students' happiness, laying a foundation for educational and psychological interventions.

6.2. Educational Implications

The educational implications of this research are as follows. Firstly, the research discovered that happiness, previously recognized to benefit from savoring belief, can be further enhanced by nurturing the meaning of life and resilience. Individuals with high resilience were found to withstand significant life stress, recover swiftly during hardships, and reduce the risks of mental illnesses [51,76]. Resilience, a skill that can be learned, can be strengthened by positive emotions such as interest, joy, satisfaction, and love [49,55]. Additionally, a strong sense of life's meaning correlated with lower suicidal tendencies and a more optimistic view of life [77]. As students recognize the value of life's meaning through achievements in overcoming challenges, fostering a positive outlook can enhance happiness and build resilience against adversity. This aligns with findings that resilience and positive affect, supported by teacher and peer encouragement, indirectly improve perceived academic performance, underscoring the role of emotional regulation, and resilience as protective factors during stressful periods [13].

Secondly, educational institutions play an essential role in stress management for students. University counselors can guide students to recall and cherish pleasant experiences, thereby enhancing savoring belief and mental health. Schools might organize activities to develop mental strength, teach students how to strengthen resilience, discover the meaning of life, and improve overall mental wellness. Emphasizing positive psychology enables students to enhance their happiness, psychological resilience, and relationships.

Finally, parental involvement in monitoring university students' mental health, promoting positivity in adversity, and closely collaborating with schools is crucial in fostering students' mental happiness. Educational authorities, schools, families, and community organizations should collaborate to provide diverse support, aiding university students in fully realizing their potential for an improved quality of life [14].

7. Limitations and Future Research Scopes

This research identified limitations. The sample was limited to Taiwanese university students. Future studies should expand to various age groups, educational systems, and cultures to enhance the findings' universality. Although current models and scales assessed some variables, they might need to fully capture students' psychological experiences, possibly affecting result validity. Future research should include qualitative methods to explore deeper motivations and psychological mechanisms. Employing a cross-sectional design may limit understanding of causal relationships [78]; longitudinal designs in future work could clarify these associations. This research focused on resilience and meaning in life as mediators. Including variables like dispositional mindfulness, personality traits, and positive psychological capital in future research could provide a more comprehensive analysis [79,80].

8. Conclusions

This research aimed to explore the relationship between savoring belief and happiness among university students and the sequential mediating roles of resilience and meaning in life in this relationship. The findings revealed that university students who exhibited a higher degree of savoring belief also displayed higher happiness. Resilience was found to significantly mediate between savoring belief and happiness. Furthermore, meaning in life also acted as a substantial mediator between savoring belief and happiness, further enhancing the positive impact of savoring belief on happiness. In the sequential mediation model, resilience and meaning in life demonstrated significant sequential mediating effects between savoring belief and happiness. This research highlighted the importance of savoring belief, resilience, and meaning in life to augment an individual's happiness. This research demonstrates that just as a thriving garden needs water, sunlight, and careful tending, our happiness grows when we improve our capacity to enjoy positive experiences, recover from setbacks, and discover profound meaning in our existence. We can greatly enhance our happiness by nurturing these attributes—appreciation of life's pleasures, resilience, and a deep sense of purpose. The results are especially significant for educators, underscoring the importance of cultivating these characteristics in students to foster increased happiness and satisfaction in their lives. Moreover, the research provided practical implications for the field of education, stressing the need to cultivate students' savoring belief, resilience, and the ability to find meaning in life, thereby improving their happiness. Future research should examine additional potential factors influencing happiness and evaluate the generalizability of the findings across different cultural contexts and age groups.

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Emotional and Social Outcomes of the Teaching Personal and Social Responsibility Model in Physical Education: A Systematic Review and Meta-Analysis

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Abstract: Context: In today's ever-changing world, fostering personal and social responsibility is essential for building strong and compassionate communities. This study aimed to provide a quantitative synthesis focusing on the emotional and social outcomes of Teaching Personal and Social Responsibility (TPSR) model-based Physical Education (PE) programs. Methods: A comprehensive literature review covering the period from November 2022 to September 2023 identified 637 articles published between 2005 and 2023. Of these, 20 met the inclusion criteria. Data from these articles were coded, and a comprehensive meta-analysis was conducted, incorporating 28 effect sizes. Methodological quality was assessed using the Medical Education Research Study Quality Instrument. Hedge's g served as the effect size measure and emotional and social outcomes subgroups were consolidated. Heterogeneity was evaluated with Cochran's Q and I^2 . Meta-regression and ANOVA-like models addressed categorical moderators, whereas publication bias was assessed through funnel plot, failsafe number, and Egger's linear regression. Results: A significant and positive effect of the TPSR model on product outcomes (Hedge's $g = 0.337$, 95% CI = 0.199 to 0.476) was found. Despite considerable heterogeneity ($I^2 = 83.830$), a random effects model was justified. Assessment of publication bias indicated a low likelihood. Moderator analyses revealed that publication countries significantly influenced the effect, with stronger effects in Turkey. Publication type (article vs. thesis) also played roles in moderation. The meta-regression analyses did not reveal significant effects for the grade level, duration of intervention, publication year or sample size on the TPSR model's impact on product outcomes. The TPSR model positively impacts emotional and social outcomes in PE, enhancing children's skills and behaviour. However, variations across cultures highlight the need for further research, considering limitations like language constraints and potential biases in study selection and data extraction.

Keywords: meta-analysis; teaching personal and social responsibility; physical education; product outcomes

1. Introduction

The Teaching Personal and Social Responsibility (TPSR) model was initially developed to leverage physical activity in order to promote the acquisition of meaningful, fundamental and transferable life skills, norms, values, character and responsibility, particularly among

disadvantaged or underprivileged children [1]. The TPSR model is rooted in two unwavering convictions: “putting kids first” ([2], p. 36) and “helping kids become better people” ([1], p. 18). The general objective of the TPSR model is to cultivate the personal, social and emotional well-being of children (e.g., a systematic literature review by Shen et al. [3]), enhancing their capacity for excellence and strengths within a prospective approach [4–7]. Moreover, the TPSR model stands out in physical education (PE) by promoting children’s holistic development. It fosters personal and social skills, cultivates positive character traits, boosts self-efficacy and confidence, reduces behavioural problems, and prepares children for lifelong physical activity. This structured approach, emphasizing responsibility and personal growth, makes TPSR a valuable framework for educators to create impactful and meaningful PE experiences [3,6].

The TPSR model, implemented within the structured and intentional context of PE and other related programs, has consistently evolved through ongoing revision and refinement [1,8,9]. In 1985, Hellison [8] interiorised the term “Taking Personal and Social Responsibility” to accentuate the program’s avoidance of a rigid set of actions. Nevertheless, in 2003, he transitioned to the term “Responsibility Model,” a modification attributed to its pervasive acknowledgement among teachers, educators, and youth workers [9]. Eventually, the “Personal and Social Responsibility” approach [1] has gained broad acceptance, buttressed by numerous scholarly works, often resulting in assorted positive outcomes (e.g., behavioural, social, emotional and academic development; [3]) among children in in-school [10] and out-of-school [11] settings.

Featuring a flexible instructional structure, TPSR model-based programs are organised into five pivotal and hierarchical levels: (1) respect for the rights and feelings of others; (2) self-motivation; (3) self-direction; (4) caring and (5) transfer “outside the gym” [1]. The initial four tiers delineate the fundamental tenets of the PE programs grounded in the TPSR model, encompassing a robust stakeholder–student rapport, the empowerment of students, the fusion of accountability and the facilitation of the transference of accountability [9]. Hellison ([9], p. 34) articulated the fifth level (transfer) as “the application of the four other levels to outside the program—on the playground, at school and home and on the street”. He remarked it as “the original impetus for developing TPSR” ([1], p. 21). Understanding how to effectively and consistently facilitate the five levels of responsibilities is crucial to the success of TPSR model-based programs. Furthermore, the effectiveness of a TPSR model-based program, as per the logic model of Izzo et al. [12], relies on the progressive achievement of immediate, intermediate and ultimate program outcomes. For instance, highlighting social and emotional outcomes, acknowledged as vital components in TPSR model-based programs, designates them as intermediate outcomes [3]. Moreover, fostering program–family collectivism [13,14] and taking into account socio-cultural factors may influence TPSR programming and its transfer, especially within the context of mainstream school system support and cultural norms and values [15]. Additionally, establishing a physically and emotionally safe environment could prevent traumatic experiences and enhance children’s sense of belonging to the programs. This is crucial for the success of their process elements [16].

Except for a reduced number of studies (e.g., Richards et al. [17]) proposing the combination of the TPSR model with the skill themes approach, most TPSR studies have been grounded in the self-determination theory. This asserts that motivation serves as a pivotal mechanism in fulfilling and empowering specific psychological needs, namely competence, autonomy and relatedness [18,19], mainly addressed in National PE Standard 5 [9,20]. Competence encompasses the sense of mastery and efficacy. Autonomy entails engaging in behaviours with a complete sense of initiative, ownership and volition, whereas relatedness involves a profound sense of belonging with others in a meaningful manner [21,22]. Within the TPSR model-based programs, children can experience autonomy and responsibility in decision making [23]. These enriching experiences typically unfold within small, voluntary, out-of-school or community-based settings, where children, despite confronting challenges and self-doubt, actively engage and participate [1].

At the forefront, TPSR model-based programs emphasise both procedural elements and the resulting product outcomes to foster optimal child development [24]. Assessing these two dimensions assists stakeholders, including educators, program leaders, parents and youth workers, in acquiring a comprehensive understanding of ongoing experiences [4] and offers profound insights into specific process elements that contribute to the product outcomes [3,7].

In this regard, there have been notable systematic literature review critiques on the TPSR model-based programs and practices assessing process elements (e.g., program duration, contextual framework and extensive range of population and culture) in in-school settings [10], out-of-school settings [11] and the global geographical distribution and representation [25]. Whereas these descriptive evaluations offer valuable insights, it is noteworthy that only one systematic literature review has specifically addressed the product outcomes in TPSR model-based programs, revealing four emerging themes: positive behavioural changes, improved inter-personal skills, enhanced emotional processes and improved academic performance [3].

Whereas the existing systematic literature reviews contribute to comprehending TPSR model-based programs, they have yet to closely examine their process elements or product outcomes, opting for a meta-analysis approach. Furthermore, the TPSR model-based programs prioritise social and emotional development as crucial intermediate outcomes [3]. Based on this, the primary purpose of this study is to make a quantitative synthesis examining the emotional and social outcomes of programs based on the TPSR model in the field of PE. The secondary aim of the study is to identify potential moderators such as publication country, grade level, publication type, intervention duration (weeks), publication year, and sample size, to investigate how these contextual factors affect the effectiveness of TPSR programs. Examining and understanding these moderators is critical to explaining how program outcomes may vary across specific contexts. To this end, this study formulated two broad research questions: (1) what is the impact of TPSR model-based programs on emotional and social outcomes? and (2) what study characteristics moderate the effects outlined in research question 1?

2. Materials and Methods

2.1. Protocol

A systematic review, including a meta-analysis, was run following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis) guideline [26].

2.2. Eligibility Criteria

The PICOS (Population, Intervention, Comparison, Outcomes, Study design) as a framework to formulate eligibility criteria was utilised. This approach ensured that our inclusion and exclusion criteria were well-defined and rigorous, allowing us to select publications that were most relevant to our research (see Table 1; [27]).

Table 1. PICOS strategy for the inclusion and exclusion criteria.

Category	Inclusion Criteria	Exclusion Criteria
Population	School-aged children and youth of both sexes aged between 6 and 18.	Children under 6 and young adults or adults aged 19 and above (e.g., Scanlon et al., 2022 [28]).
Intervention	Product outcomes, particularly within the social and emotional domains, TPSR model-based programs.	Product outcomes, encompassing behavioural changes, academic performance and physical and psychomotor domains within TPSR model-based programs. Intervention impact and results relevant to the analyses of process outcomes within TPSR model-based programs. (e.g., Javier Sánchez-Alcaraz Martínez et al., 2014 [29]).

Table 1. *Cont.*

Category	Inclusion Criteria	Exclusion Criteria
Comparison	Studies involving a minimum of two groups, consisting of either one experimental and one control group or two experimental groups.	Absence of a minimum of two groups, either one experimental and one control group or two experimental groups (e.g., Martinek and Lee, 2012 [30]).
Outcomes	Studies that reported sufficient statistical information required for conducting calculations, including essential parameters such as sample size, mean, standard deviation, t-value, p-value for the experimental and control groups.	Studies that did not report sufficient product outcome parameters and for which it was not possible to obtain such data after contacting their authors (e.g., Beale, 2016 [31]).
Study design	Randomized and non-randomized controlled studies.	Cross-sectional studies. Interventions published in sources classified as grey literature, such as reports, conference proceedings not subjected to peer review or publications not issued by commercial publishers (e.g., Hellison, 2011 [1]).

2.3. Information Sources

Studies included published articles and theses written in English and Turkish. The collected studies in Turkish were sourced from ULAKBILM (Turkish Academic Network and Information Centre) and YÖK (Turkish Higher Education Council) Doctoral and Master Theses Database. The collected studies in English were sourced from ERIC, Google Scholar, Grey Literature, Psych ARTICLES, Psych INFO, ProQuest Dissertations and Theses database, Sport DISCUS and Web of Science.

2.4. Search

The time period for conducting literature review spans from November 2022 to September 2023. The search keywords combination for the TPSR were twofold: responsibility model (personal and social responsibility, responsibility model, teaching personal and social responsibility, personal and social responsibility program) and physical education (school, in-school, physical education, primary/primary-secondary/secondary/high school). The initial search yielded a total of 721 articles.

2.5. Study Selection

This systematic review and meta-analysis encompass studies that investigated the effect of TPSR model-based programs on students' product outcomes, focusing on social and emotional processes. As the TPSR model was finalized in the early 2000s and subsequently gained widespread use, the database search period was restricted to the years 2005–2023. The data of the included publications were selected by the initial author and recorded in a standardised format. In cases of discrepancies in decisions regarding study selection, consultation with the second author was sought for resolution. After carefully examining the relevant literature's title, abstract and full text, redundant publications lacking precise data were removed. Ultimately, 17 (1 in Turkish) articles and 2 Turkish theses meeting the specified criteria were selected, yielding 28 effect sizes (Figure 1).

Following the screening process, the collected publications underwent feature coding to capture various elements, including author (year), publication country (US, Serbia, Spain, Taiwan, Turkey), grade levels (encompassing primary school, secondary school, primary-secondary school and high school), publication type (article and thesis), duration of the TPSR model-based programs intervention measured in weeks, study year and sample size. Additional details can be seen in Table 2. The inter-coder reliability index for Cohen's Kappa was computed as 0.88 [32–34], demonstrating substantial agreement. Additionally, the inter-coder reliability index based on the approach proposed by Miles and Huberman [35] was determined to be 0.96, indicating excellent agreement between the coders.

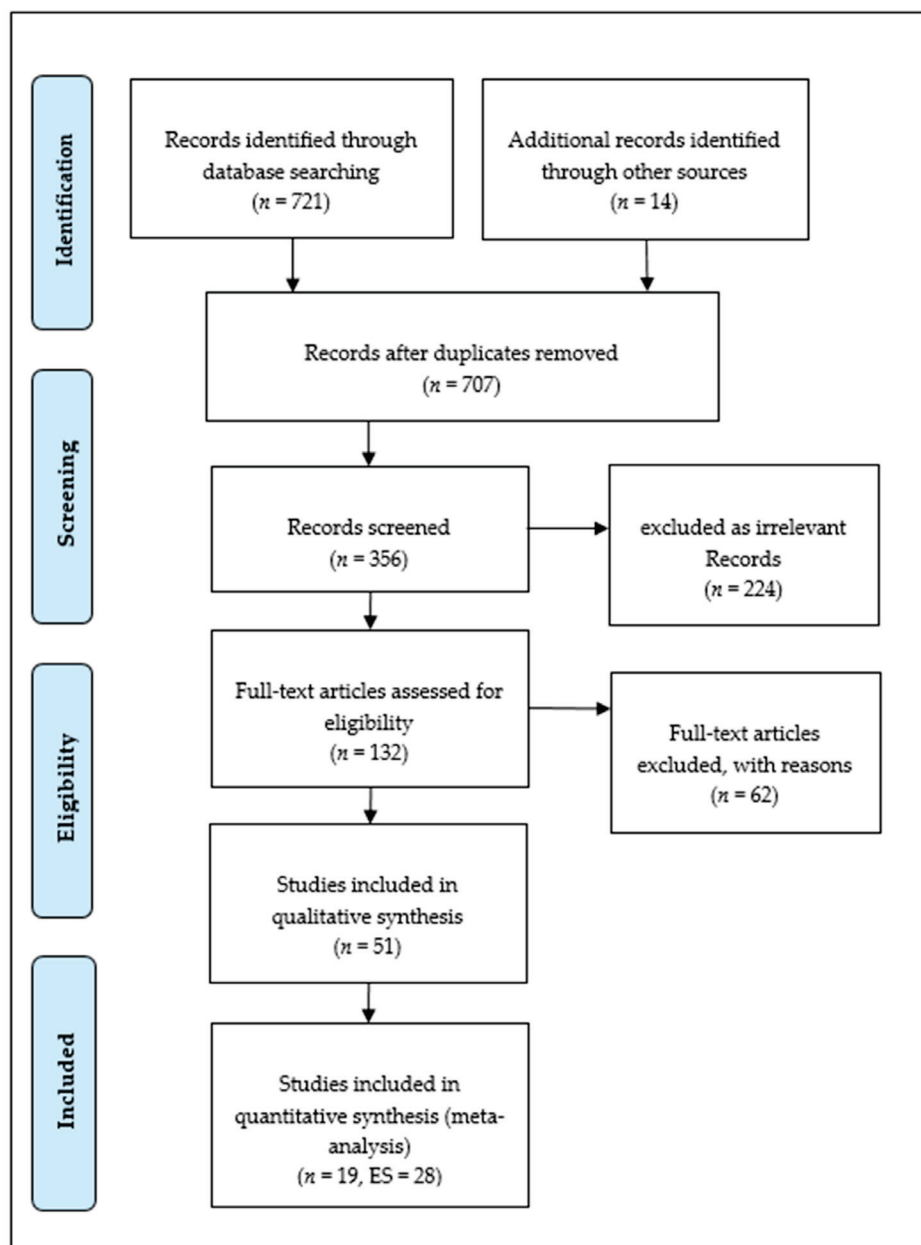


Figure 1. Study flow diagram utilizing PRISMA.

Table 2. Characteristics of the 19 studies included in the meta-analysis.

Author	Hedges's g	Publication Country ^a	Grade ^b	Publication Type ^c	Study Design ^d	Duration of Intervention (Week)	Study Year	Sample Size	Q
Arikan (2020) * [36]	60	4	1	1	1	16	2020	82	14
Balderson and Martin (2011) ** [37]	30	5	4	1	2	2	2011	74	10
Buišić and Đorđić (2018) * [38]	0.37	1	2	1	1	8	2018	45	11.5
Buišić and Đorđić (2018) ** [38]	−0.19	1	2	1	1	8	2018	45	11.5
Carreres-Ponsoda. et al. (2021) * [39]	0.24	2	1	1	1	28	2022	17	11.5
Carreres-Ponsoda. et al. (2021) ** [39]	0.72	2	1	1	1	28	2022	17	11.5
Cecchini et al. (2007) * [40]	0.23	2	4	1	1	8	2007	63	13.5
Cecchini et al. (2007) ** [40]	1.09	2	4	1	1	8	2007	63	13.5
Escarti et al. (2010) * [41]	0.03	2	2	1	2	34	2010	21	11.5
Filiz (2016) ** [42]	0.70	4	1	2	2	8	2016	28	11
García-García et al. (2020) * [43]	−0.02	2	2	1	2	20	2020	26	12
García-García et al. (2020) ** [43]	−0.08	2	2	1	2	20	2020	26	12

Table 2. Cont.

Author	Hedges's g	Publication Country ^a	Grade ^b	Publication Type ^c	Study Design ^d	Duration of Intervention (Week)	Study Year	Sample Size	Q
Hsu et al. (2022) ** [44]	0.19	3	4	1	2	18	2022	50	12.5
Jacobs et al. (2022) ** [45]	0.09	5	4	1	2	4	2019	120	11
Manzano-Sánchez and Gómez-López (2023) * [46]	0.17	2	3	1	2	20	2023	216	13
Manzano-Sánchez and Gómez-López (2023) ** [46]	0.46	2	3	1	2	20	2023	216	13
Manzano-Sánchez and Valero-Valenzuela (2019) * [47]	0.09	2	3	1	2	28	2019	227	13
Manzano-Sánchez and Valero-Valenzuela (2019) ** [47]	0.03	2	3	1	2	28	2019	227	13
Manzano-Sánchez et al. (2021) * [48]	0.17	2	4	1	2	32	2021	100	13
Manzano-Sánchez et al. (2021) ** [48]	0.34	2	4	1	2	32	2021	100	13
Manzano-Sánchez (2023) ** [49]	0.44	2	4	1	2	24	2023	205	12
Merino-Barrero et al. (2019) ** [50]	0.89	2	3	1	1	20	2019	35	12.5
Merino-Barrero et al. (2019) * [50]	0.88	2	3	1	1	20	2019	35	12.5
Muslu (2021) * [51]	0.89	4	2	2	2	12	2021	73	11.5
Sanchez-Alcaraz Martínez et al. (2018) ** [52]	0.15	2	3	1	1	12	2018	714	14
Sanchez-Alcaraz Martínez et al. (2019) ** [53]	0.23	2	3	1	1	16	2019	20	13
Simonton and Shiver (2021) * [54]	0.09	5	2	1	2	36	2021	135	15.5
Valero-Valenzuela (2019) * [55]	0.29	2	2	1	2	8	2019	60	15

^a I = Serbia, 2 = Spain, 3 = Taiwan, 4 = Turkey, 5 = USA; ^b I = high school, 2 = primary school, 3 = primary-secondary school, 4 = secondary school; ^c I = article, 2 = thesis; ^d I = RCT, 2 = semi-RCT. * = emotional outcomes. ** = social outcomes.

2.6. Data Collection Process

Regarding the data collection process from the selected studies, various parameters, including sample size, mean, standard deviation, t-value, *p*-value and additional pertinent metrics, were recorded both prior to and after the implementation of the TPSR model based programs (pre- and post-test). This information was obtained directly from the texts provided in the studies. The authors were contacted to request the related information in those studies where the data were unavailable. When the authors did not respond, descriptive data were obtained using the GetData Graph Digitizer (version 2.24) and Plot Digitizer programs (version 2.4). When the information was flagged or incomplete, it was not included in the meta-analysis.

2.7. Data Items

The variables analysed in the meta-analysis of the present study were emotional and social outcomes resulting from TPSR model-based programs. Combining two or more reported subgroups into a unified group can be beneficial in certain situations. This is particularly necessary when a study presents separate sample sizes, means and standard deviations for distinct subgroups, such as men and women. Pooling this information facilitates the calculation of a single sample size, mean and standard deviation for each intervention group. We applied the Cochrane data combination formula [56] to amalgamate data from all included studies. Subsequently, scores for emotional outcomes (e.g., self-esteem, goal setting, decision-making, sense of trust, understanding of fair play assistance, loyalty, awareness of empathy) and social outcomes (e.g., meeting people, making friends, communication, prosocial behaviour, respect and competence), as defined by the TPSR model, were aggregated into subgroups.

2.8. Study Risk of Bias Assessment

The publication bias assessment involved utilising a funnel plot, the failsafe number (Nfs) method by Khoury et al. [57] and linear regression, as outlined by Egger et al. [58]. A low risk of publication bias is suggested when the following conditions are met: (1) effect

sizes are primarily within the funnel and exhibit symmetry along its axis, (2) the failsafe number (Nfs) is below $5k + 10$ (where k represents the number of original studies), and (3) Egger's linear regression intercept is both non-significant and proximate to zero.

2.9. Additional Analyses

The meta-analysis was conducted using the Comprehensive Meta-analysis (CMA 3.3) software developed by Borenstein et al. [59].

2.9.1. Study Quality Assessment

The methodological quality of all included studies was assessed utilizing the widely recognized Medical Education Research Study Quality Instrument (MERSQI) [60]. The MERSQI assesses the methodological rigor of a study by examining 10 items categorized into six dimensions: study design, sampling, data collection, assessment instrument validity, data analyses and outcomes. In alignment with the PE context, the MERSQI tool underwent slight modifications, explicitly excluding the assessment of potential/healthcare outcomes. This adjustment resulted in a revised maximum score of 17, whereas the original scoring range for study quality typically spans from 5 to 18. The overall methodological quality score for each study is displayed in Table 2.

2.9.2. Effect Size Computation

Hedge's g served as the chosen effect size measure [61], computed based on sample sizes (n_C , n_E), means (M_C , M_E) and standard deviations (SD_C , SD_E) extracted from the pre- and post-tests of the experimental groups. The eligible studies ($n = 12$) in this systematic review included randomised controlled trials (RCT; $n = 11$) or semi-RCT designs ($n = 17$).

2.9.3. Heterogeneity Test

The heterogeneity of effect sizes was assessed through Cochran's Q statistic and corresponding I^2 value. When I^2 is equal to or greater than 75, significant heterogeneity is observed in the studies, indicating the suitability of a random effects model over a fixed effects model. This circumstance also underscores the need to evaluate potential moderators [62]. Disparities in populations and measures across studies could impact the effect size, further justifying the adoption of a random effects model and the assessment of potential moderators.

Moreover, models akin to ANOVA can be computed using a categorical moderator variable [63]. The emphasis lies in comparing group mean effect sizes for two categories (e.g., publication type) or three or more categories (e.g., grade and country). In the presence of significant heterogeneity, a commonly employed practice in meta-analysis is applying a meta-regression model to clarify the heterogeneity by including study-level covariates [64,65]. Within this framework, meta-regression analyses were conducted with three continuous variables: duration of intervention (weeks), publication year and sample size.

3. Results

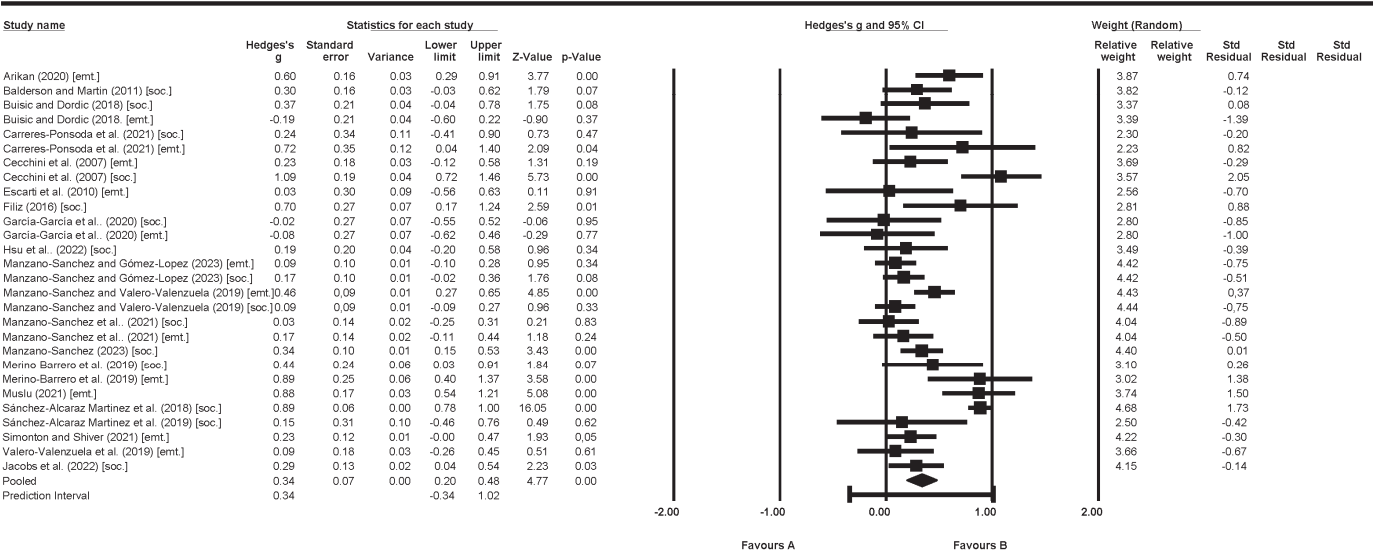
3.1. Summary of Data Description

The literature review identified 19 convenient studies encompassing 3040 students, with individual study participant ranges varying from 17 to 714. Within these studies, 28 independent effect sizes were extracted, as detailed in Table 2 and graphically represented in Figure 2.

3.2. Effect Size and the Homogeneity Test

The meta-analysis of the 28 independent effect sizes produced an overall Hedge's g of 0.337 (95% CI = 0.199 to 0.476; $z = 4.775$, $p < 0.000$), revealing a significant and positive effect of the TPSR model on product outcomes. The Cochran's Q value of 166.981 was statistically significant ($p < 0.000$, $I^2 = 83.830$), indicating considerable heterogeneity among effect sizes across the studies and advocating for the application of a random effects model.

Meta Analysis



Meta Analysis

Figure 2. Forest plot for the random effects model [36–55,59].

3.3. Assessment of Publication Bias

The collective analyses of the funnel plot, Nfs, Begg and Mazumdar rank correlation, and Egger's regression consistently indicate a low likelihood of publication bias. Notably, the funnel plot revealed that the distribution of the 28 effects was predominantly within the expected range and symmetrically positioned around its axis, as illustrated in Figure 3. An Nfs value of 1060 significantly surpassed the failsafe criteria of 150 (calculated as $(5 \times 28) + 10$). The rank correlation test reported a Kendall's tau of 0.13 with a non-significant 2-tailed p -value of 0.31. Moreover, the Egger's regression intercept registered at 1.71, with a non-significant two-tailed p -value of 0.09.

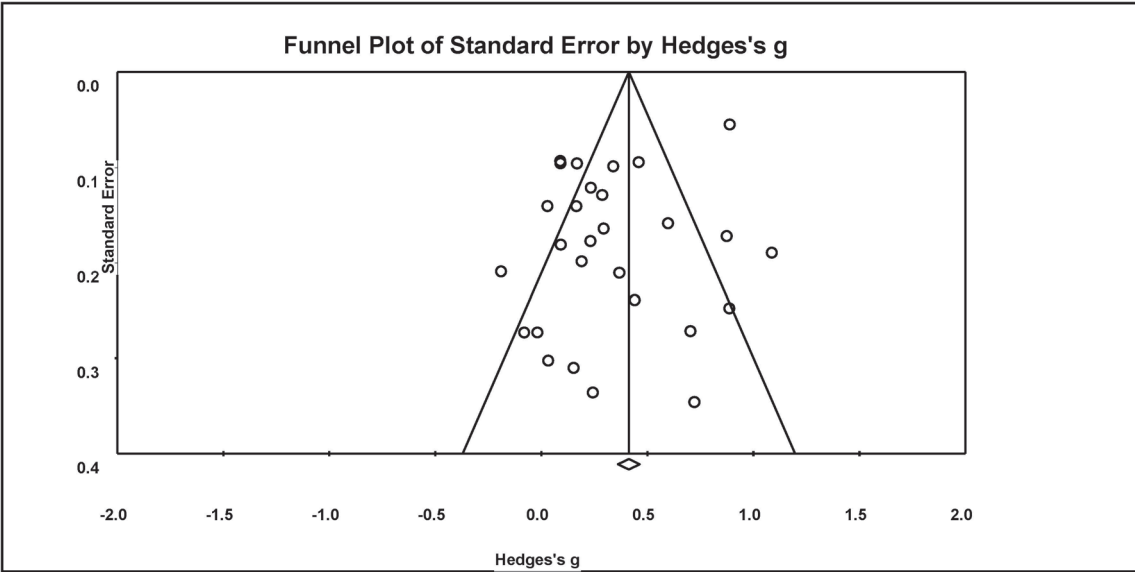


Figure 3. Funnel plot of effect sizes of the betas between TPSR model and product outcomes.

3.4. Moderator Analyses

Due to the significant heterogeneity observed in the effect sizes (see Table 3), we conducted tests for potential moderators, including product outcomes (social and emotional processes), publication country, grade, publication type, duration of intervention (week), publication year and sample size (outlined in Table 4).

Table 3. Random-model of the effect of TPSR model on product outcomes.

k	Mean g Effect size	95% CI for ES	Homogeneity Test			Tau-Squared			Test of Null (Two Tailed)	
			Q(g)	p	I ²	Tau ²	SE	Tau	z	p
28	0.337	0.199 ... 0.476	166.981	0.000	83.830	0.104	0.071	0.322	4.775	0.000

Table 4. TPSR model and product outcomes: univariate analyses of variance for moderator variables (categorical variables).

	Between-Group Effect (Q_{BET})	k	N	Mean g Effect Size	SE	95% CI for ES	Homogeneity Test within Each Group (QW)	I ²
Publication country	0.323 *							
Serbia		2		0.091	0.281	(−0.461, 0.642)	3.523	71.616
Spain		19		0.323	0.093	(0.140, 0.506)	143.541 ***	87.460
Taiwan		1		0.191	0.200	(−0.200, 0.586)	0.000	0.000
Turkey		3		0.727	0.108	(0.515, 0.939)	1.397	0.000
USA		3		0.269	0.078	(0.115, 0.422)	0.129	0.000
Grade	0.323 *							
High school		4		0.596	0.121	(0.360, 0.832)	1.360	0.000
Primary School		8		0.195	0.128	(−0.055, 0.445)	21.448 **	67.363
Primary-secondary school		8		0.397	0.151	(0.101, 0.692)	102.184 ***	93.150
Secondary school		8		0.318	0.095	(0.132, 0.504)	22.431 **	68.793
Publication Type	0.411 *							
Article		26		0.307	0.073	(0.164, 0.450)	157.939 ***	84.171
Thesis		2		0.833	0.147	(0.545, 1.121)	0.258	0.000

Index; *** = $p < 0.001$; ** = $p < 0.01$; * = $p < 0.05$.

3.4.1. Publication Country

Publication country moderated the effect of the TPSR model on product outcomes ($Q_{BET} = 14.603$, $df = 4$, $p < 0.05$; see Table 4). This effect was stronger among publications in Turkey ($g = 0.727$, 95% CI = 0.515 ... 0.939) than in Spain ($g = 0.323$, 95% CI = 0.140 ... 0.506) Serbia ($g = 0.091$, 95% CI = −0.461 ... 0.642), Taiwan ($g = 0.193$, 95% CI = −0.200 ... 0.586) and USA ($g = 0.269$, 95% CI = 0.115 ... 0.422).

3.4.2. Grade

The effect sizes did not differ significantly among grade levels ($Q_{BET} = 0.728$, $df = 3$, $p > 0.05$; see Table 4). Therefore, grade level did not moderate the effect of the TPSR model on product outcomes.

3.4.3. Publication Type

Publication type (article vs. thesis) moderated the effect of the TPSR model on product outcomes ($Q_{BET} = 10.299$, $df = 1$, $p < 0.05$; see Table 4). This effect was stronger among

students in theses ($g = 0.833$, 95% CI = 0.545 ... 1.121) than in articles ($g = 0.307$, 95% CI = 0.164 ... 0.450).

3.4.4. Duration of Intervention (Week)

Meta-regression of g onto duration of the intervention (week) did not show significant effects of the TPSR model on product outcomes ($Q_{Model} (1, k = 28) = 1.66$, $p > 0.05$; see Table 5).

Table 5. Univariate regression analyses of continuous variables (random effect model).

	Parameter	Estimate	SE	Z-Value	95% CI for B
Duration of intervention (week)	β_0	−0.0088	0.0068	−1.29	(−0.0222, 0.0046)
	β_1	0.5026	0.1424	3.53	(0.2234, 0.7818)
$Q_{Model} (1, k = 28) = p > 0.05$					
Publication year	β_0	−0.0174	0.0158	−1.10	(−0.0484, 0.0136)
	β_1	35.4744	31.9624	1.11	(−27.1708, 98.1195)
$Q_{Model} (1, k = 28) = p > 0.05$					
Sample size	β_0	0.0006	0.0004	1.67	(−0.0001, 0.0013)
	β_1	0.2565	0.0760	3.38	(0.1075, 0.4054)
$Q_{Model} (1, k = 28) = p > 0.05$					

3.4.5. Publication Year

Meta-regression of g onto publication year did not show significant effects of the TPSR model on product outcomes ($Q_{Model} (1, k = 28) = 1.21$, $p > 0.05$; see Table 5).

3.4.6. Sample Size

Meta-regression of g onto sample size did not show significant effects of the TPSR model on product outcomes ($Q_{Model} (1, k = 28) = 2.79$, $p > 0.05$; see Table 5).

4. Discussion

This meta-analysis and systematic review of 19 studies of 3040 participants and 28 effect sizes showed an overall TPSR model effect of 0.337 on emotional and social outcomes, which supports the efficacy of the TPSR model in the context of PE learning. Furthermore, publication country and publication type moderated the effect of the TPSR model on product outcomes, contributing to a comprehension of non-significant or even adverse effects.

4.1. The Teaching Personal and Social Responsibility Model and Product Outcomes

The TPSR model effect size of 0.337 on product outcomes is evident in the literature's initial and ultimate stages of the meta-analysis result. This avant garde finding is consistent with the product outcomes of the TPSR model-based programs, which encompass social and emotional outcomes [3,10]. Shen et al. ([3], p. 101), aptly describe these outcomes as 'labelled as intermediate outcomes' of the TPSR model. Therefore, the TPSR model-based programs demonstrate notable efficacy in augmenting PE learning. This fosters the utilization and development of the TPSR model for teachers, educators, youth and youth workers, ultimately enhancing their effectiveness. Regardless, the preliminary effect size indicates that dedicating resources to the design and implementation of TPSR model-based programs could enhance students' emotional and social outcomes.

TPSR model-based programs empower children to comprehend and manage their emotions through meaningful interactions with peers and adults [3,66,67]. This, in turn, assists them in advancing their abilities to recognise, express, regulate and navigate emotions, especially within the collaborative context of PA [3,10,68]. The instructional framework offered by TPSR model-based programs serves as a crucial catalyst in the development of relationships, giving rise to personalised feedback, criteria-based self-control, self-esteem, self-confidence [3], delayed gratification [40,69], and an elevated sense of empathy and

concern for children [70]. In a 16-week study conducted in Turkey with 162 students, Arikan (2020) [36], reported a noteworthy impact of the TPSR model-based programs on the advancement of children's emotional intelligence levels. In a qualitative research investigation utilising the TPSR model in a PE program with 36 high school students, Aksoy and Gürsel (2017) [71] identified an enhanced sense of trust, support and loyalty, fostering students' heightened awareness of empathy and a deeper understanding of fair play within a framework of game-based physical activity. While Pope (2005) ([71], p. 273) acknowledges the challenge of observing and measuring the effect of TPSR model-based programs, noting that "it has come to mean so many things", these studies provide compelling evidence that children involved in TPSR model-based programs demonstrated significant advancements in the critical emotional domain [3].

In addition to emotional outcomes, the social outcome in TPSR model-based programs can be designated as an intermediate outcome. The literature confirmed that the three levels of responsibilities (i.e., cooperation, assisting others and leadership) are intricately linked to social skills development [1]. TPSR model-based programs also create an environment for children to navigate and gain insights into their emotions through social interactions with peers and adults [3]. Previous studies focusing on personal and social responsibility in the classroom have proposed that improvements in indicators such as enjoyment and sportsmanship are attainable [40,69]. In Balderson and Sharpe's study [72], conducted with fourth- and fifth-grade students from four elementary classes in an inner-city charter-school setting, it was reported that both the personal accountability and personal responsibility treatments were effective in the primary treatment setting, leading to positive changes in all managerial, off-task and positive social measures. Opstoel et al. [73], in a literature review, revealed that 54 studies discuss prosocial behavior, including aspects such as respect, empathy and sympathy, as outcomes of PA. In the same literature review, authors also found that interacting with others and forming meaningful relationships were articulated in 27 individual studies. Furthermore, Carreres-Ponsoda et al. [39] proposed that the TPSR model-based programs effectively improve personal and social responsibility and prosocial behaviour in youth soccer players compared to conventional sports teaching methods.

4.2. Publication Type and Country

Publication type (article vs. thesis) and publication country (Turkish) played roles in moderation. The effect size of TPSR on emotional and social outcomes was much larger for students in the Turkish thesis than for students in all individual articles, regardless of country. Gordon and Beaudoin [25], who investigated the global adoption of TPSR across 31 countries, noted a significant diversity in the methods, locations and target audiences for program delivery. They assert that implementing TPSR in various countries poses challenges in maintaining fidelity to the model. Addressing these challenges necessitates continuous research, high-quality professional development and the establishment of communities of practice. Cultural and contextual factors specific to Turkey might influence how the TPSR is applied and how it transfers to product outcomes. This could explain the larger effect size observed in Turkish theses. This result implies the need to prioritise an in-depth exploration of the TPSR model-based programs across different geographical locations.

5. Limitations and Future Research Directions

Despite adhering to the PRISMA guideline, utilizing the PICOS framework, MERSQL, and reliability tests for formulating eligibility criteria, subjective judgments may still be involved in deciding which studies to include or exclude. The inclusion criteria restricted articles and theses to those written exclusively in English and Turkish, potentially introducing language bias and excluding relevant studies published in other languages. This limitation may impact the comprehensiveness and generalizability of the findings. We recommend that future meta-analyses incorporate studies in languages beyond Turkish and English to provide a more comprehensive and holistic understanding of the TPSR model-based programs in PE. While we utilized various databases to source studies, there

might still be a bias towards databases that are more accessible or familiar to us. This bias could result in the omission of studies from less well known or specialized databases, potentially leading to a skewed representation of the literature. Furthermore, while a second author was consulted to resolve discrepancies in study selection and data extraction, the criteria for resolving conflicts may not be fully transparent or standardized, potentially allowing for subjective judgment.

Given the limited geographical scope of TPSR model-based studies, further research in diverse countries is crucial. This would enable the exploration of other potentially influential country-level attributes, such as cultural values, economic systems and political structures. However, the need for more scientific rigor can pose a significant limitation when exploring products associated with the TPSR model. Based on the meta-analysis, two key product outcomes that facilitate the success of TPSR model-based programs were identified, i.e., emotional and social outcomes. Future meta-analysis studies can further distinguish the impact of the TPSR model-based programs on children's other product outcomes, including behavioral changes, academic performance and physical and psychomotor development. Lastly, the intended focus of our meta-analysis did not center on the process outcomes of the TPSR model. The meta-analysis recommends future TPSR model-based meta-analysis focusing on examining process outcomes that contribute to the success of TPSR model-based programs, such as learning environment, leadership and transfer.

6. Conclusions

The TPSR model emerges as a promising framework for fostering positive emotional and social development in children through PE programs. The observed enhancements in emotional intelligence, social skills, self-esteem, empathy, and prosocial behavior highlight the model's effectiveness in addressing a crucial aspect of holistic child development. Furthermore, the study underscores the potential influence of contextual factors on program outcomes. The variation based on publication country and type suggests that TPSR's effectiveness might be contingent on cultural norms and program delivery methods. This necessitates further research exploring how cultural adaptation and tailoring of TPSR interventions can optimize their impact across diverse settings. Looking forward, this study emphasizes the need for broader dissemination and implementation of TPSR model-based programs. By incorporating TPSR into PE curriculums across various settings, researchers can gain a deeper understanding of how the model's impact varies based on specific contexts. Additionally, investigating both product outcomes (e.g., emotional and social changes) and process outcomes (e.g., intervention fidelity, teacher training effectiveness) will provide a more comprehensive picture of TPSR's overall efficacy. In conclusion, the TPSR model presents a valuable tool for educators and program developers seeking to enhance the emotional and social well-being of children through PE. By acknowledging the influence of context and addressing the limitations of this study, future research can pave the way for optimized TPSR interventions that effectively promote holistic child development in diverse educational settings.

7. Practical Applications

Educational institutions and youth organizations can implement TPSR model-based programs to enhance children's emotional and social development within PE curricula. These programs provide a structured framework for promoting personal and social responsibility, fostering positive relationships, and cultivating important life skills among children. Professional development opportunities focusing on TPSR implementation can be offered to PE teachers and youth workers, emphasizing core principles and effective integration strategies. Cultural adaptation is essential when implementing TPSR model-based programs in diverse settings to ensure relevance and impact. Continued research and evaluation are needed to understand the effects of TPSR programs on various outcomes, while community collaboration strengthens implementation and sustainability. Advo-

cacy for policy support can enhance the systemic impact of TPSR model-based initiatives, promoting personal and social responsibility among children and youth through PE and related efforts.

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Article

Quasi-Seniors' Perception, Response, and Planning from the Perspective of Successful Aging

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Abstract: With the coming of a rapidly aging society, individuals born in the baby boom era after World War II are now facing the challenges of aging. From late middle age to successful aging, what are the perceptions and responses of these quasi-seniors? With this in mind, referring to Phelan's successful aging scale, the researchers developed the 4P Strategies (Physical, Psychological, Prospect, and Place and Relationships) tailored for quasi-seniors. Based on grounded theory, the results of 12 sessions of focused interviews (involving a total of 93 interviewees between the ages of 55 and 75; 41 males and 52 females; 48 not retired and 45 retired) were matched with the 4P Strategies. The results were the following: (1) regarding the Physical factor, the interviewees were shocked by their physical decline, and they had begun to devise strategies for health preservation and exercise; (2) regarding the Psychological factor, in order to mentally adapt, the interviewees agreed that moderate stress relief was absolutely necessary; (3) regarding the Prospect factor: the interviewees felt that one should make financial plans early, contemplate the value of life, and more actively learn and realize one's dreams; and (4) regarding the Place and Relationships factor, the interviewees aimed to rebuild their close relationships with their spouses, family members, and old friends and had polarized views regarding where to live in their old age. On the whole, the most discussed issue among the interviewees was where to live in their old age. Many had their own views and plans and did not stick to traditional views; however, they took the opinions of their significant others into account. During the interviews, interviewees wished to understand the responses of their peers to serve as a reference for their own decisions, and they realized that successful aging also required learning. This study aimed to encourage quasi-seniors about to enter their old age and help them to learn how to positively respond to aging as well as work towards a happy life with successful aging. This study could fill in gaps in research involving individuals in this age group and provide a reference for relevant policies.

Keywords: successful aging; quasi-seniors; adaptation theory of aging; aging-integrated

1. Introduction

The World Health Organization (WHO) has stated that individuals over the age of 65 are classified as seniors and that population aging is an indisputable fact, which presents a major challenge for every country around the world. The UN has even declared that the period 2021–2030 is the Decade of Healthy Ageing and has requested that the WHO take the lead in collective actions to reduce health inequality and improve the family and community life of seniors.

Old age can be divided into three stages; seniors between the ages of 65 and 74 are “young-old”, those between the ages of 75 and 84 are “old-old”, and those over the age of

85 are “older-old” [1]. The baby boomers, born between 1946 and 1964 after World War II (WWII), are one group of people that cannot be ignored, as they are already seniors or are about to become seniors. Statistics show that almost 76 million people were born in the US during that period, and although researchers disagree about which years the post-WWII baby boom in Taiwan spans, the population born around this period is still substantial, which includes late middle-aged and young-old people. Whether it is through their educational background, attitudes, preferences, or behaviors, these individuals exert a profound impact on the economy, the workplace, and the entire social system. In general, they have better educational backgrounds and enjoy better economic environments and living standards than their parents. Physically, they have not degenerated substantially; however, in response to the significant increase in their media literacy as a result of computers, communications, and consumer electronics, they prefer holistic healthcare; that is, in addition to physical health, they also pay attention to psychological, social, and spiritual aspects [2,3].

The most widely discussed topics in geriatrics are healthy aging, successful aging, productive aging, and active aging [4–6]. Among these, successful aging garners the most widespread acclaim, with the definition provided by Rowe and Kahn [7,8] being the most frequently referenced. Indeed, the term “aging” has long been equated with negative stereotypes such as illness, loneliness, disability, and care arrangements. Rowe and Kahn believed that successful aging has the following three key behaviors or characteristic abilities: (1) physiologically, avoiding disease and disability; (2) psychologically, maintaining high cognitive and physical function; and (3) socially, engaging actively in social life, which includes two primary elements, namely social relations and productive activities. The latter has three predicting factors, namely functional capacity, education, and self-efficacy. The intersection of behaviors in the physiological, psychological, and social aspects above is successful aging. Furthermore, there are also three theories on coping with aging, as follows: disengagement theory, activity theory, and continuity theory. The activity theory holds that seniors who can maintain social activities can better obtain a positive sense of self, social integration, and life satisfaction. Baltes and Baltes [9] asserted that, through the process of selection, optimization, and compensation, seniors maximize their gains with minimal losses in response to the impacts of aging.

In addition to the discourse by the aforementioned scholars, Phelan et al. [10], based on an elderly centered perspective, found that the definition of successful aging was of utmost importance to research in the field, from their viewpoint. In Phelan’s survey [11] of Japanese Americans and Caucasian individuals, she found that approximately six out of ten interviewees experienced changes in their views over the past twenty years. The Japanese Americans rated 13 items as a part of successful aging; in addition to the same 13 items, the Caucasians included another item—learning new things. Phelan concluded that, for seniors, the definition of successful aging is multidimensional and includes four major categories: physical health, functional health, psychological health, and social health.

Regarding the life course, Erikson [12] delineated human life into eight major stages. At 65 years old and onward is the “Integrity vs. Despair” stage. The development tasks and crises of this stage are self-pride (integrity) and despair. During this stage, individuals often look back on their lives, including what they have accomplished, what kind of person they are, and whether their lives have been meaningful. They are satisfied with their efforts and achievements, which leads to a sense of balance, wholeness, and integrity. At the same time, however, they face aging, disease, and the reality of the time that they have left, which leads to sorrow, despair, and regret. Nonetheless, Riley and Riley [1] proposed the concept of age integration, breaking the norms regarding the role that age plays in different stages of life. In the past, people tended to act in accordance with social norms. For instance, they received education during their adolescence, bore work and family responsibilities in their middle age, and enjoyed a leisurely retirement in their old age for granted. In the structure of today’s rapidly aging societies, this age-differentiated approach makes it difficult for seniors to adapt to their roles properly, thereby creating structural lag.

The increase in the average life expectancy of human beings, as assessed by Yang [13], has lengthened the period deemed middle age. She appealed for the Third Act, which was proposed by Dr. Edward Kelly. The Third Act refers to the third act of life, and “act” can also serve as a verb, implying that nothing will be gained if there are no actions during this part of life. The Third Act divides life into the following three phases: (1) dependence, the growth period in which individuals absorb and depend on the nutrition and nourishment provided by those around them in order to grow; (2) independence, the period during which individuals form their own families, build their own careers, and begin to create more possibilities on their own; and (3) inter-independence, the period during which individuals may require some assistance but still have the ability to give back to society, forming symbiotic and co-prosperous relationships with others and the environment.

An overview of existing geriatric research reveals a scarcity of studies on quasi-seniors born during the baby boomer period, despite the variation in seniors’ perspectives across different stages. In contrast to Lu’s approach [14], who used subjective/objective and end-state/process dimensions for categorizing theories on geriatric welfare and positive aging, this research refers to Phelan’s four-dimensional framework [11]. It converts the passive/static adaptation of the functional factor into the active/prospective planning of quasi-seniors and examines their perceptions, responses, and living plans regarding physical and psychological signs of early aging. This study utilizes focus interviews to shed light on the physical and psychological evaluations and preparations made by individuals aged 55 to 75, born in the post-WWII baby boom era, as they transition into old age. It aims to explore how these quasi-seniors overcome age-related challenges, actively develop coping strategies, and endeavor towards successful aging.

2. Methodologies

2.1. Selection of Methodologies

Qualitative studies aim to understand the experiences of the subject as well as how subjects themselves interpret these experiences and how they construct the social world in which they live [15]. Narration is defined as discourse aimed at certain audiences and the sequential presentation of related events using meaningful methods in order to provide an understanding of the world and/or the experiences of people [16]. When contemplating how to reach, interpret, and analyze life stories and various possibilities of other narrative materials, Lieblich et al. [17] discovered two independent orientations and developed four quadrants, the holistic vs. categorical orientation and the content vs. form orientation. Here, the categorical/content orientations were adopted, in which studied topic categories have been clearly defined. The separated paragraphs in this paper were extracted, categorized, and then reassembled into these categories/clusters. The contents of the focused interviews were placed into Phelan’s four categories of successful aging and then converted into four categories of quasi-senior responses to aging.

This study was primarily a qualitative investigation. Our methodologies included focused interviews, grounded theory analysis, and t-tests, which are briefly explained below:

1. Focused interviews: A focus group is a form of qualitative investigation method that involves six to twelve participants engaging in free and interactive discussions on certain topics to collect deeper and more authentic views and opinions. The objective is to observe a large amount of verbal interaction and dialogue within a short period of time [18]. In this study, focused interviews were conducted with individuals between the ages of 55 and 75. Each session involved seven to eleven interviewees, and the discussions were recorded and transcribed for grounded theory analysis.
2. Grounded theory analysis: This included data processing, categorization and conceptualization, context establishment, and interpretation.
 - (1) Data processing: This included numbering the interviewees, the pages of the transcripts, and the conversations between the interviewer and the interviewees.
 - (2) Open coding: This included transcribing the interviews, reviewing and analyzing the transcripts, and performing open coding.

- (3) Categorization, comparison, and conceptualization: After all of the transcripts were coded, the compiled documents were categorized, examined, compared, and conceptualized. Those with similar concepts were categorized to develop a core category. The verbalizations in the self-reports of the interviewees were listed to corroborate and explain the concepts or framework created by the researcher.
- (4) Establishment of context among concepts: The researcher placed the conditions, contexts, actions, or interaction strategies of the analyzed phenomena with the results and identified the axial coding through the coding paradigms among the categories to facilitate a better grasp of the context among the various concepts.
- (5) Interpretation: Through theoretical sensitivity or interpretation, the collected data were explained in greater depth using established theories. We transcribed the contents of the focused interviews, selected 918 key statements, and identified the primary and secondary factors.

2.2. Reliability and Validity

Reliability: To test reliability, researchers distributed relevant information to the participants and gave them the chance to comment, add information, change their minds, and provide their own interpretations.

Validity: Internal validity and external validity increase overall data validity. The interviewees participated in discussions, and the entire process was recorded in case the notes taken were inadequate. The data were re-confirmed and verified, and proofreading procedures were implemented carefully.

Triangulation: This refers to the use of different methods, data, observers, and theories during studies as well as applying and combining several types of methods, theories, researchers, or data sources to overcome biases that may result from a single method, researcher, theory, or data source. This study combined multiple theories associated with old age, data from the 12 sessions of focused interviews, and multiple raters to give consideration to both reliability and validity.

2.3. Study Participants and Procedures

1. **Study participants:** This study recruited participants from locations such as Chang Gung Health Village and senior community colleges in Taiwan. Prospective participants were required to be voluntary, able to articulate clearly verbally, free from serious health issues, and capable of independently performing daily activities. The study participants were between 55 and 75 years of age. They included 41 men and 52 women. In terms of retirement status, 45 were retired, and 48 were not retired. Among the participants, 37 lived in retirement communities, and 56 lived in their current place of residence.
2. **Data collection and organization:** The data from the 93 participants in the 12 sessions of focused interviews were transcribed, and key points were extracted. For the conceptualization process, this study referred to the definition provided by Phelan et al. [11] on successful aging, and open coding was performed to identify the secondary factors. Following a process of selection, classification, comparison, and interpretation [19], meaningful statements were extracted and coded. The coding principles for each interviewee number were as follows. The first set of two digits was the number of the interviewee. In the second set of digits, the first two digits indicated the number of the focused interview session, and the last two digits represented the number of the interviewee within this session. The digit in the third set indicated the gender of the interviewee (1: male; 2: female). The digit in the fourth set represented the retirement status of the interviewee (1: not retired; 2: retired), and the digit in the fifth set was the interviewee's place of residence (1: home or current residence; 2: retirement community). For example, 17-0302-2-1-1-0169 means that the interviewee data and

text source were from Interviewee No. 17, who was No. 2 in Session 03 of the focused interviews; the interviewee was female, was not retired, and lived in her current residence. The extracted text began on Line 0169 of the transcript of this session.

3. Reliability test of coded data: Inter-rater reliability was adopted for reliability analysis. The researcher and two university teachers served as the raters. After coding all of the data, the researcher made a coding list. A computer then randomly selected 50% of the data, and the other two raters performed reliability tests independently, according to the coding list, to ensure the consistency of the coding results. The coding results from the researcher and the two other raters were tested using the percent agreement formula. The results were 0.96 in the Physical factor, 0.94 in the Psychological factor, 0.84 in the Prospect factor, and 0.81 in the Place and Relationships factor, thereby indicating that the coding results in this study were reliable.

3. Results

The four major categories that Phelan established for successful aging were modified in this study to Physical, Psychological, Prospect, and Place and Relationships, based on the perceptions and responses of quasi-seniors. Using the first letter of these categories, they are referred to as the 4P Strategies of Quasi-seniors and explained accordingly below:

3.1. Responses of Interviewees to Physical and Psychological Aspects of Aging

3.1.1. Physical Items

The perceptions and responses regarding the body can be divided into (1) physical changes, (2) health preservation, and (3) health and exercise. The representative statements made by the interviewees were as follows.

1. Physical Changes (P1)

Regardless of how well they performed in sports or at work in the past, the interviewees were generally aware that their bodies were deteriorating, to the point of affecting their confidence. Some representative statements were as follows:

I'm almost 60. I don't feel old, but my stamina tells me I'm old.

(03-0103-1-1-1-0010)

Even drinking water makes me fat.

(01-0101-1-1-1-0165)

My eyesight is failing. My concentration is failing. I forget things I've learned; it's a bit embarrassing.

(36-1103-1-2-1-0046)

I like to hike and exercise. I ran 68 marathons, but I stopped due to fasciitis.

(45-1203-1-1-1-0211)

2. Health Preservation (P2)

Eating mild and low-calorie diets was the general consensus. Some representative statements were as follows:

Less oil, less salt, less sugar, less processed foods, best boiled, nuts.

(52-1302-1-2-1-0280)

Go on a diet, and eat a light and non-greasy diet.

(09-0201-1-1-1-0283)

Only light diets are healthy. But the question is: can you stick to them?

(42-1109-2-1-1-0604)

I've cared for my diabetic mother and aunt for eight years. I have experience with health preservation, and it's true that you have to be mindful of what you eat.

(46-1204-1-1-1-0405)

My wife controls what I eat. She buys supplements, and I have to take them.
(07-0107-1-1-1-0225)

3. Health and Exercise (P3)

The interviewees felt that nothing was more important than health and exercise. Some even felt that it was worth sacrificing some of their achievements.

You can ask anyone living in a retirement community, and they'll go on about how rich they are and so on, but I tell you: health is the most important.
(63-0408-2-2-2-672)

You have to exercise if you want to preserve your health. A bit of exercise and sweating are probably better than taking any supplements.
(14-0207-1-1-1-0362)

Spend time on your health after you're 30, and you'll see a big difference between you and your classmates in your 60s and 70s. My diet, exercise, daily habits... if I could do it all over again, I'd spend more time on these, even if I had to sacrifice some of my achievements.
(90-0804-1-2-2-0660)

3.1.2. Psychological Items

The perceptions and responses regarding the body can be divided into (1) psychological perception, (2) easy stress handling, and (3) proactiveness and positivity. Some representative statements made by the interviewees were as follows:

1. Psychological Perception (M1)

Some interviewees exclaimed outright that they did not think of the day they would get old. Others realized that they were aging due to a friend or family member passing away or due to information from the media.

How did I get old, too? I had never thought about that.
(21-0306-2-1-1-0229)

I still can accept that I'm getting old, my hair is going gray, and my teeth are becoming loose.
(10-0202-2-1-1-0091)

I said goodbye to five friends last year (who passed away); they were all in their early 50s.
(28-1006-1-1-1-0070)

After you retire, you grow apart from your coworkers and classmates, and then there's nothing at the end. You'll only have a few of your closest friends.
(39-1106-1-2-1-0540)

2. Easy Stress Handling (M2)

The interviewees felt that going with the flow and relieving stress moderately were the most important. Some representative statements were as follows:

Having the right mindset and attitude is more important than taking supplements.
(12-0204-1-1-1-0254)

I have no plans and live in the now. I just need food in my belly. I'm a freelancer right now.
(44-1202-1-1-1-0255)

I treat myself well. I buy myself a small gift on my birthday. I haven't learned how to have coffee myself, though.
(18-0303-2-1-1-0026)

Don't stress! Enjoy the new experiences that you now have first.

(24-1001-1-1-1-0102)

3. Proactiveness and Positivity (M3)

The interviewees felt that one should plan early and enjoy continuing to work. There were also references to the diligent work image of older generations. Some representative statements were as follows:

I think the period between 55 and 75 years old is the most important part of life.

(29-1007-1-1-1-0023)

Plan your ideal old age; don't wait until you're retired to think about it.

(24-1001-1-1-1-0542)

If there's work we can do, we still like to work half the day and then use the rest of the time for leisure. Having fun all 365 days of the year can get boring, too.

(52-1302-1-2-1-0032)

I'll work until I'm old and can move no longer. My father was the same.

(29-1007-1-1-1-0062)

3.2. Views of Interviewees Regarding Prospect as well as Place and Relationships of Aging

3.2.1. Prospect Factor

The grasp and plans of the interviewees with regard to the Prospect aspect can be divided into (1) financial plans, (2) learning and dreams, and (3) meaning. Representative statements made by the interviewees are presented below.

1. Financial Plans (F1)

The interviewees agreed that finances were important and believed that they could only be at ease if they had enough savings; they also shared their ways of estimating retirement savings. A selection of representative statements was as follows:

It doesn't matter if you get married or have children; you're alone in the end, so you have to make plans no matter how young you are. When you are pursuing your career between 40 and 60, don't forget your health, and save some money so that you can have a good life in your old age.

(69-0505-2-2-2-0732)

I suggest putting your finances and health first; you don't have to be perfect at work.

(79-0609-2-2-2-0722)

Be good to yourself. Definitely be financially independent, and you'll have a high social status and naturally gain the respect of others.

(91-0805-2-2-2-0630)

2. Learning and Dreams (F2)

Many of the interviewees mentioned their dreams and learning engagements. Some representative statements were as follows:

Right now, I'm planning to realize my dreams one by one. I want to go to Paris for a six-month course and go to New York to go skydiving, diving, and take pictures.

(35-1102-2-2-1-0170)

If you want to do something, do it now. Don't wait until you're old to realize your dreams. Do it now, and do it yourself. Set realistic goals first. Don't travel the world first. Start by traveling around one place. If your dream is too big, start little by little.

(66-0502-2-2-2-0135)

I wanted to when I heard the urge, but at the time, I didn't have the courage, the money, or the ability. Then I had the money prepared, but I didn't have the strength to roam.

(65-0501-1-2-2-0683)

You have to leave the house and take some courses in order to be happy and so your children can be rest assured.

(75-0605-2-2-2-0624)

3. Meaning (F3)

The interviewees reflected on the meaning of life and wished to explore their beliefs and live a life of value. Some representative statements were as follows:

I lived in Australia for 46 years, from being a student to working, getting married, having children, raising my children, and getting divorced. Talking about this makes me feel like a walking robot.

(67-0503-2-2-2-0656)

My brother wasn't very old, but he died suddenly, and it makes you think about things.

(32-1010-1-1-1-0187)

The thing I'm most afraid of is going through life without having benefited anyone and dying without anyone knowing.

(68-0504-1-2-2-0398)

My ideal life in old age: exploring a faith.

(15-0208-1-1-1-0643)

I try to help the disadvantaged and donate as much as possible.

(51-1301-2-2-1-0158)

Where my value in the future lies is doing something good for kids.

(21-0306-2-1-1-0241)

3.2.2. Place and Relationships Factor

The grasp and plans of the interviewees with regard to the Place and Relationships aspect can be divided into (1) friends and family, (2) residence in old age, and (3) significant others. representative statements made by the interviewees are presented below.

1. Friends and Family (S1)

Many interviewees cared about how they would get along with their spouse after retirement, and they also mentioned their relationships with their siblings, children, and grandchildren. They felt that they needed to rebuild close relationships with friends and family members. A selection of representative statements was as follows:

Rebuilding close relationships, building close relationships. . .It's not just your spouse; there are also your friends and family. I think it's pretty important. It's the source of your happiness.

(05-0105-1-1-1-0499)

Well! After retiring, I'm starting over with my husband and whatever because we haven't been together all day and all night in a very long time.

(08-0108-2-1-1-0477)

I don't want to become a burden to my children.

(30-1008-1-1-1-0826)

Taking care of your grandchildren may make you feel "useful" in your old age, but instead I want to escape (escaped dream). I don't want to spend my "seenager" years taking care of my grandchildren.

(3-0602-2-2-2-0181)

Don't be an annoying old person.

(82-0703-2-2-2-0899)

Just mind your own business.

(86-0709-2-2-2-0488)

2. Residence in Old Age (S2)

Younger interviewees wished to live with their family or siblings. However, some felt it was time to and were not against living in a retirement community, believing that retirement communities were safe and organized a lot of activities. Still, they did have to consider their budget. Some representative statements were as follows:

I'm still going to live in my home in Taipei. It's bustling whenever I go out, and that makes me happy.

(02-0102-1-1-1-0601)

Ideally, I'm going back to Yilan to buy a house with a yard I can grow vegetables in.

(45-1203-1-1-1-0222)

I'm a single mother. My older sister is not married either. Everyone's getting old. We siblings want to live in a place to ourselves and take care of each other.

(42-1109-2-1-1-0486)

If I'm mobile, then I want to live by myself. If my health is failing, I'll tell my kids to send me to a nursing home.

(16-0301-1-1-1-0218)

Hiring a foreign domestic helper is definitely not as good as any professional institution, where I could have friends, take part in activities, and not be a burden to my children. If I really have any health issues, they (the professional institutions) have doctors.

(03-0103-1-1-1-0584)

I'm old. It's dangerous not having anyone around me, so I'm moving back retirement home again.

(63-0408-2-2-2-0056)

You don't have to live there forever. You can live in both Taiwan and the US. But live in a good environment for the beginning of the rest of your life.

(80-0701-1-2-2-0239)

3. Significant Others (S3)

The interviewees took the opinions of their own elderly parents and their married children into account. Some shared how society views retirement communities and what their own adaptation experiences were. Some representative statements were as follows:

My dad would not accept living in a retirement home in Tamsui. He was willing to live with me. My mother lives alone. She has her fellow apprentices and doesn't want to live with me.

(44-1202-1-1-1-0626)

My dad went to check out a retirement home. He felt there was no warmth. It was cold, and there were all old people there.

(06-0106-2-1-1-0738)

My wife says she is willing to live in a retirement community. I haven't thought about it.

(15-0208-1-1-1-0637)

My younger brother convinced my mom to move into a retirement home. At first, she cried whenever my brother visited. Now, she's changed her mind and is very thankful. She's gradually feeling happier and getting to know a lot of people.

(62-0407-1-2-2-0481)

At the request of her younger brother, the daughter of a military man moved her whole family to Paraguay. Her husband is quite shy, so she handled everything. Her husband likes retirement communities, and her friend came too, so they came back.

(74-0604-2-2-2-0221)

At the time, her in-laws objected to living by themselves. They were going to bring them here first, but they didn't have the time. It was a rare opportunity, so we moved in.

(71-0508-2-2-2-0567)

Those sent to a nursing home by their children are usually depressed. And if they don't have any religion or anything to find comfort in, then it's easier for them to get sick.

(76-0606-2-2-2-0616)

4. Discussion

4.1. Qualitative Research Conclusions and Discussion

Focused interviews were conducted to analyze the four major aspects of which quasi-seniors were aware, with regard to aging and their corresponding factors. During the interviews, many interviewees paid attention to the opinions of others, which served as references from which they could learn. The contents of the interviews were analyzed based on relevant theories. The results and discussions are as follows.

4.1.1. Physical Factor

1. Physical changes: No matter how much the interviewees paid attention to exercise or could handle social functions in the past, they were generally aware that their bodies were deteriorating, including their memory and stamina. They were surprised that old age was upon them, to the point of affecting their confidence. Regarding the self-awareness of aging, Sato [20] mentioned that seniors perceived their aging from the inside out. Because of failing eyesight, hearing, and memory, they felt themselves degenerating physically and mentally.
2. Health preservation: Beginning to eat light diets was a widespread consensus among the interviewees. The spouses of the male interviewees, in particular, constantly reminded them about this and even controlled their diets. Some were reminded of their mortality by cases in their family, and some doubted their own ability to stick to such diets.
3. Health and exercise: This secondary factor was the most frequently discussed in the Physical factor. The interviewees agreed that nothing was more important than health and exercise. That is, to live, you must move. The retired interviewees even realized that exercise would have been worth sacrificing some of their achievements. Based on the 2018 City and County Aging Development Index questionnaire designed by the Taiwan Active Aging Association, all of the interviewees were asked what they thought the necessary condition for a happy life was, and the most frequent response was also physical health (44.4%).

4.1.2. Psychological Factor

1. Psychological perception: Some interviewees sighed about aging or were unwilling to accept it. Some perceived that they were aging from friends or family members passing away or from information in the media. Some felt that they were psychologically retired, while others expressed weariness with regard to stress at work, and still others who were retired perceived that their social circle was shrinking. These echo the opinions of other researchers. Kugaya [21] indicated that wishing to remain young and not grow old is a basic biological desire and a natural response supporting the original human desire for self-realization. About 75% of the interviewees felt that they were "unexpectedly young". Fishman [22] cited the finding of Jim Sherman, indicating that even if they were old, many people still did not believe that old age was upon them. Sato [20] observed that people also perceive their own aging when

they see the growth of children and grandchildren, reach retirement age (or transfer), or are treated as a senior.

2. Easy stress handling: This secondary factor was mentioned the most among the psychological factors. The interviewees felt that going with the flow, relieving stress moderately, and relaxing were the best strategies. They expressed that there was no harm in enjoying everyday life, the little joys in life, and even new experiences.
3. Proactiveness and positivity: The interviewees felt that one should plan early, seize one's golden years, and enjoy continuing to work, as retiring and idling or having fun all day was also boring. There were also references to the diligent work image of older generations, who served as good role models. Krouk [23] also clearly indicated that maintaining creative activities can make people feel proficient, significantly improve their entire health condition, and reduce the level of senior depression and sense of loneliness.

4.1.3. Prospect Factor

1. Financial plans: The interviewees agreed that finances were important, believing that they should plan early, be financially independent, and have enough savings in order to be at ease and be respected. They also cared about how much funds they needed in order to retire. Yang [13] cited an analysis performed by Jo Ann Jenkins, which indicated that living a meaningful life for 50-year-olds nowadays begins with health, wealth, and self.
2. Learning and dreams: There were lively discussions about this secondary factor, which was also the most discussed item in the Prospect factor. Many of the interviewees mentioned their dreams and the things that they were learning, such as languages, musical instruments, and drawing, which they did not have the opportunity to learn when they were young. There was also hiking, yachting, doing the Grand Tour, among a wide variety of other activities. Some interviewees mentioned that engagement in such activities was also a way of easing the burden on the next generation. Tsai et al. [24] also stated that social involvement can not only help seniors to maintain their actual and perceived health, but it also exerts a positive impact on their mental health and subjective sense of wellbeing. Learning engagements offer knowledge, abilities, and skills. They also provide mental stimulation and re-preparation of physical abilities as well as restore and renew vitality and promote survival abilities in increasingly complex environments.
3. Meaning: The interviewees reflected on the value and meaning of life. Some lamented the mundaneness of the early years of their life, some wished to explore their beliefs, and some had begun contemplating due to the sudden death of a family member. An analysis conducted by Kaufman [25] indicated that seniors are not considered "old" by their friends or family and that they do not consider themselves "old" either, as long as they remain meaningfully active and productive. Takkinen and Ruoppila [26] advocated that the meaning of life is the foundation of a sense of wellbeing in seniors.

4.1.4. Place and Relationships Factor

1. Friends and family: Many interviewees cared about how they would get along with their spouse after retirement and also mentioned their relationships with their other family members, such as parents, siblings, children, and grandchildren. They felt that rebuilding close relationships with friends and family members was important. Some advised not to become annoying old people, and others did not want to spend their "seenager" years tied to their grandchildren. Some living in retirement communities suggested minding one's own business and avoiding quarrels. Tsai [24] analyzed the relationships of senior couples and noted the following: (a) clear division of housework, (b) open communication, (c) clear distinctions between public and private affairs, and (d) high-quality time. These show the importance of rebuilding relationships.

2. Residence in old age: Moving a place of residence in one's old age is a major event. The interviewees presented polarized views regarding this issue. Younger interviewees wished to live with their spouse, family, and even siblings. Some were not against living in a retirement community if necessary. However, they were also worried that there were only seniors in retirement communities or had to consider their budgets. Some believed that retirement communities were safe and provided many activities. Some even already saw retirement communities as their home. Returnees from overseas compared themselves to migratory birds, with the flexibility to come and go.
3. Significant others: From a psychological perspective, Sullivan [27] defined significant others as people who are extremely crucial to one's life or wellbeing. These people could be one's parents, teachers, elders, siblings, friends, peers, or even passersby met by chance. Indeed, many interviewees indicated that they had to consider the opinions of their own elderly parents and their married children into account if they wanted to live in a retirement community. Some shared not only their views or the views of others regarding retirement communities but also their own adaptation experiences or those of other residents.

4.2. Interview Implications

Apart from focused interviews with confidential recordings, interviewees glean several significant implications from the content and demeanor of the interviewees' speech:

- (1) Baby boomers aspire to age successfully, replacing the traditional notion of "raising children as a hedge against aging".

In terms of overall discussion, the most highly discussed concern is settling down and interpersonal relationships, with opinions sharply divided. Filial piety for Taiwanese people encompasses expressions of obedience, honoring ancestors, carrying on family lineage, living with and taking care of parents, etc., with living alone often perceived as abandonment by children. However, as times change, attitudes among baby boomers are gradually shifting, sparking lively discussions and a keen interest in understanding the perspectives of other interviewees. Generally, baby boomers entering their later years hope to rebuild close relationships with spouses, relatives, and old classmates, but may not necessarily wish to live with their children, instead focusing more on health, and whether their dreams have been fulfilled.

- (2) Residents of health villages share positive stories and new options.

Many residents of health villages share their inner transformations from rejection to acceptance and joy upon living in these communities. Younger women feel that living in health villages is safe and convenient, while older individuals find reassurance in medical care. They share their stories in several focused interviews and spread the word among peers, as user experiences often serve as the best form of publicity. The proliferation of health institutions in Taiwan reflects this trend, although cost remains a significant consideration for residency.

- (3) Women demonstrate psychological adaptability.

Pre-retirement men exhibit a high degree of concern regarding the Physical factor, likely because men generally experience more drastic and noticeable changes in physical strength and appearance as they age, leading to greater reflection. In contrast, women show a higher degree of discussion regarding the Prospect and Place and Relationships factors, possibly due to women's regular focus on health, financial planning, and future arrangements. They tend to be more accepting and adept at handling emotions, playing more caregiving roles within the family, which makes them more adaptable and receptive to approaching old age. Particularly, younger women who have recently retired exhibit enthusiastic expressions when they talked about learning new things.

- (4) Being a successful elder is something that requires learning.

Life demands learning at every stage, and it should not be taken for granted. Indeed, a senior long-term care worker expressed that in the face of aging, there is no need to be overly depressed; however, one should not be completely ignorant either. One of the interviewees (82-0703-2-2-2) said, “You have to learn how to be a senior; you won’t know how just by getting old. It’s like being a mother; you won’t know how just by having a baby. That’s impossible; you have to learn how.” This perspective also fully demonstrates their determination to age successfully.

There are several limitations to this study. Firstly, the study was conducted in northern Taiwan, where participants generally have average incomes and education levels and hold relatively open views on the concept of raising children to support old age. Secondly, due to the small sample size, presenting quantitative analysis results may lack persuasiveness. Additionally, participants in focus group interviews may be influenced by the opinions of others and may not fully express their true thoughts. Future follow-up studies could focus on different regions, expand the pool of participants, or conduct more in-depth interviews to explore finer nuances of personal stories.

5. Conclusions

This study investigated the perceptions and responses of quasi-seniors with regard to aging. Through focused interviews, the views of 93 interviewees between the ages of 55 and 75 were collected. The four major categories that Phelan established for successful aging (physical, functional, psychological, and social health) were modified to perceptions and response factors suitable for quasi-seniors, namely, the 4P Strategies: Physical, Psychological, Prospect, and Place and Relationships. A brief analysis of this study is as follows: (1) Physical factor: The interviewees were startled at the decline in their stamina and physiological functions, and they had already begun to devise strategies for health preservation and exercise. (2) Psychological factor: Whether or not they could mentally adapt, the interviewees agreed that moderate stress relief was absolutely necessary. (3) Prospect factor: The interviewees felt that one should plan their financials early, contemplate the value of life, and more actively learn and realize one’s dreams. (4) Place and Relationships factor: The interviewees aimed to rebuild their close relationships with their spouses, family members, and old friends and had polarized views regarding where to live in their old age; each also had own opinions and considerations. In analyzing the implications of the interviews, the following was also found: (1) Baby boomers aspire to age successfully, no longer relying on the traditional expectation of “children supporting parents in old age.” (2) Residents of health villages offer positive stories and share new options. (3) Women demonstrate psychological adaptability. (4) Being a successful elder requires learning.

From Phelan’s successful aging to the 4P Strategies of quasi-seniors, this study aimed to help people who are about to enter old age to understand themselves and each other, find the courage to face the many challenges of aging, and have the chance to become happy seniors who thrive with age. It was also hoped that this study could fill in gaps in research involving retired and non-retired individuals between the ages of 55 and 75 and provide a reference for relevant policies.

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Article

Emotion Regulation and Self-Efficacy: The Mediating Role of Emotional Stability and Extraversion in Adolescence

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Abstract: The feeling of emotional self-efficacy helps people understand how to handle positive and negative emotions. Emotion regulation is the process that helps people control their emotions so that they can adapt to the demands of the environment. This study has a twofold aim. First, it examines the relationships among emotion regulation, the personality traits of extraversion and emotional stability, and the feeling of emotional self-efficacy for positive and negative emotions in an adolescent population. Second, it examines the mediating role of personality traits (extraversion and emotional stability) in the relationship between emotion regulation and emotional self-efficacy for positive and negative emotions. The participants were 703 adolescents (49.9% male and 50.1% female) aged between 15 and 18 years ($M = 15.86$, $SD = 0.30$). Significant relationships were observed among emotion regulation, the personality traits of extraversion and emotional stability, and emotional self-efficacy for positive and negative emotions. The structural equation model confirmed the direct link between emotion regulation and emotional self-efficacy and mediation by the personality traits of extraversion and emotional stability. This study confirms that emotional self-efficacy is connected to the emotion regulation strategies that adolescents use. Effective emotion regulation encourages self-perception and emotional coping. The results are discussed in connection to previous research.

Keywords: emotional self-efficacy; emotion regulation; extraversion; emotional stability; adolescence

1. Introduction

In everyday life, people must deal with emotionally charged situations that can cause stress and a lack of efficacy in decision making. These situations have a particularly strong impact in adolescence, a period of physiological and associated psychological, emotional, and behavioural changes [1]. These changes create instability and variations in personality traits, even potentially evolving towards a negative personality [2]. Such changes can occur in the process of transition into adulthood and can stay with people for the rest of their lives. Therefore, the ability of adolescents to manage everyday situations effectively and achieve the desired outcome will help them in the process of self-management (as agentic beings) to ensure the sound development of beliefs of emotional efficacy [3]. This emotional self-efficacy can influence the types of goals people set for themselves and even their professions as adults [4]. In addition, personality traits play a role in the way in which people deal with problems. Extraversion and emotional stability (or conversely neuroticism) are the two personality traits that most greatly enable adaptation to the demands of the environment [5] and that share the strongest relationship with emotional self-efficacy [6].

In this context, it is considered that emotion regulation, as a process that helps control emotions, will play a key role. Individuals who are able to regulate their emotional state will mature in a more adaptive manner in their environment. Overall, it will increase their degree of personal and social well-being [7]. Consequently, it could be instructive to

conduct an analysis of these aspects during adolescence, a period of change and instability in personality traits. Specifically, an analysis of the relationships between the ability for emotion regulation and the development of feelings of emotional self-efficacy, as well as the mediating role of the personality traits of emotional stability and extraversion, can provide insight into the importance of encouraging the development of an emotionally stable personality and the ability to externalise feelings and emotions effectively. This process can have benefits in terms of interactions with others, given that the belief of being effective in emotion management can play a role [8,9].

Studies have shown the direct relationships between self-efficacy and positive and negative emotion regulation strategies [10]. However, the mediating role of emotional stability and extraversion in this relationship remains unknown. The present study attempts to fill this gap. The results provide insight into the importance of encouraging strategies aimed at developing these two personality traits in adolescence, a period of change that leads to a degree of immaturity in personality traits [11,12] before these traits stabilise and remain throughout adulthood [13]. Therefore, the aim of this study is to analyse the role of emotion regulation (cognitive reappraisal and expressive suppression) as a predictor of self-efficacy for positive and negative emotions, as well as the mediating role of the personality traits of emotional stability and extraversion.

1.1. Personality and Emotional Self-Efficacy

Personality traits are defined as relatively stable patterns of thought, feelings, and behaviour in an individual [14]. However, in early adolescence, an individual's personality becomes unstable [15]. Personality traits change in the opposite way, becoming less mature until adulthood, when they mature again [2,13,16,17]. Adolescence is characterised by changes in personality traits [11,12]. As a result, behavioural patterns and forms of temperament gradually establish themselves in relation to the environment [18].

Social cognitive theory suggests that personality traits are shaped by multiple processes. These processes include the generalisation of skills and self-awareness, which form through interactions between a person and the environment, as well as transitions in life. These traits ultimately become behavioural patterns [19]. The five-factor model refers to five big traits: extraversion, agreeableness, conscientiousness, neuroticism (vs. emotional stability), and openness to experience. There are also superficial traits or expressions of personality referring to people's beliefs, abilities, values, and attitudes. These values depend on core structures, but they are flexible and can be shaped by environmental influences [20]. This superficial group includes self-evaluations of efficacy, which help create awareness of how to manage positive and negative emotions [8].

Two of the big five personality traits, extraversion and neuroticism (vs. emotional stability), predict positive and negative emotional states [21]. In this model, neuroticism is the opposite of emotional stability. Extraversion and emotional stability enable adaptation to the demands of the environment [5]. Extroverts tend to have positive emotional states and are satisfied with life. In contrast, neurotic people tend to be in a negative emotional state, among other reasons because they focus on negativity, which makes them more prone to stimuli that cause negative emotions [22]. Also, people with high levels of emotional stability have more resources to tackle negative emotional states [23,24].

Emotional stability and extraversion tend to encourage people to seek a greater connection to their environment. People with high levels of emotional stability have resources to relate to others via assertive attitudes that help them defend their needs. Extroverts seek social interactions and others with whom to relate [19,25]. They take an interest in their company and tend to be assertive [26]. Thus, both of these personality traits can play a crucial role in social relations and in the search for solutions to day-to-day events that lead to tension, which are widely present in adolescents' academic and occupational environments [5].

Emotional self-efficacy is defined as people's belief in their capacity to achieve proposed goals efficiently and achieve desired outcomes [27]. Social cognitive theory draws

on an agentic perspective, in which agency works through a process of causality, involving personal, behavioural, and environmental factors [3]. In this process, people actively shape the course of their lives. Hence, they can anticipate the consequences of their actions to guide them towards plans of action, supported by a process of reflection and self-regulation [27]. Achieving goals largely depends on self-efficacy, which defines the course of action in a process of self-management of psychosocial functioning [28]. This self-efficacy also influences motivation and perseverance in the face of difficulties, as well as the expectations of outcomes [29]. Beliefs and the process of self-regulation also influence the sense of achievement or failure [3]. While experiencing achievement, a person's feeling of self-efficacy grows, while motivation, capacity, and interest in the task all improve too. This occurs via cognitive, motivational, affective, and decision-making mechanisms [27]. The experience of failure may have a negative impact on the feeling of self-efficacy and may reduce interest and motivation to achieve proposed goals [29].

The feeling of efficacy that accompanies achievement or failure is associated with positive and negative emotions. Self-efficacy for positive emotions refers to a person's perceived ability to express emotions such as happiness, enthusiasm, and pride as a result of success and pleasurable events. Self-efficacy for negative emotions refers to a person's perceived capacity to handle and improve emotions such as anger, distress, irritation, or dejection, expecting negative results [1]. Authors have noted the need for further research into connections between personality traits, emotional self-efficacy, and emotion regulation [8].

Furthermore, the different strategies for handling emotions are related to personality traits [30] and emotional self-efficacy [6]. Studies have shown that self-efficacy and emotion regulation link certain personality traits such as extraversion and neuroticism (vs. emotional stability) to a better quality of life because they are associated with positive emotionality and more active and dynamic procedures [31].

1.2. Emotion Regulation

Emotion regulation is a process that helps people control their emotions to adapt to the demands of their environment [32]. It involves handling positive and negative emotions [33]. The process model of emotion regulation [34,35] divides the strategies of emotion regulation into two groups: one focusing on antecedents of the emotional experience and another on responses [33–35]. Antecedent-focused strategies are activated before the emotional experience occurs, such as cognitive reappraisal. In contrast, response-focused strategies are those that are activated once the emotional process has begun, such as expressive suppression [9].

Cognitive reappraisal is considered an adaptive strategy linked to better social relations [7], better interpersonal functioning [9,36], and higher levels of positive affect [37]. Conversely, expressive suppression is considered a maladaptive strategy related to greater difficulties in establishing social relations and a lower level of well-being [38–40]. Some studies of adolescence have linked expressive suppression to emotional dysregulation and cognitive reappraisal to adaptive emotional coping [40]. Other studies have linked high scores in expressive suppression and low scores in cognitive reappraisal to problematic types of behaviour in an academic environment [41]. Despite these results, expressive suppression can be adaptive in preschool environments [42], even though it becomes maladaptive in the long term [43].

1.3. Emotion Regulation, Emotional Self-Efficacy, and Personality

Empirical evidence has confirmed the connections between emotional self-efficacy and emotion regulation. It has been observed that emotional self-efficacy is related positively to cognitive reappraisal but negatively to expressive suppression [10]. Moreover, the way in which self-efficacy is evaluated is important in understanding the process of emotion regulation [44,45]. Bujor and Turliuc [46] found that, in addition to reducing the intensity of negative emotions, cognitive reappraisal also boosted positive emotions,

whereas expressive suppression could be an efficient way of regulating the expression but not the experience of emotions. High scores in expressive suppression are associated with greater negative affect and lower positive affect [38,47,48]. Emotional self-efficacy refers to individuals' perceptions of their emotional management, while emotion regulation refers to how individuals manage their emotions [8,9]. Although these variables are both related to emotions, self-efficacy is a belief about emotional management, whereas regulation is the way individuals act when faced with their emotions. Emotional self-efficacy distinguishes between positive and negative emotions. In contrast, emotion regulation focuses on the strategies used to manage those emotions. Emotion regulation focuses on cognitive reappraisal and expressive suppression strategies, while emotional self-efficacy focuses on emotional management beliefs regarding positive and negative emotions. Therefore, it is important to understand the relationship between emotional self-efficacy and emotion regulation [8].

Research into relationships between personality traits and emotional self-efficacy has confirmed that high scores in self-efficacy are related to high scores in extraversion and low scores in neuroticism [6]. People with higher scores in neuroticism (or low scores in emotional stability) are easily irritable and respond unsuitably to stressful factors of negative affect [49]. Furthermore, they have difficulties in regulating negative emotions [50]. Neuroticism is strongly and negatively correlated with self-efficacy in coping with negative emotions of anger, irritation, despair, and distress, although it does not appear to have such a strong link to self-efficacy for positive emotions [45].

In addition, high levels of emotional stability are related to self-efficacy for negative as well as positive emotions [51]. People with high emotional stability tend to experience negative emotions of anger, sadness, and emotional distress at lower levels than those with low emotional stability [46]. Furthermore, emotional stability is positively correlated with self-efficacy for the negative emotions of despair and distress [52]. Meanwhile, high scores in extraversion are associated with experiences of positive affect [53]. For instance, Shi et al. [52] found a significant positive correlation between extraversion and self-efficacy for positive emotions.

2. Aims and Hypotheses

This study has a twofold aim: (i) to analyse the relationships among emotional self-efficacy for positive and negative emotions, emotion regulation, and the personality traits of extraversion and emotional stability in an adolescent population; and (ii) to verify the mediating role of these two personality traits in relation to emotion regulation and self-efficacy for positive and negative emotions, following the suggestions of Caprara et al. [8]. The goal is thus to observe whether extraversion and emotional stability mediate the relationship between emotion regulation and emotional self-efficacy.

Extraversion and neuroticism were included as mediating variables for two reasons. First, extraversion and neuroticism have direct effects on positive and negative affect, whereas openness, conscientiousness, and agreeableness may have an instrumental (indirect) effect on positive and negative affect [54]. These findings from the literature justify the use of these two variables as mediating variables [54]. Additionally, neuroticism increases during adolescence, especially among girls [2,16]. Moreover, previous studies have used extraversion and neuroticism as mediating variables [55–57]. Second, personality variables are unstable during adolescence [12,15], as can also be observed in our research. They have been found to have standard deviations of 1.28 and 1.20. Thus, if they present variability, they cannot be considered constants. Based on the previous findings and a review of the literature, it is hypothesised that the following relationships will hold in adolescence:

H1. *Positive relationships will be observed among cognitive reappraisal, the personality traits of emotional stability and extraversion, and self-efficacy. Cognitive reappraisal will be related to self-efficacy for both positive and negative emotions.*

H2. Expressive suppression will be negatively related to positive emotional self-efficacy and positively related to self-efficacy for negative emotions.

H3. Emotion regulation will influence self-efficacy of positive and negative emotions (despair and distress; anger and irritation).

H4. The personality factors of extraversion and emotional stability will act as mediating variables between emotion regulation and self-efficacy for positive and negative emotions (despair and distress; anger and irritation).

3. Methods

3.1. Participants

The participants were 703 adolescents (49.9% male and 50.1% female) aged between 15 and 18 years ($M = 15.86$, $SD = 0.30$). The age distribution of the sample was as follows: 35.7% were 15 years old, 46.2% were 16 years old, 13.9% were 17 years old, and 4.1% were 18 years old. All the adolescents were studying either in the last year of compulsory secondary education (49.6%) or in the post-16 baccalaureate (50.4%) in the Spanish province of Valencia. Finally, 49.5% studied in state schools, and 50.5% studied in private or subsidised schools.

3.2. Instruments

Emotion Regulation Questionnaire (ERQ) [9] (Spanish adaptation by [36]).

This instrument evaluated the two strategies of emotion regulation: cognitive reappraisal and expressive suppression. A seven-point Likert scale was used, ranging from 1 (*completely disagree*) to 7 (*completely agree*). Cognitive reappraisal had a Cronbach's alpha score of 0.80, and expressive suppression had a Cronbach's alpha score of 0.74. These values were similar to those for the Spanish validation ($\alpha = 0.79$ for cognitive reappraisal and $\alpha = 0.75$ for expressive suppression) [36]. The instrument had 10 items. An example item was "When I want to feel the most positive emotion (such as joy or fun), can I change what I am thinking?" and "I keep my emotions to myself".

Ten-Item Personality Inventory, TIPI [57].

This brief measuring instrument was used for the big five domains of personality traits [57]. It evaluated the personality traits of extraversion (enthusiastic), agreeableness (affectionate), conscientiousness (reliable and self-disciplined), emotional stability (not easily irritated), and openness to experiences (inquisitive). A seven-point Likert scale was used, ranging from 1 (*completely disagree*) to 7 (*completely agree*). It consisted of 10 items. An example item was "Calm, emotionally stable" for emotional stability and "Extraverted, enthusiastic" for extraversion. This questionnaire has been widely accepted for use in scientific research and has provided results comparable to other more extensive personality questionnaires [57,58]. It was conceptualised in terms of the domains of behaviour from behaviour domain theory (BDT), estimating the constructs by inference based on generalisation in the population. The items for each trait were understood to correspond to behaviour, and their responses did not have to be interrelated [59]. Short personality questionnaires, which follow the five-factor model, have been shown to have adequate psychometric criteria and tend to be used for reasons of economy of effort [60]. The Cronbach's alpha scores were 0.7 for extraversion and 0.67 for neuroticism (vs. emotional stability). Alpha scores greater than 0.60 can be considered acceptable [61–63]. The item–total (item–item) correlation coefficient was $r = 0.544^{**}$ for extraversion and $r = 0.507^{**}$ for emotional stability [64]. Given the variable nature of personality traits during adolescence, the indications of Wu and Zumbo [65] were followed in this study. Accordingly, the variables of emotional stability and extraversion were included as mediating variables.

Regulatory Emotional Self-Efficacy, RESE [8].

This scale examined perceived self-efficacy, geared towards showing or experiencing positive or negative affect. The scale had 12 items, using a five-point Likert scale ranging

from 1 (*incapable*) to 5 (*completely capable*). This scale had two subdimensions: (1) emotional self-efficacy perceived to express positive affect (POS), with $\alpha = 0.74$; and (2) emotional self-efficacy perceived to express negative affect. Negative affect had two further subfactors: (1) emotional self-efficacy perceived in handling anger and irritation (ANG), with $\alpha = 0.72$; and (2) self-efficacy perceived in handling despair and distress (DES), with $\alpha = 0.74$. An example item was “How well can you: Express joy when good things happen to you?”

3.3. Procedure

This study was cross-sectional. The sample was selected based on the classification of secondary schools in the Spanish province of Valencia. The project received permission from the schools and support from the teaching staff. Group evaluations were carried out during class time in the adolescents’ classrooms. Two expert evaluators supervised the entire procedure. For participation, authorisation from the schools, families, and students themselves was first received. The parents and students completed and signed the informed consent form. The management team of the schools approved the intervention. The ethical guidelines of the Helsinki Declaration for this type of research were followed. Participation was voluntary, anonymous, and confidential. At any moment in the process, the students could withdraw their participation if they wished. However, no student decided to withdraw from the evaluation. The evaluations were carried out in sessions of approximately 45 min. The data were collected between February and May 2019.

3.4. Data Analysis

First, to provide background on the variables, the descriptive statistics and Pearson correlations were examined for all variables. Second, a predictive structural equation model was estimated using confirmatory techniques. The dimensions of emotion regulation (cognitive reappraisal and expressive suppression) acted as antecedent variables. The emotional self-efficacy dimensions (POS, ANG, and DES) acted as consequent variables. The personality variables of emotional stability and extraversion acted as mediator variables. The statistical analyses were carried out in SPSS 24.0 and Mplus 8 [66].

4. Results

4.1. Descriptive and Correlation Analyses

Table 1 shows a platykurtic (negative kurtosis) distribution for all variables. The variables of expressive suppression, DES and ANG, had positive asymmetry, with longer right tails. The other variables had negative asymmetry, with longer left tails.

Table 1. Descriptive analyses of the variables.

	Mean	Standard Deviation	Asymmetry	Kurtosis	Minimum	Maximum
Cognitive reappraisal	4.40	0.986	−0.023	−0.512	2.50	6.33
Expressive suppression	3.72	1.26	0.020	−0.957	1.50	6.00
Extraversion	4.89	1.28	−0.129	−0.917	2.50	7.00
Emotional stability	4.29	1.20	−0.114	−0.743	2.00	6.50
Positive emotional self-efficacy (POS)	4.49	0.490	−0.653	−0.821	3.50	5.00
Negative emotional self-efficacy (DES) *	3.17	0.716	0.073	−0.901	2.00	4.50
Negative emotional self-efficacy (ANG) **	2.85	0.772	0.054	−0.883	1.50	4.25

* DES: self-efficacy for coping with despair and distress; ** ANG: self-efficacy for coping with anger and irritation.

Table 2 shows the correlations between the variables. The strategies of cognitive reappraisal were positively correlated with extraversion, emotional stability, self-efficacy for positive emotions, and self-efficacy for negative emotions (DES and ANG). The correlation indices with DES ($r = 0.408^{**}$, $p < 0.01$) and with ANG ($r = 0.422^{**}$, $p < 0.01$) were high.

Expressive suppression was negatively correlated with extraversion and positive emotions. However, the relationships with emotional stability and with self-efficacy for the negative emotions DES and ANG were positive. The correlation indices were low. Extraversion and emotional stability were negatively correlated ($r = -0.130^{**}$, $p < 0.01$). In addition, extraversion was positively correlated with positive emotions and DES. Emotional stability was positively correlated with DES and ANG. The correlation indices were low, except between extraversion and positive emotions ($r = 0.347^{**}$, $p < 0.01$) and between emotional stability and ANG ($r = 0.359^{**}$, $p < 0.01$), whose values were close to the mean.

Table 2. Correlation analysis.

	1	2	3	4	5	6
1. Cognitive reappraisal	-					
2. Expressive suppression	0.070	-				
3. Extraversion	0.141 **	−0.299 **	-			
4. Emotional stability	0.242 **	0.107 **	−0.130 **	-		
5. Positive emotional self-efficacy (POS)	0.196 **	−0.297 **	0.347 **	−0.061	-	
6. Negative emotional self-efficacy (DES) *	0.408 **	0.103 **	0.128 **	0.236 **	0.109 **	-
7. Negative emotional self-efficacy (ANG) **	0.422 **	0.145 **	0.075	0.359 **	−0.002	0.595 **

** $p < 0.01$; * DES: self-efficacy for coping with despair and distress; ** ANG: self-efficacy for coping with anger and irritation.

4.2. Structural Equation Model

A measurement model was tested by analysing full structural equation models using the full-information maximum-likelihood method. For this method, an estimator was used for robust quantitative variables (MLR) [67]. The two dimensions of emotion regulation and the three factors of emotional self-efficacy acted as latent variables. In contrast, emotional stability and extraversion were the observed variables.

The fit model was evaluated using the chi-square index, comparative fit index (CFI), Tucker–Lewis index (TLI), and standardised root mean square residual (RMSEA). The fit was considered satisfactory with values for the CFI and TLI greater than 0.90 and values for RMSEA and SRMR less than 0.08, depending on the complexity of the model [68]. The criteria described by Kline and Kenny et al. [69,70] were followed. The model had two antecedent variables, three consequent variables, and two mediator variables (Figure 1). It had a satisfactory fit: $\chi^2(232) = 647.282$, $p < 0.01$; CFI = 0.905; TLI = 0.900; RMSEA = 0.050, 90% CI [.046,.055]; SRMR = 0.055. The factor loadings of the latent variables appear in Figure 2.

The model illustrated a direct, positive, and significant effect of cognitive reappraisal on the three variables of emotional self-efficacy (POS, DES, and ANG). Expressive suppression had a negative effect on self-efficacy for positive emotions and a positive effect on self-efficacy for both negative emotions (DES and ANG).

Emotional stability mediated the relationship between cognitive reappraisal and self-efficacy for negative emotions (DES and ANG) but not self-efficacy for positive emotions (POS). However, extraversion mediated both positive and negative (DES and ANG) self-efficacy. The direct relationships of cognitive reappraisal with the three self-efficacy variables had higher indices than the relationships of mediation.

Expressive suppression had direct, positive relationships with self-efficacy for positive and negative (DES and ANG) emotions and with emotional stability. However, it had a negative relationship with extraversion. In this case, the personality trait variables also mediated the relationship between the antecedent and consequent variables, with slightly higher beta values. The model predicted 28.9% of the variance of self-efficacy for positive emotions, 30.1% of the variance for negative emotions of despair and distress (DES), and 40.6% of the variance for negative emotions of anger and irritation (ANG). Associations of greater than 0.25 between variables indicated medium effects. Associations greater than 0.35 indicated large effects [71].

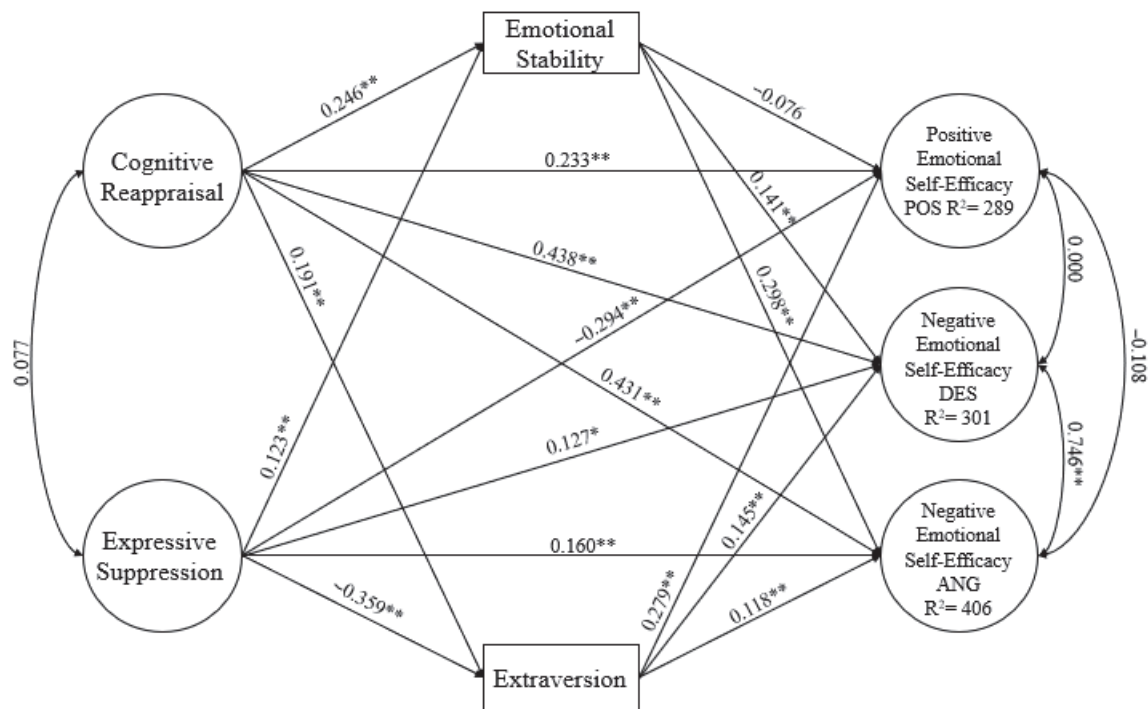


Figure 1. Model with antecedent, consequent, and mediator variables. ** $p < 0.01$; * $p < 0.05$.

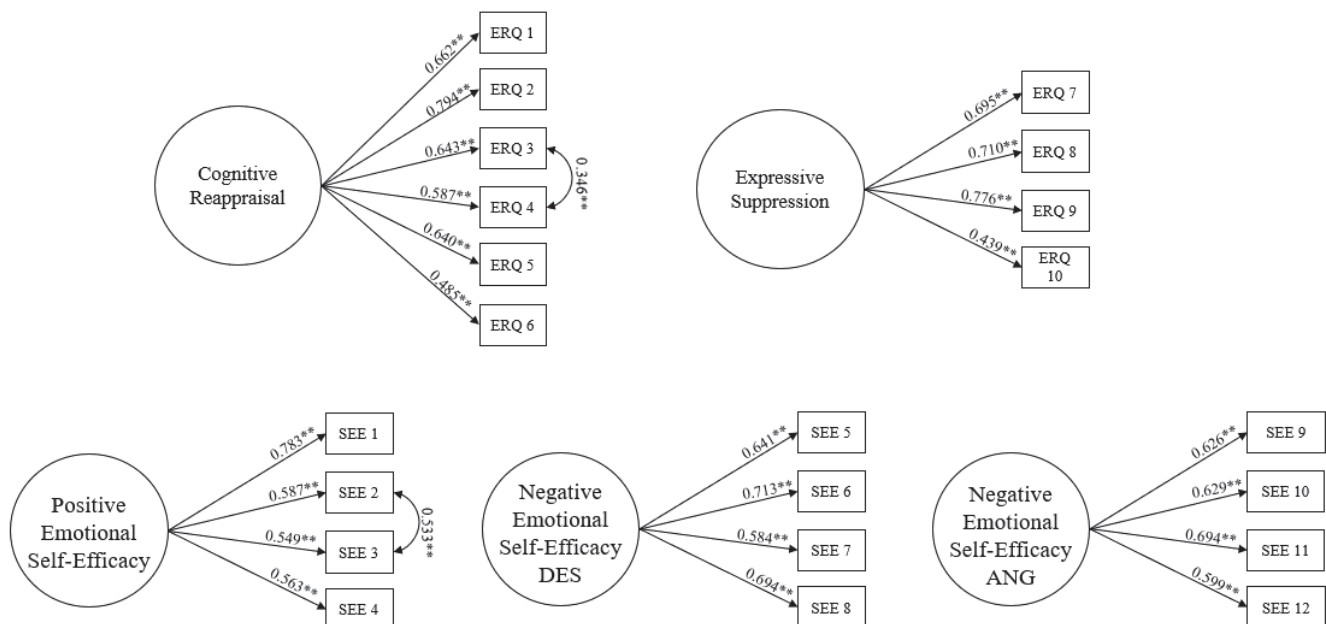


Figure 2. Factor loadings of latent variables. ** $p < 0.01$.

5. Discussion and Conclusions

This study had a twofold aim: (i) to analyse the relationships among emotion regulation, the personality traits of extraversion and emotional stability, and the feeling of efficacy for positive and negative emotions in an adolescent population; and (ii) to verify the mediating role of the personality traits of extraversion and emotional stability in the relationship between emotion regulation and self-efficacy for positive and negative emotions. The model, which represents a new line of exploration, is based on an extensive empirical study. The present study also attempted to overcome the limitations highlighted

by Caprara et al. [8] by including the variables of emotion regulation and personality, as well as emotional self-efficacy.

The results lead to the following conclusions. The first conclusion is that the analyses show the positive relationships between cognitive reappraisal and self-efficacy for positive and negative emotions (Hypothesis 1). They also show that expressive suppression has a positive relationship with self-efficacy for negative emotions but a negative relationship with self-efficacy for positive emotions (Hypothesis 2). The analysis thus confirms that cognitive reappraisal increases the perception of self-efficacy for coping with adolescents' positive and negative emotions. In other words, in complex situations of everyday life, adolescents who are able to apply emotion regulation strategies that focus on the antecedent of the emotional experience can cope more effectively with positive and negative (ANG and DES) emotions. In contrast, focusing on the emotional response, such as expressive suppression, negatively affects the self-efficacy for positive emotions and increases feelings of self-efficacy in the use of negative emotions. Therefore, when faced with an emotional experience, adolescents who are more capable of focusing on antecedents (such as self-control or the search for alternatives) will be able to increase their feelings of emotional self-efficacy and will be more likely to succeed and achieve self-management throughout their lives [3,27]. Experiencing emotional efficacy increases the belief of efficacy and helps cope with situations in a potentially successful manner, which will have a multiplying effect on future situations. Gunzenhauser et al. [10] observed similar findings in a German population. These findings are also consistent with those of Gross and John [9], confirming that strategies of expressive suppression are dysfunctional in terms of the regulation of emotional expression. However, it may initially seem contradictory that expressive suppression should be positively related to negative emotional self-efficacy (DES and ANG). Notably, expressive suppression is an emotion regulation strategy, whereas emotional self-efficacy refers to individuals' beliefs about their ability to address negative emotions and cope with these emotions suitably. Hence, although expressive suppression may be a maladaptive strategy [43], in school contexts, it may be adaptive because it can attenuate the immediate behavioural response and can help individuals cope with overwhelming negative emotions [42].

The second conclusion relates to Hypothesis 3, aimed at analysing the effects of emotion regulation on self-efficacy for positive and negative emotions. The results show direct, positive relationships between cognitive reappraisal and positive and negative (DES and ANG) emotional self-efficacy. The correlation indices are high for the two dimensions of self-efficacy for negative emotions (DES and ANG). A similar situation appears with expressive suppression, which also has direct relationships with self-efficacy for positive and negative (DES and ANG) emotions. However, in this case, the relationship is weaker. The relationships are direct and positive in all cases, except between expressive suppression and self-efficacy for positive emotions, where the relationships are negative. Hence, emotion regulation strategies that focus on the antecedents of emotional experience enable the management of positive and negative emotions by regulating behaviour to achieve more efficient emotional coping [46]. Expressive suppression reduces self-efficacy for positive emotions [38,48]. In sum, the results support the idea that cognitive reappraisal reduces the intensity of negative emotions and strengthens positive emotions. This situation may also lead to positive emotional feelings [37] and an improvement in interpersonal relationships [7,25,36]. In addition, expressive suppression negatively affects the establishment of smooth, efficient social relations [38,39] and is associated with greater negative affect [38,47].

The third conclusion is that extraversion and emotional stability act as mediating variables [21,54] (Hypothesis 3). Extraversion mediates the relationships between the two types of emotion regulation (cognitive reappraisal and expressive suppression) and positive and negative (DES and ANG) emotions. Emotional stability mediates the relationships between the two types of emotion regulation (cognitive reappraisal and expressive suppression) and self-efficacy for negative emotions (DES and ANG). However, it does not mediate

self-efficacy for positive emotions (Hypothesis 4). People who use antecedent-focused emotion regulation strategies and who are emotionally stable will tend to feel more self-efficient in coping with the negative emotions of despair and anger. In summary, emotional stability provides resources to cope with negative emotions more suitably [19]. Even so, it does not seem to have an effect on positive emotions. Positive emotions seem to be more strongly linked to antecedent-focused strategies in emotional experience. One possible explanation is that people with high emotional stability feel that negative emotional coping is an achievement and pay less attention to positive emotional coping [45,46]. The results partially confirm Hypothesis 4 and are consistent with earlier research, although some studies have considered neuroticism instead of emotional stability (given that they are opposites) [45]. In an adult population, scholars have also observed links between neuroticism and negative emotions but not between self-efficacy and positive emotions [45].

Regarding extraversion, the findings corroborate its relationship with positive and negative emotional self-efficacy, as well as confirming its mediating role in the relationships between emotion regulation and positive and negative (DES and ANG) emotional coping. People with a tendency towards extraversion tend to perceive themselves as more effective in coping with positive and negative emotions [52]. This perception may be partly because extroverts easily establish social relationships. Therefore, they have more opportunities to cope with their emotional state and thus manage it efficiently. They also tend to exhibit more positive emotional states and to have experiences involving positive affect [53]. Moreover, extraversion is positively associated with negative emotional self-efficacy (DES), which refers to handling emotions of despair and distress. Faced with highly emotionally charged situations, extroverts are more capable of tackling negative emotional states that cause despair and distress. For instance, a recent study [22] showed links between extraversion and lower levels of physical symptoms associated with negative emotions.

In sum, adolescents with greater extraversion and emotional stability are more likely to cope with highly emotionally charged situations more effectively, particularly those with a negative emotional charge that leads to both externalising and internalising problems such as aggression, anger, distress, or despair. Likewise, the use of antecedent-focused emotion regulation strategies, coupled with emotional stability, can act as a strength that helps adolescents deal with negative emotional burdens. Therefore, they will avoid externalising problems such as aggression or anger, as well as internalising problems such as distress or despair.

6. Limitations and Future Research

This study is not free from limitations. First, the results should be taken with some caution, given that this study was cross-sectional. Data gathering was carried out in a single evaluation, which may have been influenced by respondents' degree of willingness to participate. This study shows the existence of direct relationships, but causal relationships cannot be established. A longitudinal study would strengthen the results. Second, the variables included in this study were part of a more extensive study. Therefore, bias may appear because of participants' tiredness. Even so, possible tiredness was taken into account, and the sessions were kept short. Third, this study focused on a general Spanish adolescent population (15 to 18 years of age). It would be of interest for future studies to include younger adolescents and, if possible, adolescents from different sociocultural backgrounds. As noted by Kim et al. [24], extraversion and emotional stability may be moderated by culture. Finally, some authors have expressed doubts about the use of short personality questionnaires [72]. However, the TIPI is widely accepted by the research community [57–60,62].

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Informed Consent Statement: Informed consent was obtained from all subjects involved in this study and their parents (legal age minors).

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Case Report

Tirzepatide and Glycemic Control Metrics Using Continuous Glucose Monitoring in Older Patients with Type 2 Diabetes Mellitus: An Observational Pilot Study

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Abstract: This observational pilot study aimed to investigate continuous glucose monitoring (CGM) metrics in older Japanese patients with type 2 diabetes mellitus (T2DM) using a CGM system (FreeStyle Libre Pro) during the first tirzepatide administration and compare the glycemic control measures before and after the initial injection. The four patients had a mean age of 79.5 years (standard deviation [SD]: 5.8), a mean body mass index of 24.6 kg/m² (SD: 4.7), a mean glycated hemoglobin level of 9.1% (SD: 2.1), and a mean measurement period of 10.5 days (SD: 3.5). After the inclusion of tirzepatide treatment, the mean of time in range, time above range, and time below range changed from 53.2% to 78.9% ($p = 0.041$), 45.8% to 19.7% ($p = 0.038$), and 1.0% to 1.5% ($p = 0.206$), respectively. Improved hyperglycemia reduced the oral hypoglycemic medication in two cases and decreased the frequency of insulin injections in two cases. To elucidate the potential benefits of tirzepatide, future studies should investigate the long-term impact on functional prognosis, safety, and tolerability and distinguish between the use of other weekly agonists, especially in nonobese older Asian patients. However, tirzepatide-associated robust glycemic improvement may simplify diabetes treatment regimens in older patients with T2DM.

Keywords: tirzepatide; time in range; continuous glucose monitoring; elderly

1. Introduction

Eli Lilly and Company launched tirzepatide (Mounjaro®) in the United States on 7 June 2022. Tirzepatide was initially released in Japan on April 18, 2023, including two initiation and maintenance doses (2.5 and 5 mg), followed by four higher doses (7.5, 10, 12.5, and 15 mg), on June 12. Tirzepatide, a new medication based on a natural gastric inhibitory peptide (GIP) sequence, has been structurally modified to bind to glucagon-like peptide 1 (GLP-1) receptors. It is designed based on the amino acid sequence of GIP but is modified to also bind to the GLP-1 receptor, thereby stimulating insulin secretion in a glucose-concentration-dependent manner [1,2]. The insulin-secreting effect of GIP is significantly reduced in patients with chronic hyperglycemic conditions. Additionally, GIP enhances energy accumulation in adipocytes, potentially causing obesity [3]. However, GIP has recently been reported to suppress appetite and induce weight loss effects at concentrations far above physiological levels. A completely new once-weekly injectable formulation has been developed to act on GIP receptors with the accumulation of new results.

The SURPASS J-mono study [4], a domestic phase III clinical trial, was conducted to assess the superiority of weekly tirzepatide doses (5, 10, or 15 mg) over 0.75 mg dulaglutide in 636 Japanese patients with inadequately controlled type 2 diabetes mellitus (T2DM). Participants were randomized to the tirzepatide or dulaglutide groups, and tirzepatide exhibited a significant reduction in glycated hemoglobin (HbA1c) compared with dulaglutide. Adverse events did not significantly differ between the groups. The focus on obese subjects and the minimal representation of older individuals raises questions about generalizability. Additionally, the first-line use of an incretin modulator should be acknowledged.

The body mass index (BMI) of the Japanese population with diabetes is increasing, but it remains significantly lower than that of their Western counterparts. The average BMI of registered patients with T2DM in 2018 was 24.8 kg/m² [5]. The continuous glucose monitoring (CGM) substudy in the SURPASS-3 trial evaluated the association between tirzepatide and hyperglycemic or hypoglycemic time, as well as glycemic variability, compared to insulin degludec in 243 individuals over 52 weeks [6]. The study focused on titration in the SURPASS-3 subpopulation with diabetes (mean BMI: 33.9 kg/m²) and revealed that tirzepatide reduced daily glycemic variability and was closely aligned with target ranges. This multicenter, randomized, open-label study predominantly included obese participants, which differs from the Japanese population with T2DM. The limited representation of individuals aged ≥75 years raises uncertainty regarding the applicability of the study to this older population.

The HbA1c is the gold standard for the glycemic control index, but it does not reflect the detailed daily fluctuations in blood glucose levels. The use of CGM provides vital data for “better glycemic management quality” in older populations prone to unconscious hypoglycemia. Furthermore, the simplification of diabetes drug therapy is essential for older patients with impaired cognitive function, visual function, and hand dexterity. Therefore, we investigated the short-term advantages and disadvantages of tirzepatide onset evaluated by CGM in older patients with T2DM in Japan.

2. Materials and Methods

2.1. Study Design

This observational pilot study investigated short-term changes in glycemic control induced by tirzepatide onset using CGM in Japanese older patients with T2DM.

2.2. Participants

Patients with diabetes in our department underwent CGM, specifically when notable blood glucose fluctuations, hypoglycemia unawareness, or both were suspected. Participants signed written informed consent during the FreeStyle Libre Pro sensor attachment.

This study focuses on the first tirzepatide administration in patients with T2DM who actively manage their condition through a combination of dietary control, exercise, and pharmacological treatment, yet continue to suffer insufficient glycemic control. Tirzepatide initiation was well explained and performed. The patients decided when to take weekly tirzepatide injections.

The local ethics committee of the National Centre for Geriatrics and Gerontology approved this exploratory observational study aimed at building evidence on diabetes in older individuals (reception No. 1724).

2.3. CGM

CGM was performed using a CGM system (FreeStyle Libre Pro), worn on the upper arm of the nondominant hand for up to 14 days. The data were averaged over the measurement period. Furthermore, CGM was used to measure the appropriate glucose range (70–180 mg/dL, time in range [TIR]), hyperglycemic range (>180 mg/dL, time above range [TAR]), and hypoglycemic range (<70 mg/dL, time below range [TBR]) [7], in addition to sensor glucose and coefficient of variation (%CV).

2.4. Category Classification

A joint committee of the Japan Diabetes Society and Japan Geriatrics Society published “Japan Diabetes Society (JDS)/Japan Geriatrics Society (JGS)” to provide safe and effective diabetes care tailored to individual patient conditions [8,9]. Patients were categorized into three classifications based on health status, age, and use of medications that can cause hypoglycemia and comorbidities. Category classification is a comprehensive measure of physical, cognitive, and daily functions in older people with diabetes [10]. The more advanced the category, the worse the patient’s daily function. Patients were classified according to the Daily Functional Scale-8 questionnaire [10].

2.5. Statistical Analysis

Mean CGM metrics included normally distributed data and were therefore compared before and after tirzepatide administration using a paired *t*-test. The IBM Statistical Package for the Social Sciences version 28 (Armonk, NY, USA) was used for statistical analyses.

3. Case Presentations

(Case 1) An 81-year-old female patient with an 18-year diabetes duration and Category II diabetes reported a history of hypertension, dyslipidemia, hyperuricemia, and osteoporosis. She is currently being treated with glimepiride at 1 mg/day and acarbose at 300 mg/day, with the recent addition of tirzepatide. The glimepiride dose was successfully reduced to 0.5 mg/day after 36 days and was discontinued after 64 days (Table 1).

Table 1. Treatment course of Case 1.

	7 Days before the First Injection	23 Days after the First Injection	36 Days after the First Injection
HbA1c (%)	12.1	-	9.8
LDL/HDL/TG (mg/dL)	84/52/171	78/53/147	94/68/126
eGFRcr (mL/min/1.73 m ²)	40.2	34.9	34.2
AST/ALT (IU/L)	38/44	24/44	25/46
Body weight (kg)	75.6	73.9	-

LDL cholesterol, LDL; HDL cholesterol, HDL; triglyceride, TG; aspartate aminotransferase, AST; alanine aminotransferase, ALT.

(Case 2) An 87-year-old male patient with a 13-year diabetes duration and Category I disease reported a history of angina pectoris and polymyalgia rheumatica, for which he takes prednisolone at 3 mg/day. His diabetes is currently being managed with glimepiride at 0.5 mg/day, empagliflozin at 10 mg/day, imeglime at 2000 mg/day, and dulaglutide at 0.75 mg/week. The dulaglutide supply was limited. Thus, tirzepatide was replaced with dulaglutide. Imeglimine was successfully discontinued after 38 days (Table 2). Furthermore, tirzepatide was also discontinued due to weight loss.

Table 2. Treatment course of Case 2.

	4 Days before the First Injection	23 Days after the First Injection	38 Days after the First Injection
HbA1c (%)	7.8	-	7.3
LDL/HDL/TG (mg/dL)	82/51/99	-	63/52/103
eGFRcr (mL/min/1.73 m ²)	70.7	-	73.8
AST/ALT (IU/L)	17/10	-	16/9
Body weight (kg)	54.0	52.7	-

LDL cholesterol, LDL; HDL cholesterol, HDL; triglyceride, TG; aspartate aminotransferase, AST; alanine aminotransferase, ALT.

(Case 3) A 74-year-old male patient with an 11-year diabetes duration and Category II cancer reported a preexisting nonfunctioning adrenal tumor, along with arte-

riosclerosis obliterans, hypertension, and hyperuricemia. His medications included dapagliflozin (5 mg/day), voglibose (0.6 mg/day), pioglitazone (15 mg/day), and insulin degludec/insulin injections (twice a day). Voglibose was discontinued. The frequency of insulin injections was reduced from twice a day to once a day after 22 days (Table 3).

Table 3. Treatment course of Case 3.

	6 Days before the First Injection	22 Days after the First Injection
HbA1c (%)	8.8	7.8
LDL/HDL/TG (mg/dL)	98/64/150	73/50/101
eGFRcr (mL/min/1.73 m ²)	50.8	54.6
AST/ALT (IU/L)	16/11	15/8
Body weight (kg)	71.2	71.0

LDL cholesterol, LDL; HDL cholesterol, HDL; triglyceride, TG; aspartate aminotransferase, AST; alanine aminotransferase, ALT.

(Case 4) A 76-year-old male patient with approximately a 26-year diabetes duration and Category II reported a history of angina pectoris. The patient received insulin injections four times a day. Insulin aspart injections three times a day were discontinued, and the number of insulin injections was considerably reduced after tirzepatide initiation (Table 4).

Table 4. Treatment course of Case 4.

	5 Days before the First Injection	15 Days after the First Injection	21 Days after the First Injection
HbA1c (%)	7.7	7.5	-
LDL/HDL/TG (mg/dL)	89/56/71	85/46/69	-
eGFRcr (mL/min/1.73 m ²)	70.5	63.6	-
AST/ALT (IU/L)	21/21	18/18	-
Body weight (kg)	53.0	-	53.8

LDL cholesterol, LDL; HDL cholesterol, HDL; triglyceride, TG; aspartate aminotransferase, AST; alanine aminotransferase, ALT.

Figure 1 and Table 5 describe the course of the four cases.

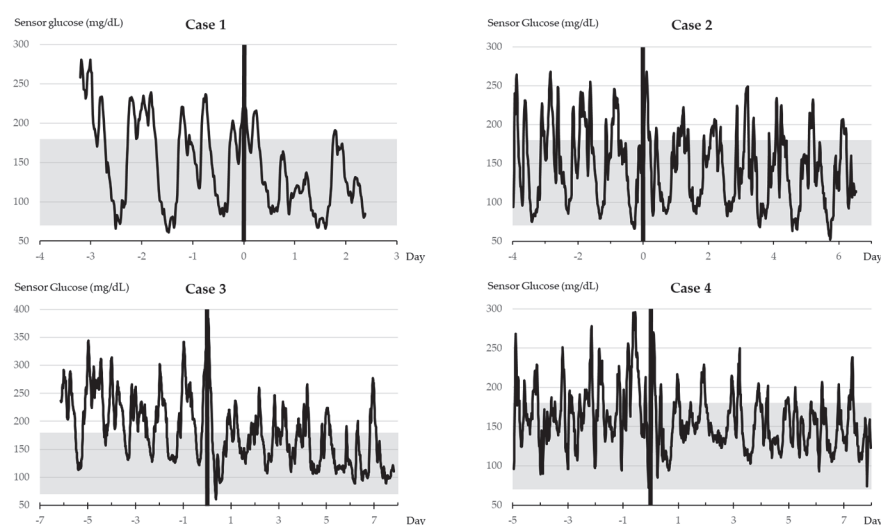


Figure 1. Tirzepatide initiation and CGM. Vertical bold lines indicate the timing of tirzepatide administration. The grayscale denotes the TIR range.

Table 5. Changes in CGM indices before and after tirzepatide administration.

	Observation Periods (Days)	Before			After		
		TIR	TAR	TBR	TIR	TAR	TBR
Case 1	7	52.6%	44.5%	2.9%	85.2%	11.8%	3.1%
Case 2	8	67.5%	31.4%	1.0%	76.6%	21.0%	2.4%
Case 3	14	27.6%	72.4%	0.0%	70.4%	29.2%	0.4%
Case 4	13	65.1%	34.9%	0.0%	83.4%	16.6%	0.0%

4. Results

The analysis focused on four cases where the initial administration of tirzepatide coincided with CGM measurements conducted for up to 2 weeks. They reported a mean age of 79.5 years (median, 78.5; range, 74–87), a mean BMI of 24.6 kg/m² (median, 23.6; range, 20.4–30.8), a mean glycated hemoglobin level of 9.1% (median, 8.3; range, 7.7–12.1), and a mean measurement period of 10.5 days (standard deviation: 3.5).

A *t*-test was used to compare the CGM indices of the four cases. After the tirzepatide treatment, the mean of TIR, TAR, and TBR improved from 53.2% (standard deviation [SD]: 18.2) to 78.9% (SD: 6.8) ($p = 0.041$), from 45.8% (SD: 18.6) to 19.7% (SD: 7.4) ($p = 0.038$), and from 1.0% (SD: 1.4) to 1.5% (SD: 1.5) ($p = 0.206$), respectively (Figure 2).

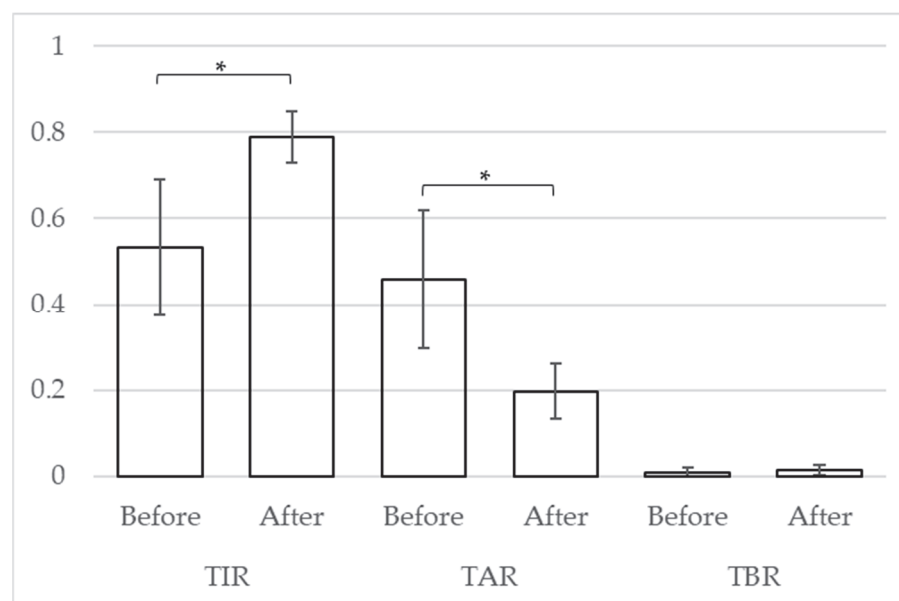


Figure 2. Change in CGM indicators. The vertical axis indicates the proportion of each indicator. * $p < 0.05$.

5. Discussion

Herein, we present four cases of CGM recorded for older Japanese patients with T2DM who received tirzepatide treatment. Immediately after the tirzepatide administration, hyperglycemia improved and TIR increased in older patients with T2DM. Furthermore, the mean TBR increased, but this short-term observation of some patients did not demonstrate significant differences.

The primary aim of this analysis is not to assess the mid-term or monthly effects of tirzepatide treatment but rather to confirm whether there is any occurrence of nocturnal or unintended hypoglycemia after the first injection and whether there are any unexpected adverse events in older patients. The exact timing of glucose lowering after the first administration of tirzepatide is not fully understood. We were able to present new clinical data demonstrating rapid improvement in sensor glucose levels after the first injection of tirzepatide.

Three of the four patients belonged to Category II (mild cognitive impairment to mild dementia or instrumental activity of daily living [ADL] decline and basic ADL independence) [8,9]. The early and potent hypoglycemic effect reduced the number of daily oral hypoglycemic medications and insulin injections. Correcting hyperglycemia while avoiding hypoglycemia is particularly important for older patients with T2DM [11]. Therefore, tirzepatide administration could be a useful treatment option for older patients with T2DM.

Conversely, a strong weight loss effect of tirzepatide has been reported [12–14], including rapid weight loss in three of four patients. Correction of obesity may be beneficial in older T2DM patients with obesity, but weight loss may be a risk factor for frailty/sarcopenia. One patient discontinued tirzepatide because of weight loss. An increase in the tirzepatide dose from the initial dose is expected to improve the weight loss effect. Therefore, longer-term observation within the Japanese patient population, which includes a large proportion of older and nonobese patients, is essential.

During short-term follow-up, eGFR values worsened in two cases (Cases 1 and 4) and improved in two cases (Cases 2 and 3). In the results of the post hoc analysis of renal outcomes in the SURPASS-4 trial, eGFR values appeared to decrease initially, suggesting an initial dip [15]. The clinical significance of this variation in eGFR values was unclear. However, clinicians should be aware of the eGFR value, which may decrease in the early stages of administration.

The present analysis is not an interventional study, but rather an examination of a small number of cases; the observation period for CGM was short. The duration of CGM monitoring before and after tirzepatide administration varied from case to case. Although there was little difference in the daily routines of the patients in this study between weekdays and weekends, the potential influence of life-cycle effects on the CGM indicator cannot be ignored. Furthermore, the small sample size raises concerns about the generalizability of the statistics derived from the statistical analysis to the older population as a whole. However, the experience gained from its application with older patients was deemed valuable.

Although it is important to conduct future interventional and long-term observational studies, it is also crucial to establish the safe use of tirzepatide. Additionally, while the powerful effect of various agents in reducing blood glucose levels and body weight is remarkable, it can also lead to adverse effects such as hypoglycemia, weight loss, frailty, and sarcopenia, especially in older patients. Therefore, when using GLP-1 receptor agonists, it is important to clarify the optimal formulation for various older individuals.

6. Conclusions

The CGM index immediately improved after tirzepatide administration. In the short term, tirzepatide may potentially decrease the requirement for multiple medications and streamline treatment regimens. The long-term effects of tirzepatide in a population that includes older and nonobese individuals will be investigated in future studies.

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Informed Consent Statement: Consent was obtained in the form of website opt-out. The information can be downloaded at <https://www.ncgg.go.jp/ncgg-kenkyu/ekigaku/1724.html>.

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Article

Grit and Second Language Learning Engagement: The Mediating Role of Affect Balance

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Abstract: The study of the relationship between key psychological attributes of learners and their engagement in second language (L2) learning helps to understand the critical personality mechanisms influencing language learning. The present study examined the L2 learning engagement from the perspectives of grit (i.e., consistent efforts and interests devoted to a long-term goal) and affect balance (a notion that takes into account both positive and negative emotions concurrently, assessing and evaluating which side holds more significance or influence). A cohort of English L2 learners ($N = 394$) participated in an online survey aimed at gauging their levels of grit, affect balance, and engagement in L2 learning. The results indicated that grit and affect balance were significantly correlated with behavioral engagement and affective engagement in L2 learning. However, among the two components of grit, namely consistency of interest, showed no significant relationship with L2 learning engagement, while perseverance of effort was significantly positively correlated with L2 learning engagement. Affect balance played a partially mediating and full mediating role between perseverance of effort and behavioral engagement as well as affective engagement respectively. These findings confirm the crucial role of perseverance of effort in second language learning and reveal the unique role of affect balance in their relationship.

Keywords: grit; positive emotions; negative emotions; affect balance; learning engagement

1. Introduction

In recent years, research in the field of second language acquisition has continuously intersected with psychological studies. New perspectives have been drawn from personality psychology [1] and positive psychology [2]. Various aspects of the mechanisms influencing language learning are explored by examining internal and external influencing factors on learners. The research related to positive psychology has become a hot topic in foreign language learning [2–5]. Positive psychology, breaking free from the previous emphasis on how negative psychology influences language learning, focuses on the positive aspects of human nature, such as grit [6], enthusiasm [4], hope [7], and more. Grit, as a concept at the intersection of personality psychology and positive psychology, has received sustained attention in recent second language (L2) studies [8,9].

1.1. Grit and L2 Learning

Grit refers to an individual's "consistent perseverance and interest towards long-term goals" [10,11]. Therefore, Duckworth et al. [10] divided grit into two components: perseverance of effort (PoE) and consistency of interest (CoI). PoE refers to an individual's ability to persist in doing something uninterruptedly, even in the face of setbacks. CoI is the unwavering passion for something over time, rather than a fleeting interest followed by a change in focus. Research has validated that grit consists of both PoE and CoI [11], but subsequent studies found that it is PoE, not CoI, that significantly predicts academic

achievement [12]. This suggests that, in the academic context, PoE in grit may play a more important role than CoI [13].

Recent studies have pointed out the need to design a specific grit scale for second language (L2) learning due to its uniqueness [14]. Teimouri et al. [14] designed and validated an L2 grit scale based on Duckworth et al. [11]. The primary distinction between general grit and L2 grit lies in the focus of measurement: while general grit assesses perseverance and passion for long-term goals in various domains, L2 grit specifically evaluates these qualities within the context of second language (L2) learning. For instance, a typical item in general grit, such as “I am diligent”, gauges perseverance of effort (PoE) across different areas. In contrast, an item in L2 grit would be modified to reflect the specific context, such as “I am a diligent English language learner”, emphasizing perseverance and passion specifically within the realm of L2 acquisition. Overall, the results show that L2 grit is positively correlated with learners’ language learning motivation and academic achievement, and this correlation is stronger than the results obtained using a general grit scale. Subsequent research using the L2 grit scale found positive correlations between L2 grit and L2 enjoyment and proficiency [15], positive correlations between L2 grit and L2 listening and reading self-efficacy, and negative correlations with L2 reading and listening anxiety [16]. Khajavy et al. [17] found that general grit could not significantly predict L2 academic achievement. These results indicate that the level of grit measured by a general grit scale does not have a significant relationship with L2 learning, unlike L2-specific grit [17]. However, some studies have found a negative correlation between general grit and L2 learning anxiety [6], suggesting that general grit can predict L2 academic performance by influencing L2 enjoyment [15]. Recent findings have further substantiated the strong link between enjoyment in L2 learning and general grit. For instance, in a study by Lee [18], it was discovered that perseverance of effort (PoE) exhibited a positive correlation with enjoyment in L2 learning across middle school, high school, and university students. However, while there was a positive correlation between classroom enjoyment and CoI for middle and high school students, this association was not observed among university students. Lee [18] also found that PoE in general grit could significantly predict L2 communication willingness, while CoI could not predict L2 communication willingness, and this result was also consistent across middle school, high school, and college students [18].

Although some studies use the L2 grit scale and others use a general grit scale, consistently, research results show a significant correlation between grit and L2 learning. It is worth noting that most existing studies demonstrating the effective prediction of L2 learning-related variables by general grit are based on L2 learner groups in China. Therefore, this study continues to use a general grit scale to measure the level of PoE and CoI in L2 learners. In addition, despite abundant evidence indicating a significant relationship between grit and L2 academic emotions [15,18], these studies lack a systematic understanding of emotions, especially a balanced understanding of positive and negative emotions. To delve deeper into this matter, we would introduce L2 emotion research, highlighting its evolution from a negative focus to a positive focus in the subsequent section. Additionally, we will explore the potential for jointly considering both positive and negative affects in this context.

1.2. L2 Academic Emotions: From Negative to Positive and Then to Balance

In the field of applied linguistics, there has been a noticeable shift towards emotions in the last 20 years, recognizing the limitations of previous research that focused too much on cognitive processes [19]. Early research on language learning emotions mostly concentrated on negative emotions, particularly language learning anxiety [20]. MacIntyre [20] summarized that language anxiety could lead to a decrease in academic performance, a decrease in perceived L2 abilities, a decrease in learners’ willingness to communicate, and interference in cognitive processes such as language input, processing, and production. A recent meta-analysis found a significant negative correlation ($r = -0.36$) between L2 anxiety

and L2 academic achievement. Moreover, L2 anxiety can explain 13% of the variance in L2 academic achievement [21], indicating that L2 emotions may affect L2 academic achievement.

Recent research has shifted from the perspective of negative emotions to positive emotions. For instance, Dewaele and MacIntyre [22] first introduced the variable of foreign language enjoyment (FLE) and found a significant negative correlation between FLE and language learning anxiety. Recent research further found that positive emotions play a mediating role in the relationship between teacher support and students' engagement in foreign language learning, and this mediating role is equally significant for both males and females [23]. In addition to enjoyment, other positive emotions such as passion and hope have also gained attention in L2 learning. For example, Chen et al. [24] found that harmonious passion is more predictive of positive performance in L2 learning activities, compared to obsessive passion. Furthermore, enthusiasm for L2 learning can transfer to other domains and promote personal growth. These results indicate that positive emotions from the perspective of positive psychology play a positive role in L2 learning, supporting a more complete depiction of the panorama of L2 learning emotions.

The application of positive psychology in L2 learning is not a disregard for defects and negative emotions but a search for balance between positive and negative emotions in humans. This perspective provides a new angle for the study of L2 learning emotions, namely affect balance. Affect balance is a concept that simultaneously considers positive and negative emotions, comparing and weighing which side has greater weight. It is often calculated by subtracting the score of negative emotions from the score of positive emotions [25]. Individuals with higher affect balance scores generally have more positive emotions and fewer negative emotions. Some studies also indicate that higher affect balance is associated with less emotional variability, while lower affect balance is associated with higher nightly stress [26]. This suggests that affect balance, as a component of subjective well-being, is closely related to an individual's life satisfaction [26]. Emerging from the positive psychology movement in L2 learning, there has been notable value in exploring how emotions influence L2 learning from an affect balance perspective. This approach enhances previous perspectives, which tended to be either positive dominant or negative dominant, by embracing a balanced understanding that incorporates both negative and positive affects.

1.3. L2 Learning Engagement: The Relationship between Grit and Academic Emotions

Research on learning engagement has accumulated significantly in the field of learning science, but there has been relatively less focus on it in the context of L2 learning [27]. Generally, in L2 learning, learning engagement is considered to be the effort exerted by L2 learners in the learning process, including various elements such as behavior and emotions [27]. Some studies have found that L2 learning anxiety has a negative impact on learning engagement [28]. Teacher support can positively predict L2 learning engagement [29] and positive academic emotions play a mediating role in this positive predictive effect [23]. It can be seen that recent research in L2 learning has begun to explore the correlation between L2 learning emotions and engagement, obtaining reliable relationship validations. However, the relationship between L2 grit and L2 learning engagement has not been verified. Liu [8] briefly reviewed the relevant studies on L2 learning engagement and grit, suggesting a possible positive relationship between the two, but did not provide supporting data [8]. As language learning often involves a challenging and prolonged journey marked by numerous obstacles and setbacks, learners must cultivate a positive mindset to navigate these challenges effectively and maintain their engagement with the learning process. Grit, characterized by steadfast commitment and perseverance toward long-term goals, emerges as a crucial trait in empowering language learners to overcome obstacles and sustain their engagement over time [8]. Therefore, this study attempts to simultaneously measure grit and L2 learning engagement and explore the relationship between the two. Learning engagement is a layered construct, including behavioral, affective, cognitive, and agentic engagement [27], and the former two were widely explored in the

literature [30]. Since the present study was an initial attempt to investigate the relationship between engagement and affect balance in the L2 learning context, behavioral and affective engagements were its focus.

1.4. The Present Study

Despite the growing attention to L2 grit, current research results are controversial, especially regarding the unclear relationship between CoI and L2 learning. Most results suggest that the consistency of interest (CoI) within grit cannot positively predict L2 academic achievement [31]. However, there is also evidence indicating that CoI can predict L2 learning emotions. Some studies have not distinguished between the two dimensions of grit but instead treated them as a whole when studying their relationship with L2 learning [15]. Given the inconsistency in existing research and different measurement approaches, this study, assuming grit as a whole, further differentiates CoI and perseverance of effort (PoE) to investigate the relationship between grit and L2 learning engagement. Additionally, current L2 emotion research lacks the perspective of affect balance, usually distinguishing positive and negative emotions, which is not conducive to exploring the comprehensive characteristics of individual learning emotions. This study measures both negative and positive emotions in L2 learning, calculates affect balance, and explores the relationship between L2 affect balance and L2 learning engagement.

Recently, Liu and Wang [9] found that in the relationship between grit and foreign language performance, foreign language enjoyment, and anxiety act as mediating variables influencing the relationship between grit and language performance, with a stronger mediating effect of foreign language anxiety. However, Liu and Wang [9] did not investigate the impact of affect balance on the relationship between grit and foreign language learning engagement. When considering affect balance, which entails integrating positive emotions alongside negative ones, a more holistic comprehension of emotional experiences emerges. Based on the above analysis, the research questions for this study are as follows:

RQ1: How are grit (PoE and CoI), L2 affect balance, and L2 learning engagement related?

RQ2: How do grit (PoE and CoI) and L2 affect balance predict L2 learning engagement?

RQ3: Does L2 affect balance have a mediating effect in the relationship between grit and L2 learning engagement?

2. Method

2.1. Participant

Convenience sampling was adopted. A total of 394 (367 freshman and 27 sophomores) participated in the study, including 100 males, with an overall average age of 20.19 years. The students were learning English as their second language and had been learning English since primary education. The participants spend 3–4 h per week on English language learning.

2.2. Measurement

2.2.1. Grit

The grit scale was initially proposed by Duckworth et al. [11], and later Duckworth and Quinn [10] introduced a shortened version of the grit scale, consisting of eight items that measure perseverance of effort (PoE) with four questions and consistency of interest (CoI) with four questions. The scale uses a 5-point rating, ranging from 1 (“Not at all like me”) to 5 (“Very much like me”). This scale has been used in previous studies [6,15]. In this study, the internal consistency reliability (Cronbach’s alpha) for PoE and CoI on this scale were 0.76 and 0.75, respectively. The confirmatory factor analysis provided construct validity for grit (CFI: 0.98, NFI: 0.98, IFI: 0.98, SRMR: 0.08)

2.2.2. Affect Balance

The affect balance questionnaire was adapted from Diener et al.’s [25] research, measuring individuals’ emotional experiences in engaging in certain activities over a recent period. In this study, it inquired about students’ emotional experiences in learning English

over the past three months, using a 5-point scale ranging from “Very rarely or never” to “Very often or always”. The chosen emotional descriptors included “Positive”, “Satisfied”, “Good”, “Happy”, “Enjoyable”, “Joyful”, “Sad”, “Unpleasant”, “Worried”, “Bad”, “Negative”, and “Angry”. Positive emotions were calculated by summing the scores of the first six emotions, while negative emotions were calculated by summing the scores of the latter six emotions. Affect balance was derived by subtracting the negative emotion score from the positive emotion score. The internal consistency reliability (Cronbach’s alpha) for the positive emotion questionnaire and negative emotion questionnaire in this study were 0.92 and 0.89, respectively. The construct validity was also confirmed (CFI: 0.99, NFI: 0.99, IFI: 0.99, SRMR: 0.05).

2.2.3. Language Engagement

The learning engagement questionnaire was adapted from Skinner et al.’s [30] wording has been altered to cater to English learning context, covering both behavioral (e.g., “I strive to achieve good grades in my English class”) and affective aspects (e.g., “I feel very good during English class”) in English learning context of students’ learning engagement with five items each. Behavioral engagement assesses actions dedicated to English learning, while affective engagement evaluates positive sentiments and attitudes toward English learning. A 7-point scale was used, with response options ranging from 1 (“Extremely unlike me”) to 7 (“Extremely like me”). In this study, the internal consistency reliability (Cronbach’s alpha) for behavioral engagement and affective engagement were 0.90 and 0.94, respectively. The confirmatory factor analysis showed learning engagement had a good model fit (CFI: 0.99, NFI: 0.99, IFI: 0.99, SRMR: 0.07).

3. Results

3.1. Descriptive Statistics and Correlation Analysis

Table 1 presents the descriptive statistics of the variables. It is apparent that students exhibit a relatively high level of L2 learning engagement, as evidenced by a mean score of 5 out of 7, and their grit is also at a moderately medium level (2.59/5). Regarding learning emotions, both positive and negative emotions are present. Therefore, the majority of students are in a relatively balanced affective state.

Table 1. Descriptive statistics for variables.

	M ± SD
Behavioral engagement	5.35 ± 1.05
Affective engagement	5.05 ± 1.23
Consistency of interest	1.84 ± 0.79
Perseverance of effort	3.35 ± 0.74
Grit	2.59 ± 0.61
Negative emotions	2.40 ± 0.81
Positive emotions	3.47 ± 0.73
Affect balance	1.07 ± 1.35

From the results of the correlation analysis (Table 2), it is evident that there was no significant relationship between consistency of interest (CoI) and L2 learning engagement, including both behavioral and affective engagement. Additionally, positive L2 learning emotions did not show a significant correlation with CoI. However, the remaining variables exhibited significant correlations. Specifically, negative academic emotions showed a negative correlation with learning engagement, while positive learning emotions and grit were significantly positively correlated with learning engagement.

Table 2. Correlation matrix of variables.

Variables	BE	AE	CoI	PoE	Grit	NE	PE	AB
BE	—							
AE	0.77 ***	—						
CoI	0.00	−0.01	—					
PoE	0.35 ***	0.28 ***	0.26 ***	—				
Grit	0.21 ***	0.18 ***	0.81 ***	0.78 ***	—			
NE	−0.26 ***	−0.41 ***	−0.22 ***	−0.18 ***	−0.25 ***	—		
PE	0.56 ***	0.70 ***	0.05	0.42 ***	0.29 ***	−0.54 ***	—	
AB	0.46 ***	0.63 ***	0.16 **	0.34 ***	0.31 **	−0.89 ***	0.86 ***	—

Note: BE: behavioral engagement, AE: affective engagement, CoI: consistency of interest, PoE: perseverance of effort, PE: positive emotion, NE: negative emotion, AB: affect balance. *** $p < 0.001$, ** $p < 0.01$.

3.2. Predictive Effects of Grit and Affect Balance on Learning Engagement

Grit and affect balance were entered into a regression model as predictor variables for learning engagement. There was no apparent linear covariation between the two predictor variables, as indicated by VIF values less than 1.12. The model showed good explanatory power with an R^2 of 0.46, and $p < 0.001$. However, grit did not significantly predict L2 behavioral engagement ($\beta = 0.08$, $t = 1.64$, $p > 0.1$), while affect balance ($\beta = 0.43$, $t = 9.22$, $p < 0.001$) was a significant predictor for L2 behavioral engagement. For affective engagement, affect balance as a predictor variable also had a significant predictive effect, with an R^2 of 0.63, $p < 0.001$, and $\beta = 0.63$, $t = 15.35$, $p < 0.001$. Grit, on the other hand, could not significantly predict affective engagement ($\beta = -0.02$, $t = -0.45$, $p > 0.1$).

Since consistency of interest (CoI) did not show a significant relationship with learning engagement, further analysis was conducted to explore whether the weaker predictive effect of grit on behavioral and affective engagement was due to simultaneously considering CoI and PoE. PoE and affect balance were included in the regression model as predictors for learning engagement. For behavioral engagement, both PoE ($\beta = 0.22$, $t = 4.74$, $p < 0.001$) and affect balance ($\beta = 0.38$, $t = 8.28$, $p < 0.001$) independently and significantly predicted behavioral engagement, with an R^2 of 0.50, $p < 0.001$. However, PoE could not significantly predict affective engagement in L2 learning ($\beta = 0.08$, $t = 1.93$, $p > 0.05$), while affect balance could significantly predict affective engagement ($\beta = 0.60$, $t = 14.48$, $p < 0.001$).

3.3. The Mediating Role of L2 Affect Balance in the Relationship between Grit and L2 Learning Engagement

Due to the relatively weak correlation between consistency of interest (CoI) and L2 learning engagement, the focus here was primarily on the relationship between perseverance of effort (PoE) and L2 learning engagement. The specific results of the mediation model are illustrated in Figure 1. PoE could directly predict behavioral engagement ($\beta = 0.30$, $z = 4.76$, $p < 0.001$) but only marginally predicted affective engagement ($\beta = 0.11$, $z = 1.94$, $p = 0.053$). However, PoE could predict both behavioral engagement ($\beta = 0.17$, $z = 5.38$, $p < 0.001$) and affective engagement ($\beta = 0.27$, $z = 6.35$, $p < 0.001$) through the mediating effect of affect balance. These results indicated that the relationship between grit and both behavioral and affective engagement in L2 learning was influenced by affect balance. The relationship between grit and behavioral engagement was partially mediated by affect balance, while the relationship between grit and affective engagement was fully mediated by affect balance.

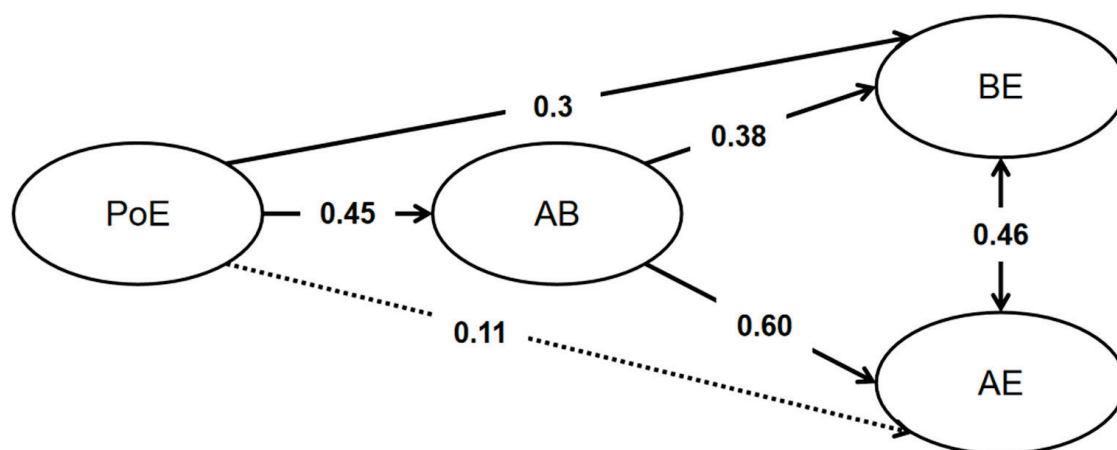


Figure 1. The mediating role of affect balance (AB) in the relationship between PoE (perseverance of effort) and L2 behavioral (BE) and affective engagement (AE). The dotted lines indicate the non-significance ($p > 0.05$).

4. Discussion

The present study, for the first time, investigated the predictive roles of grit and affect balance on L2 learning engagement. The results indicated that, overall, both the PoE and affect balance were correlated with and significantly predicted L2 behavioral engagement rather than affective engagement. Additionally, in the relationship between PoE and L2 learning engagement, affect balance played a significant mediating role.

4.1. The Correlation between Grit and L2 Affect Balance

The correlational analysis in this study revealed a significant association between grit and L2 positive emotions, negative emotions, and affect balance. These findings align with previous research; for instance, Teimouri et al. [14] found significant correlations between general grit and language enjoyment ($r = 0.21$, $p < 0.001$) and anxiety ($r = -0.26$, $p < 0.001$). Additionally, Teimouri et al. [14] used an L2 grit scale and found a significant correlation between L2 grit and language enjoyment ($r = 0.45$, $p < 0.001$) and a negative correlation with language anxiety ($r = -0.27$, $p < 0.001$). Li and Dewaele [6] found that general grit could significantly predict foreign language anxiety. Similar to Li and Dewaele [6], this study also found that general grit could significantly predict affect balance ($\beta = 0.31$, $t = 6.40$, $p < 0.001$). These consistent findings affirm the crucial role of general grit in L2 learning, especially in influencing emotional reactions during the language learning process. High levels of grit may aid individuals in coping with negative emotions, such as anxiety. However, further research is needed to explore the relationship between grit and other negative emotions, such as shame and confusion.

4.2. Grit and L2 Learning Engagement: PoE Rather Than CoI Plays a Role

The results of this study indicate that general grit cannot significantly predict individuals' L2 learning engagement, including behavioral and affective engagement. These results suggest that the impact of general grit on L2 learning engagement is limited, and a crucial reason for this limitation is that general grit encompasses both PoE and CoI. These two components show differential relationships with learning engagement. Correlational results indicate a significant positive correlation between PoE and L2 learning engagement, including both behavioral and affective engagement. However, CoI shows no correlation with either behavioral or affective engagement. These findings are similar to those of Teimouri et al. [14], who found that PoE had a significant correlation with grammar scores, speaking scores, GPA, and self-reported language proficiency, while CoI did not show significant correlations. These results imply that, compared to CoI, PoE has a closer relationship with language learning. As the difficulty of language learning increases and

learning time extends, the motivation to maintain higher levels of learning engagement may be driven more by the inertia of PoE than by CoI. Over time, many language learners may lose their initial interest and passion but still require sustained effort to achieve a certain language proficiency level. Therefore, individuals with high levels of grit are more likely to adopt persistent effort to achieve their goals.

These findings also highlight the criticism of measuring general grit, including both PoE and CoI [32]. PoE, compared to general grit, shows a stronger correlation with L2 learning. This indicates that, when analyzing grit as a personality trait, it is essential to consider the differential contributions of its various aspects. Therefore, in future research, when analyzing grit as a personality trait, more attention should be paid to PoE rather than CoI. However, PoE cannot significantly predict L2 affective engagement, indicating that the personality trait of grit may have a more substantial impact on language learning behavior than on affective engagement. One possible explanation for the finding that general grit cannot predict L2 affective engagement may be that general grit may not be as evident in L2 learning as L2 grit. There is evidence suggesting that L2 grit and general grit produce different results concerning their correlation with language learning achievement. For example, L2 grit is significantly correlated with grammar scores ($r = 0.26$, $p < 0.001$), speaking scores ($r = 0.30$, $p < 0.001$), GPA ($r = 0.45$, $p < 0.001$), and self-evaluated language proficiency ($r = 0.31$, $p < 0.001$). In contrast, general grit shows no significant correlation with grammar scores ($r = 0.05$, $p > 0.05$) and self-evaluated proficiency ($r = 0.11$, $p > 0.05$), and weaker correlations with speaking scores ($r = 0.18$, $p < 0.05$) and GPA ($r = 0.14$, $p < 0.05$) [14]. These results suggest that L2 grit may be more relevant to L2 academic performance. However, general grit is still correlated with various L2 academic achievements, albeit to a lesser extent [14]. Additionally, the reliability coefficient of CoI in the L2 grit scale designed by Teimouri et al. [14] is only 0.66, slightly lower than the desirable reliability level of 0.7. Therefore, the study provides corrected correlation coefficients when conducting correlational analysis [14]. In contrast, the general grit scale shows high reliability coefficients, all exceeding 0.75. Therefore, there is room for improvement in the reliability of L2 grit in that study, which may affect the stability of the correlation results. Nevertheless, the general grit scale's high reliability coefficients and its correlations with relevant language learning emotions and academic achievements confirm that general grit can be still used in L2 learning research.

4.3. Affect Balance as a Mediator in the Relationship between Grit and L2 Learning Engagement

Another contribution of this study is the examination of L2 learning emotions' predictive role and their mediating effect on the relationship between grit and L2 learning engagement from the perspective of affect balance. Affect balance, considering both positive and negative emotions, has been shown to be closely related to life satisfaction [33]. This study also found a significant correlation between L2 affect balance and L2 learning engagement, including both behavioral and affective aspects. Compared to positive emotions, the correlation strength between L2 affect balance and engagement is weaker, indicating that pure positive emotions play a stronger role in L2 learning engagement. However, L2 affect balance, by incorporating positive emotions after accounting for negative emotions, provides a more comprehensive understanding of emotional experiences. As individuals experience various emotions, including both positive and negative, examining only positive or negative emotions cannot capture a balanced understanding of emotions. Some perspectives suggest that excessive positive emotions can also bring negative impacts, and negative emotions have adaptive functions [34]. For example, if someone feels extremely low levels of negative emotions, such as anxiety or fear, the individual is likely to have psychopathy and show antisocial behaviors [34]. Therefore, experiencing certain levels of negative emotions is beneficial and affect balance is considered a suitable emotional experience for learning.

Finally, when simultaneously considering PoE and affect balance, affect balance can significantly predict both behavioral and affective engagement, while PoE can only signifi-

cantly predict behavioral engagement. Additionally, affect balance serves as a mediator in the relationship between PoE and L2 learning engagement. This further enriches the results of Liu and Wang [9], indicating that, in addition to L2 enjoyment and anxiety mediating the relationship between grit and language performance, affect balance also mediates the relationship between PoE and L2 learning engagement. The complete mediating effect of affect balance in the relationship between PoE and L2 affective engagement confirms the critical role of affect balance in affective engagement. It also demonstrates how affect balance can influence the impact of related personality variables on L2 affective engagement. The partial mediating effect of affect balance in the relationship between perseverance of effort and behavioral engagement suggests that affect balance can also play a role in behavioral engagement. Therefore, in the analysis of learning engagement, it is essential to consider personality variables such as perseverance of effort and incorporate emotion-related influencing factors. Specifically, a balanced state of negative and positive emotions is crucial for language learners' behavioral and affective engagement. Thus, language educators need to have a comprehensive understanding of learners' emotions, not only focusing on positive or negative emotions but also grasping learners' emotional experience as a whole.

4.4. Limitations and Future Directions

Although this study has discovered the significant roles of general grit and affect balance in L2 learning engagement, as well as the differential correlational relationships between CoI and PoE with L2 learning engagement, and the mediating role of affect balance in the relationship between L2 learning engagement and PoE, there are several aspects worth considering in future research.

Firstly, most studies on the role of emotions in the L2 learning process adopt cross-sectional research designs and lack longitudinal research. Emotions in individual language learning experiences are dynamic and unstable. Although this study measured learners' L2 learning emotions by requiring participants to recall their overall learning emotional experiences over the past month, there is still a certain time limitation. Therefore, future research could extend the time for tracking emotional changes and explore the characteristics of L2 emotions over more extended periods, examining their relationship with L2 academic achievements and engagement.

Secondly, categorizing emotions into positive and negative groups is a relatively binary approach to emotions. While valence is an essential variable in explaining differences in emotional activation [35], some argue that the unique effects of discrete emotions cannot be entirely explained by valence [36]. Therefore, future research could simultaneously consider multiple discrete emotions, such as shame, which has been less studied, and investigate how they, along with personality traits like grit, collectively influence L2 learning outcomes and engagement.

Lastly, a considerable amount of research focuses on L2 learning, with less emphasis on third language (L3) research [37]. While L3 learning shares similarities with L2 learning, it also has its unique characteristics. Hence, future research could further explore the roles of emotions and personality traits in the L3 learning process.

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Article

Filial Maturity and Caregiving to Aging Parents

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Abstract: The aging of parents results in changes in the filial relationship. The increasing vulnerability of parents leads adult children to realize that they have individual needs and cannot fully function as sources of security and protection, as they did before. Simultaneously, the evidence of losses and disability imposes the need for care, which tends to be assumed by adult children. Therefore, there is a progressive change in the volume of support exchanges between parents and children, with more support from adult children to parents. The way adult children adapt to these transitions is influenced by several internal and relational factors. Filial maturity has been associated with filial caregiving towards aging parents. The concept of filial maturity describes a developmental stage in which the adult child overcomes the filial crisis, realizing and accepting that the parent also needs support and comfort and starting to relate to him/her beyond the strictly parental role. Thus, this study aims to explore the role of attachment and mental representation of caregiving in filial maturity. A total of 304 children aged between 35 and 64 years old participated in this study, with at least one of the living parents aged 65 years or older, not institutionalized. Attachment was assessed with the Adult Attachment Scale, mental representation of caregiving with the Mental Representations of Caregiving Scale and filial maturity with the Filial Maturity Measure. The results suggest that attachment, mental representation of caregiving and the interaction between the two explain 24.5% ($p < 0.01$) of variability in Comprehending and 11.1% ($p < 0.05$) of variability in Distance, two dimensions of filial maturity. These findings suggest that it is important to consider mental representation of caregiving and attachment when adult children must adapt to changes in the filial relationship and to the need to care for parents.

Keywords: filial caregiving; filial maturity; attachment; aging parents; middle-aged children

1. Introduction

The demographic, social and economic transformations that we have been witnessing since the second half of the 20th century—such as greater longevity, the postponement of parenthood and the decrease in birth rates—have led to profound changes in family structure [1]. These changes become particularly visible in middle age when the empty nest gives way to the full nest and middle-aged adults are divided between the appeals of the ascending (own parents) and descending (children) generations [2,3].

All these transformations, associated with the changes that occur, both in adulthood and with aging, have a profound impact on the nature and dynamics of the relationship between middle-aged children and aging parents [1].

1.1. Filial Relationships and Filial Caregiving in Middle Age

In filial relationships—relationships that are established between adult children and aging parents—the dynamic between caregiving and care-receiving throughout life develops in ways that distinguish them from other relationships. They combine the relationship's

previous progress with specifics emerging in the current developmental and family period [1,4]. One of its key aspects is the process of differentiation and individualization of adult children in relation to their parents, which begins in adolescence [5,6].

Family relationships in adult life evolve towards reciprocity, hierarchical horizontality and mutuality [7]. In this sense, the older generation abandons the authoritarian position, the younger generation starts looking at parents beyond their parental role and both actors seek to balance two roles—being dependent and being dependable [8]. However, this balance can be blurred by the increase in fragility and dependence, which often accompanies the greater longevity of the parents and which imposes the demand for filial caregiving [9].

In the transition to greater dependence of parents, adult children experience mixed, ambivalent and contradictory emotions: on the one hand, they want to be present and available, but on the other, new tasks conflict with existing routines and roles, and they may have doubts regarding how to care without taking control of the relationship [10–12]. This ambivalence is also manifested in parents who want both independence and connection to their adult children [13]. In this adaptation, attachment, mental representation of caregiving and filial maturity can be resources or constraints to deal with caregiving for aging parents.

1.2. Filial Maturity

The concept of filial maturity was introduced by Blenker in 1965 [14] to describe the change that occurs in the nature and quality of the relationship between parents and adult children. She proposed a new developmental stage beyond genital maturity and introduced the concept of filial maturity to characterize the successful transition from that to old age.

According to Blenker [14], most individuals around 40/50 years of age experience a filial crisis, when they are confronted with the aging and increasing vulnerability of the parents and with the possibility that they cease to function as sources of support as they grow older and need the support and comfort of their children. In this way, adult children are impelled to respond to the needs of their parents—when successful, they reach filial maturity. This means they abandon the rebelliousness and desire for emancipation and separation typical of adolescence and youth. They establish a relationship with their parents beyond the limits of the filial role, seeing them in a more objective way, which encompasses not only their parental role but also their individual role and history: their own pre-existing motivations and needs. This enables adult children to take care of parents based on their actual needs, respecting their individuality, instead of infantilizing care.

After Blenker, Nydegger [15] reformulated the concept of filial maturity, distinguishing in it two dimensions: Distancing and Comprehending. Distancing encompasses the separation of the adult child from the parents and the formation of a new life as an adult, as well as the objective perception that the parent is a person with limitations. Comprehending occurs after Distancing and refers to the ability to see parents as individuals with a life history that exists independently of the parent–child relationship.

Regarding the role of filial maturity in filial care, research is scarce but existing studies show that higher levels of filial maturity are associated with less burden [16], greater ability to deal with parent caregiving and a lower tendency to opt for institutionalization without considering other options [17].

1.3. Attachment and Caregiving

Attachment refers to a strong and lasting emotional bond built in childhood [18]. It is based in the dynamics between caregiving and care-receiving established between mother and young child, through which the individual obtains feelings of comfort and security to deal with the demands and adversities of life.

Different experiences with the attachment figure lead to different attachment patterns or styles, expressing the individual's beliefs about himself as someone deserving of care and affection, and about others as available and trustworthy people. These beliefs, called Internal Working Models (IWMs), are the mechanism through which early attachment

influences care-seeking and caregiving behaviors, as they provide information about how the individual should act and how others will respond in other social contexts [19]. Thus, experiences of sensitivity and responsiveness with the mother lead to a secure attachment. Experiences of rejection lead to an avoidant attachment. Experiences of inconsistency and ambivalence lead to an anxious attachment.

Caregiving, according to attachment theory, aims to reduce the suffering of other people, protect them from danger and encourage their growth and development [20–22]. It also has a representational component with its developmental roots in the IWM of attachment relationships [23,24]. The caregiving IWMs include the model of the self as a caregiver—the extent to which the individual sees himself with proper skills and abilities to care—and the model of others who need help—the extent to which the individual considers that others deserve help [25].

To provide care, the person must have reached a certain degree of security [26]. Only then can they perceive others not only as sources of security, but also as human beings who need and deserve comfort and support [24]. Dealing with the suffering of another person can evoke two types of reactions that are very much influenced by the attachment style. Thus, secure individuals tend to show empathic compassion, focusing on the other person's needs or suffering and trying to relieve stress for the benefit of the person who is suffering [21,27–30]. Insecure individuals tend to react with personal stress, focusing on their own discomfort, which can be alleviated by either ignoring and abandoning the situation, or helping if help is the best way to reduce the caregiver's own discomfort [21,25,29,31].

1.4. Study Aim

Research has shown the relevance of attachment, mental representation of caregiving and filial maturity for understanding midlife filial caregiving. However, the way in which these variables are articulated has been analyzed little. Thus, the aim of this study is to examine the role of attachment and mental representation of caregiving in filial maturity.

2. Materials and Method

2.1. Study Design

The study employed a cross-sectional design.

2.2. Participants

Participants were selected through a convenience sampling procedure. The following inclusion criteria were established: (a) age between 35 and 64, (b) had at least one living parent aged 65 or older and (c) the parent was not institutionalized.

Participants were recruited from health and social care services who were supporting the aging parents.

Directors of the social care services approved the study and gave access permission to personal information of the adult children whose parents attended the services. Health services required the study to undergo prior review by an accredited Medical Research and Ethics Committee.

Participants were then contacted either in person or via telephone to take part in the study. After acceptance, data collection protocols were applied directly and in person by researchers.

The application of the protocols was preceded by the guarantee of confidentiality of the data provided and informed consent, both by the participant and the researchers.

2.3. Variables and Instruments

Attachment: Portuguese version of the *Adult Attachment Scale* [32,33] evaluates 3 attachment styles (secure, anxious, avoidant) across 18 items rated in a 5-point *Likert* scale. Secure attachment style includes individuals who feel comfortable with intimacy, can trust others and are not afraid to be abandoned; avoidant style encompasses those who do not

feel comfortable with proximity towards others, do not trust them but are not afraid of being abandoned; anxious style refers to those who feel uncomfortable with proximity towards others, do not trust them and are particularly afraid of being abandoned. The *Cronbach alpha* was 0.81, the *Spearman–Brown* coefficient was 0.84 and the *split-half* correlation coefficient was 0.83.

Mental Representation of Caregiving (MRC): Portuguese version of the *Mental Representation of Caregiving Scale* [25,34] has 27 items rated in a 7-point *Likert* scale. Items are organized into 4 factors: (1) Perceived ability to provide effective help (MRC-1); (2) Perceived ability to recognize others' needs (MRC-2); (3) Egoistic motives for helping (MRC-3); (4) Appraisal of others as worthy of help (MRC-4). The *Cronbach alpha* ranged between 0.70 and 0.80 and all items significantly correlated with the total score of the factor they belong to.

Filial Maturity: Portuguese version of the Filial Maturity Measure [35,36] has 9 items rated in a 6-point *Likert* scale. Items are organized into two subscales: (1) Comprehending, which assesses the ability to establish an intimate, understanding and mutually supportive relationship with the parents, (2) Distancing, which refers to the children's awareness of the parents' faults and limitations. The *Cronbach alpha* was 0.84 for Comprehending and 0.58 for Distancing.

Parent's Functional Status: was assessed in two domains: basic activities of daily living (BADL) and instrumental activities of daily living (IADL). Functionality in BADL was assessed by the Portuguese version of Barthel Index [37,38], which encompasses 10 BADLs—feeding, bathing, grooming, dressing, bowel control, bladder control, toilet use, transfers (bed to chair and back), mobility (on level surfaces) and stairs. Scores range from 0 to 100, with higher scores indicating greater independence. The Portuguese version of Barthel Index showed high reliability with a *Cronbach's alpha* of 0.89 and an item-total correlation ranging from 0.53 to 0.85. Functionality in IADL was assessed with the Portuguese version of Lawton Index [38,39], which includes eight IADLs—preparing food, housekeeping, doing laundry, shopping, using the telephone, using transportation, handling finances, and handling medications. The Portuguese version of Lawton Index shows a *Cronbach's alpha* of 0.92 and an item-total correlation ranging from 0.75 to 0.86.

2.4. Data Analysis Procedures

Data were analyzed using the SPSS V24 statistical software. The assumptions underlying the use of parametric tests were met. The T-Test for independent samples and the Chi-Square Test were used. To explore the impact of attachment and mental representation of caregiving on the two subscales of filial maturity, hierarchical multiple regression models were used.

First, the known predictors from previous investigation were inserted, in order of importance, in the explanation of the outcome, and then the new predictors were inserted, based on theoretical importance, through the Enter and Forward methods. Predictor variables were entered in seven steps: (1) sociodemographic variables—gender, age, years of education, marital status, professional status, number of children, number of siblings (Enter); (2) attachment—secure vs. insecure (Enter); (3) the four factors of MRCS (Enter); (4) interaction between attachment and the four factors of MRCS (Forward); (5) cohabitation with the parent (Forward); (6) parent's functionality in basic activities of daily living—independent versus dependent (Forward); (7) parent's functionality in instrumental activities of daily living—independent versus dependent (Forward). Cases whose standardized residuals had values greater than 3 were excluded. There was an absence of multicollinearity (absence of a perfect linear relationship) between the predictors, through the Variance Inflation Factor (VIF) values, which were shown to be lower than 4, and through the Tolerance values, which were shown to be above 0.10.

3. Results

3.1. Sociodemographic Characteristics of Participants

Results for sociodemographic characterization of participants are presented in Table 1.

Table 1. Sociodemographic characteristics.

	Male (n = 97)		Female (n = 207)		Total (n = 304)	
	n	%	n	%	n	%
Age (35–64)						
M (SD)	50.48 (7.75)		48.56 (7.79)		49.17 (7.82)	
Education						
M (SD)	11.51 (4.70)		13.22 (4.73)		12.67 (4.78)	
Marital status						
Single	14	14.40	33	15.90	47	15.50
Married/Living together	72	74.20	146	70.50	218	71.70
Divorced/Separated	10	10.30	23	11.10	33	10.90
Widowed	1	1.00	5	2.40	6	2.20
Professional status						
Employed	77	79.40	157	75.80	234	77.00
Full-time	62	63.90	137	66.20	199	65.60
Part-time	15	15.50	20	9.70	35	11.50
Unemployed	7	7.20	31	15.00	38	12.50
Retired	13	13.40	19	9.20	32	10.50
Children (0–4)						
M (SD)	1.40 (0.92)		1.36 (0.92)		1.37 (0.92)	
Brothers						
M (SD)	2.32 (2.22)		2.10 (2.02)		2.17 (2.08)	
Distance from parent						
M (SD)	19.87 (49.35)		17.90 (48.08)		18.54 (48.42)	
Parents' functionality in BADL *						
Independent	62	63.90	136	65.70	198	65.10
Slightly dependent	17	17.50	42	20.30	59	19.40
Moderately dependent	4	4.10	11	5.30	15	4.90
Severely dependent	7	7.20	8	3.90	15	4.90
Totally dependent	7	7.20	10	4.80	17	5.60
Parents' functionality in IADL *						
Independent	5	5.2	32	15.50	37	12.20
Moderately dependent	52	53.60	89	43.00	141	46.40
Severely dependent	40	41.20	86	41.50	126	41.40

* The parent with the highest degree of dependence was considered.

A total of 304 adults with a mean age of 49.17 years (SD = 7.821) participated in the study. Participants were mostly women (68.10%) with a mean age of 48.56 years (SD = 7.79) and with a higher level of education than men. Men (31.90% of the sample) had a mean age of 50.48 years (SD = 7.75). Most of the participants were professionally active (77.00%), married or living together (71.70%), averaging one child (SD = 0.92). On average, the participants lived 18.54 km away from their parents.

3.2. Characterization of Participants Regarding Attachment, Mental Representation of Caregiving and Filial Maturity

Most participants had a secure attachment style (56.6%) and 43.4% had insecure attachment (35.2% anxious attachment and 8.2% avoidant attachment; see Table 2).

Table 2. Attachment style and type.

	Male (n = 97)		Female (n = 207)		Total (n = 304)		χ^2
	n	%	n	%	n	%	
Attachment style							0.05
Secure	54	55.7	118	57.0	172	56.6	
Anxious	35	36.1	72	34.8	107	35.2	
Avoidant	8	8.2	17	8.2	25	8.2	
Attachment type							0.05
Secure	54	55.7	118	57.0	172	56.6	
Insecure	43	44.3	89	43.0	132	43.4	

Regarding MRC, women scored significantly higher than men on factors MRC-1 ($t(302) = -3.80, p < 0.001$) and MRC-2 ($t(302) = -5.24; p < 0.001$), which means that they perceive themselves as more able and available to care and as more able of identifying and recognizing the needs of other people. Men had higher scores on the MRC-3 factor ($t(302) = 2.98, p < 0.01$) (see Table 3), which means that they have more selfish motivations for caregiving (see Table 3).

Table 3. Mental representation of caregiving and filial maturity.

	Male (n = 97) M (SD)	Female (n = 207) M (SD)	t (302)
Mental representation of caregiving			
MRC-1 ^a	5.39 (0.60)	5.67 (0.57)	−3.80 ***
MRC-2 ^b	4.83 (0.88)	5.48 (0.84)	−5.24 ***
MRC-3 ^c	2.08 (0.69)	1.84 (0.56)	2.98 **
MRC-4 ^d	4.97 (1.28)	5.17 (1.30)	−1.28
Filial Maturity			
Comprehending	3.49 (1.15)	3.90 (1.13)	−2.87 **
Distancing	3.54 (1.25)	3.79 (1.17)	−1.73

Note: ** $p < 0.01$; *** $p < 0.001$. Note: ^a perceived ability to provide effective help; ^b perceived ability to recognize others' needs; ^c egoistic motives for helping; ^d appraisal of others as worthy of help.

Results for filial maturity indicated that, although women had higher levels of Comprehending and Distancing, the difference in relation to men is only significant for Comprehending ($t(302) = -2.87, p < 0.01$) (see Table 3).

3.3. Multivariate Analyses for Filial Maturity

Tables 4 and 5 present results from the hierarchical regressions for Comprehending and Distancing. Regarding Comprehending, the Final Model of the regression explains 24.6% (R^2) of variance in Comprehending (see Table 4). The block of variables that contributes most to the explained variance in Comprehending is the one that encompasses the MRC factors ($\Delta R^2 = 0.160; p = 0.000$). In the Final Model (see Table 5), the significant predictors are age, the MRC-1 and MRC-4 factors, and the interaction between attachment and the MRC-2 factor (Attachment X MRC-2). Attachment and the MRC-2 factor are only significant in the Final Model when the block of variables relating to the interaction between attachment and MRC is inserted. This means that lower age, perception of more capacity and availability to provide care, more evaluation of others as deserving of help and the combined effect of attachment and mental representation of caregiving are associated with greater ability to establish relationships with parents based on intimacy, understanding and mutual support. The interaction between attachment and MRC-2 factor suggests that, in secure children, a greater ability to recognize the needs of others means a greater Comprehending dimension. Conversely, in insecure individuals, the same ability is related to less Comprehension.

Table 4. Change statistics for variables predicting Comprehending and Distancing.

Model	R	R^2	$Adjusted\ R^2$	Change Statistics				
				$R^2\ Change$	$F\ Change$	df1	df2	Sig. $F\ Change$
Comprehending [†]								
1 ^a	0.252	0.064	0.041	0.064	2.853	7	294	0.007
2 ^b	0.254	0.065	0.039	0.001	0.331	1	293	0.566
3 ^c	0.474	0.225	0.193	0.160	14.951	4	289	0.000
4 ^d	0.496	0.246	0.212	0.021	8.202	1	288	0.004
Distancing								
1 ^a	0.128	0.016	−0.007	0.016	0.704	7	296	0.669
2 ^b	0.234	0.055	0.029	0.038	11.987	1	295	0.001
3 ^c	0.252	0.064	0.025	0.009	0.693	4	291	0.597
4 ^e	0.311	0.096	0.056	0.033	10.518	1	290	0.001
5 ^f	0.333	0.111	0.068	0.014	4.607	1	289	0.033

^a Predictors: (constant), sociodemographic variables. ^b Predictors: (constant), sociodemographic variables, attachment. ^c Predictors: (constant), sociodemographic variables, attachment, MRC. ^d Predictors: (constant), sociodemographic variables, attachment, MRC, Attachment X RMPC-2. ^e Predictors: (constant), sociodemographic variables, attachment, MRC, Attachment X RMPC-1. ^f Predictors: (constant), sociodemographic variables, attachment, MRC, Attachment X RMPC-1, Attachment X RMPC-4. [†] 2 cases whose standardized residuals were below −3.00 were excluded.

Table 5. Summary of hierarchical multiple regression analysis for variables predicting Comprehending and Distancing.

Final Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Standard Error	β	t	Sig.
Comprehending					
Gender	0.126	0.134	0.052	0.941	0.347
Age	−0.022	0.008	−0.155	−2.777	0.006
Education	−0.124	0.134	−0.053	−0.922	0.357
Marital status	−0.079	0.160	−0.031	−0.496	0.621
Professional status	−0.154	0.156	−0.057	−0.987	0.325
Children	−0.016	0.178	−0.006	−0.090	0.928
Siblings	0.120	0.171	0.037	0.703	0.483
Attachment	−2.034	0.714	−0.889	−2.850	0.005
MRC-1	0.640	0.105	0.334	6.097	0.000
MRC-2	−0.197	0.097	−0.154	−2.041	0.042
MRC-3	−0.149	0.106	−0.080	−1.403	0.162
MRC-4	0.147	0.047	0.168	3.114	0.002
Attachment X MRC-2	0.387	0.135	0.919	2.864	0.004
Distancing					
Gender	0.219	0.157	0.085	1.396	0.164
Age	−0.007	0.009	−0.044	−0.723	0.470
Education	0.024	0.153	0.010	0.157	0.875
Marital status	0.102	0.182	0.038	0.560	0.576
Professional status	−0.040	0.179	−0.014	−0.222	0.824
Children	−0.113	0.202	−0.038	−0.560	0.576
Siblings	0.011	0.197	0.003	0.056	0.955
Attachment	−5.615	1.363	−2.320	−4.119	0.000
MRC-1	−0.349	0.177	−0.173	−1.969	0.050
MRC-2	−0.131	0.084	−0.097	−1.559	0.120
MRC-3	−0.051	0.122	−0.026	−0.423	0.673
MRC-4	−0.076	0.080	−0.082	−0.946	0.345
Attachment X MRC-1	0.713	0.230	1.679	3.098	0.002
Attachment X MRC-4	0.229	0.107	0.517	2.146	0.033

Findings for Distancing showed that the Final Model of the regression explains 11.1% (R^2) of variance in Distancing. The significant predictors of Distancing are attachment ($\Delta R^2 = 0.038$; $p = 0.001$), the interaction between attachment and MRC-1 factor ($\Delta R^2 = 0.033$; $p = 0.001$) and the interaction between attachment and MRC-4 factor ($\Delta R^2 = 0.014$; $p = 0.033$). The Final Model (see Table 5) shows that the significant predictors of Distancing are

attachment, the interaction between attachment and MRC-1 factor (Attachment X MRC-1), and the interaction between attachment and the MRC-4 factor (Attachment X MRC-4). The contribution of attachment is significant since it is inserted into the model, suggesting that insecure attachment is related to more Distancing. The interaction between attachment and MRC-1 factor suggests that, in secure attached children, Distancing increases when the ability and availability to provide care also increases. Conversely, in insecure attached children, Distancing decreases when the ability and availability to provide care increases. The interaction between attachment and factor 4 suggests that, in children with Secure Attachment, Distancing increases when factor 4 increases, that is, the more they evaluate others as deserving of care. On the other hand, in children with insecure attachment, Distancing is relatively constant, regardless of the value of factor 4, which indicates that there is no relationship between the two variables in insecurely attached children.

4. Discussion

Adult children participating in this study show different mental representations of caregiving, depending on gender: women consider themselves more capable of providing adequate and effective care to a person who needs help and are more available to get involved in that care, more able to recognize and identify other people's needs, their requests for help and the way they feel and have less selfish motivations to care, caring altruistically, not expecting to obtain advantages, benefits or to avoid negative consequences. In fact, it is common for women to have more experience in caring, as they are more frequently faced with situations in which responsibility for caring is required of them: they tend to be the main caregivers for their children in the first months of their lives, from other family members when they become ill and from older family members [40–42]. However, in this study, women are more likely to be single and unemployed unlike men who are older, more likely to be married, more likely to be employed, and farther from their parents' homes. It may happen that the female participant population may have relatively more favorable conditions for caregiving than men.

Regarding filial maturity, Comprehending is higher in daughters than in sons. Several studies that analyze the association between the quality of the filial relationship and gender show that relationships between mothers and daughters are closer emotionally [43]. Not only do daughters feel closer to their mothers and turn to them to confide in them [4,44], but mothers also feel more positive affection towards their daughters, sharing more intimate and emotional information with them and they turn to them for comfort [4,45]. This emotional closeness between mothers and daughters can encourage the sharing of experiences between them and thus reduce conflicts [46–49]. In the context of these closer relationships, individuals are likely to be better able to understand each other [15,35].

Regression analyses show that filial maturity is essentially explained by attachment and mental representation of caregiving. These results highlight the relevance of the representational dimension of caregiving and of the attachment relationship in the development of filial maturity.

Thus, in terms of Comprehending, the interaction between attachment and MRC-2 factor suggests that, in secure attached children, greater ability to recognize the needs of others increases this dimension, while in insecure children, it decreases it. In secure children, this association makes sense, because it is the perception of signs of discomfort and suffering in others that activates the caregiving system and, consequently, the actions of approaching and relieving the discomfort [25]. At the Distancing level, the interaction between attachment and MRC-1 factor and the interaction between attachment and MRC-4 factor suggest that, as secure individuals see themselves as more capable of caring and see others as deserving of help, they also seem better able to recognize parental flaws and limitations. It should be noted that recognizing parental limitations is not a negative aspect, but a necessary condition for developing filial maturity [14,15]. Thus, these results seem to suggest that, in secure children, the development of positive representations of themselves as caregivers and of others as needing care seems to be accompanied by a

more realistic and objective perspective on the parents, which allows them to integrate their weaknesses and limitations (Distancing), although this Distancing is lower than that of insecure children. These data seem to reinforce the notion that attachment security enhances the development of more realistic and adequate mechanisms for evaluating reality (of oneself and others) [50,51], which in turn can promote more filial maturity.

In addition to their combined effect, attachment and mental representation of caregiving are also separately relevant for the development of filial maturity, but in a differentiated way according to each of its dimensions. That is, MRC is significant in explaining Comprehending and attachment in explaining Distancing. Thus, we can anticipate that the greater perception of ability and availability to care and the perception of others as deserving of care facilitate the development of the ability to establish intimate, understanding and supportive relationships (Comprehending). In other words, children would hardly be available for close, understanding and supportive filial relationships if they did not have these representations. On the other hand, children with secure attachment will have positive and flexible IWMs of themselves and the parents, which are essential for developing the ability to accept that parents also have weaknesses, flaws and limitations (Distancing). It is very likely that the representations of self and others and the ways of relating that children have developed in relationships with their parents, and that are active throughout their lives, influence the way in which, in adult life, they position themselves in the relationship with aging parents, specifically in the way they understand and interpret their potential and limitations and in the way they relate to them.

In addition, one of the factors that has been pointed out as a facilitator of filial maturity is openness and mutual knowledge between children and parents [15], which is closely associated with secure attachment. Likewise, negative emotions towards parents, resentments and unresolved conflicts are obstacles to the objectivity necessary for the development of mature relationships with parents, which is typical of insecure (avoidant and anxious) individuals.

In summary, considering the overall results of the regression analyses, we can consider that both attachment and MRC may constitute developmental precursors of filial maturity.

Still, some potential limitations of this study should be addressed. The sample is not representative, but its size is significant. Furthermore, the sociodemographic characteristics between men and women are different, which makes this sample specific and may limit the generalization of the results. Also, attachment and mental representation of caregiving were evaluated at a general level, whereas filial maturity refers specifically to the relationship with aging parents. The study shows that attachment and MRC moderately predict filial maturity, implying that other variables can be involved and added to the accounted variance. In the future, other factors should be analyzed, such as filial anxiety, the current engagement in regular parental caregiving activities, coping styles and personality characteristics. Lastly, all the variables were assessed through self-reporting. It is important that future research takes these issues into account.

5. Conclusions

In summary, the results show that younger adult children, who perceive themselves as more able and available to provide care and who evaluate others as deserving of help also have greater ability to establish relationships with parents based on intimacy, understanding and mutual support. Also, in secure attached children, the ability to see parents objectively, recognizing their abilities and needs as they are, increases when the ability and availability to provide care also increases, and the more they evaluate others as deserving of care.

This study contributes significantly to knowledge in such a complex and still poorly studied area as filial relationships in middle age and filial maturity, pointing out filial maturity and filial caregiving as developmental tasks of midlife, filial maturity as a facilitator of this task, and attachment and mental representation of caregiving as developmental

resources that enhance adaptation to the challenges that the aging of parents poses within the scope of the filial relationship.

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Article

Association of Spousal Social Support in Child-Rearing and Marital Satisfaction with Subjective Well-Being among Fathers and Mothers

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Abstract: This study explored the association of spousal support and marital satisfaction with the subjective well-being of fathers and mothers using a mediation analysis. Data were gathered from 360 fathers and 338 mothers (aged 25–50 years). Subjective well-being was measured as an outcome using the Japanese version of the World Health Organization-Five Well-Being Index. Marital satisfaction was measured as a mediating variable using the Japanese version of the Marital Relationship Satisfaction Scale. Spousal social support (including instrumental, emotional, and appraisal support) was measured as an independent variable using four-point scales. Control variables were the father's and mother's ages, number of children, age of the youngest child, children going to nursery school or kindergarten, use of childcare services, self-evaluated low economic status, and weekday working hours. Among fathers, instrumental and emotional support had significant direct and indirect effects, with the latter mediated by the impact of marital satisfaction on subjective well-being; appraisal support had only significant indirect effects. Among mothers, instrumental support had significant direct and indirect effects; emotional and appraisal support had only significant indirect effects. Our findings indicate that social support from spouses has protective direct and indirect effects on subjective well-being among parents and suggest the need for mutual support between spouses to facilitate effective co-parenting.

Keywords: fathers in childcare; marital satisfaction; social support from spouse; subjective well-being

1. Introduction

Childcare is a physically and mentally overburdening task. Fathers and mothers may develop physical and mental health problems due to the overload of childcare chores and the constant need to deal with the demands of their children [1–3]. However, mothers typically spend more time than fathers on housework and childcare. This trend is stronger in Japan than in the U.S. and Europe, with mothers spending considerably more time than fathers on housework and childcare [4].

Surely, the responsibility for child-rearing should be shouldered equally by fathers and mothers. In recent years, measures aimed at promoting fathers' involvement in child-rearing, such as the Ministry of Health, Labor and Welfare's "Ikumen (hunky dads) Project", have been gaining national momentum in Japan [5]. One of the goals of the Healthy Parents and Children 21 (Tier 2) campaign is to encourage fathers to participate in child-rearing (Fundamental Issue C: "Percentage of fathers actively involved in child-rearing" ([target value 55%]) [6]. Increasing fathers' participation in child-rearing reduces the burden on mothers and helps maintain their mental health [7–9]. Furthermore, it may positively affect child health and development (e.g., by preventing injury and obesity) [8,9].

However, promoting paternal parenting poses challenges. The length of working hours is reportedly an important determinant of childcare involvement [10,11], and increasing fathers' childcare time is difficult while they are working long hours [12]. If, in addition to their current work conditions, Japanese fathers are forced to shoulder the burden of childcare, they may experience health problems. Furthermore, childcare anxiety in mothers and problems of child abuse may develop owing to fathers' increased childcare burden [8,9]. Indeed, recent studies reported that fathers are also more likely to experience worsening mental health after the birth of their children [11,13]. Measures to support mothers in preventing mental health problems during child rearing are essential and are being expanded in Japan's maternal and child health care system (e.g., free screening for postpartum depression during postnatal checkups). Meanwhile, in Japan, the implementation of support measures for fathers has been slower than for mothers. Research findings that contribute to effective support measures for fathers should inform further efforts to improve the understanding of the current status of fatherhood.

Therefore, effectively facilitating fathers' participation in childcare requires investigating factors associated with paternal involvement in childcare and changeable factors that protect fathers' mental health. Thus far, several factors associated with the mental health of fathers involved in child-rearing have been identified. Among personal factors, stress [13] and a history of mental illness [13,14] have been reported. Among domestic factors, younger child age [11,15], family structure (e.g., single parent) [15,16], satisfaction with the marital relationship [17–19], social support [13,19], and maternal depression [19] have been reported. Socioeconomic factors reported in previous studies include working hours [11], unemployment [14], high expenditure [11], and economic insecurity [19].

Domestic factors as determinants of fathers' mental health are essential for the promotion of smooth co-parenting by couples [20]. Therefore, we focused on marital relationship satisfaction and social support from spouses as protective factors for paternal mental health. Satisfaction with the marital relationship refers to the degree of subjective satisfaction with the couple's emotional ties [18]. It is an important source of solidarity while co-parenting and managing a family [20]. Marital relationship satisfaction is related to the mental health of both parents raising children [17–19]. It can be measured using the Quality Marriage Index [21,22]. Social support represents the functional aspect of social relationships surrounding individuals and refers to all kinds of support and assistance exchanged with others [23]. According to a classification in a previous study [23], the components of social support are emotional support, appraisal support, informational support, and instrumental support. Emotional support provides empathy and affection through respect, trust, concern, and listening. Appraisal support provides positive evaluation, such as affirmation, feedback, and social comparison. Informational support provides information necessary to solve problems, such as advice, suggestions, and instructions. Instrumental support includes the provision of tangible goods and services, such as material goods, money, labor, assistance through the donation of time, and environmental changes. Informational support can be considered a type of instrumental support.

As noted above, spousal social support and marital relationship satisfaction are factors that protect fathers' mental health [13,17–19]. Social support has been reported to be a predictor of marital relationship satisfaction [17,24]. Furthermore, a study conducted on mothers found that social support from spouses (i.e., fathers) positively impacted marital relationship satisfaction, which resulted in better mental health of mothers [25]. Thus, we aimed to investigate whether marital satisfaction mediates the association between social support and mental health is observable in fathers. Whether the above mediating mechanisms differ by the type of social support from the spouse (i.e., instrumental, emotional, or appraisal support) also remains unknown.

The current study conducted a survey of fathers and mothers involved in child-rearing to examine the (i) conditions of subjective well-being reflecting the positive aspects of mental health and (ii) mediation effects of marital satisfaction on the relationship between social support from the spouse and subjective well-being of fathers when compared to

mothers. The present study thus contributes to the maintenance of subjective well-being among fathers, as well as improved and effective involvement of fathers in childcare.

2. Materials and Methods

2.1. Participants

The survey was conducted in April 2020. We collaborated with an Internet research company with 1.2 million registered members to administer the survey. The company selected fathers based on stratification by the employment status of their wives (three categories: full-time employees, part-time employees, and unemployed), age (two categories: 25–35 and 36–50 years), and age of the youngest child (two categories: 0–3 and 4–6 years). Additionally, the company selected mothers based on stratification by their own employment status (three categories: full-time employees, part-time employees, and unemployed), age (two categories: 25–35 and 36–50 years), and age of the youngest child (two categories: 0–3 and 4–6 years). Recruitment included fathers and mothers who were married, whose youngest child was aged under 6 years, and who were not on maternity or childcare leave. Only fathers and mothers who were married and lived with their spouses were included. Among full-time employees, those who were working under the short working hour system due to child-rearing were also included. Self-employed and freelance workers were not included.

This study was conducted on fathers and mothers raising young children (under 6 years old) for the following reasons. The burden of raising young children (aged under 6 years) is considered to be greater than that of raising children of school age. It is also known that a couple forms a cooperative parenting style when the child is relatively young, and this significantly impacts the couple's marital relationship later in life (e.g., "postpartum crisis") [26]. Therefore, it is worthwhile to investigate individuals who need more support. Additionally, nowadays, the number of dual-earner households in Japan is increasing compared to previous years, and about half the households are dual-earners. Therefore, data on full-time employees, part-time employees, and unemployed mothers should be included in the analysis. Because the survey utilized a volunteer-based participation style rather than random sampling, the possibility of bias was considered in the mothers' occupations. Therefore, when recruiting mothers, we selected an equal number of mothers from each of the three groups: full-time employees, part-time employees, and unemployed mothers.

2.2. Measurements

2.2.1. Subjective Well-Being

Subjective well-being was measured using the Japanese version of the World Health Organization-Five Well-Being Index (WHO-5-J) [27], a self-administered questionnaire comprising five items assessing the degree of subjective well-being during the past two weeks on a six-point Likert scale, ranging from 0 (not at all) to 5 (all the time). Item scores were summed to obtain a total score (range: 0 to 25), with higher scores reflecting a higher level of subjective well-being (Cronbach's alpha coefficients in this study were 0.879 and 0.867 for fathers and mothers, respectively).

2.2.2. Marital Relationship Satisfaction

Satisfaction with the marital relationship was measured using the six-item Japanese version of the Marital Relationship Satisfaction Scale (e.g., "We have a flawless married life.") [21,22]. Participants were asked to respond to each item on a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Scores for each item were added to obtain the total marital relationship satisfaction score. The higher the score, the more likely the participants were satisfied with their marital relationship (Cronbach's alpha coefficients in this study were 0.930 and 0.940 for fathers and mothers, respectively).

2.2.3. Spousal Social Support

We measured the social support in child-rearing that fathers and mothers receive from their spouses. Items for spousal social support were created and measured while referring to a previous study [28], with instrumental support defined as “being taught about how to do childcare and household chores”, emotional support as “listening to my problems and concerns in daily life”, and appraisal support as “receiving praise for involvement in childcare and household chores”. The participants were asked to respond to each item on a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). The higher the scores, the more likely the participants were to receive each type of social support from spouses.

2.2.4. Other Measurements

Parents’ age, number of children, age of the youngest child, working hours on weekdays, self-evaluation of low economic status, children attending nursery school or kindergarten, use of childcare services, childcare and housework hours on weekdays and holidays, leisure time on weekdays and holidays, and sleeping hours on weekdays and holidays were all assessed and used as control variables in the mediation analysis or in the description of participants’ basic characteristics. Parents’ ages were obtained from information held by the survey company.

The participants were divided into two groups according to whether they worked an average of 12 h or more per day, considered “long working hours”. The use of nursery schools and kindergartens was dichotomized into “use” if the respondent used a licensed nursery school, unlicensed nursery school, kindergarten, or certified childcare center (*nintei-kodomo-en*) and “no use” if the respondent did not use any of these. Use of childcare support services was dichotomized as “use” if the respondent used childcare support services provided by childcare centers and local governments, babysitters, housework services, or other childcare related services and “no use” if the respondent did not use any of these services. Subjective economic status was evaluated through five classes (excellent, good, normal, poor, and very poor) and dichotomized into two categories (high economic status if they were in the former three classes and low economic status if they were in the latter two classes).

The childcare environment is highly individualized, and the burden of childcare differs depending on the situation in which fathers and mothers are embedded (e.g., age of the children, use of childcare services, and economic status of the family), and it is conceivable that the nature of factors related to the mental health of fathers and mothers also differs. Therefore, this study used the above-mentioned control variables in the analytical model, with reference to previous studies [11,15–19].

2.3. Statistical Analysis

First, SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA) was used for analysis. A *t*-test for continuous variables and a chi-squared test for categorical variables were conducted to compare the basic characteristics of fathers and mothers. A *t*-test for principal measurements was conducted for fathers and mothers, and Cohen’s *d* was estimated as an indicator of effect size. According to the guideline for effect size [29], Cohen’s *d* = 0.2, 0.5, and 0.8 are interpreted as small, medium, and large effects, respectively.

Second, the SPSS macro PROCESS program (Model 4) [30] was used to perform the mediation analysis for fathers and mothers separately. A model was run using social support from the spouse (instrumental support, emotional support, and appraisal support) as the independent variable, subjective well-being as the dependent variable, marital satisfaction as the mediating variable, and the control variables mentioned above. Analysis was carried out by type of social support and gender. The significance level for all tests was set at 5%. The confidence intervals (CI) for the bootstrap method (estimated using 3000 samples) were set at 95% while estimating the significance of the indirect effects. We calculated the variance inflation factor to check for multicollinearity before performing

the mediation analysis. We performed the mediation analyses according to Baron and Kenny's framework (1986) [31] as follows. First, the statistical significance of the effect of social support from the spouse on subjective well-being was examined (i.e., total effect). Second, the statistical significance of the effect of social support on marital satisfaction was examined. Third, the statistical significance of the direct effect of social support on subjective well-being was examined. The direct effect is the value remaining after controlling for the mediation effect of marital satisfaction within the total effect. In addition to these three steps, the statistical significance of the indirect effect of marital satisfaction mediating the association between social support and subjective well-being was tested.

2.4. Ethical Considerations

This study was approved by the Ethics Committee of Fukushima Medical University (approval number: 2019-156; approval date: 13 September 2019). All participants were informed about the purpose of the study, that their participation was completely voluntary, that they could withdraw at any time without facing any penalty, and that no personally identifiable information would be gathered from the survey. All participants provided informed consent.

3. Results

Data for 360 fathers (mean age: 36.8 years; standard deviation: 5.5) and 338 mothers (mean age: 35.9 years; standard deviation: 4.9) were obtained. Table 1 shows the basic characteristics of participants. When comparing fathers' and mothers' basic characteristics, significant differences were found in age (fathers > mothers; $p < 0.05$), long working hours (fathers > mothers), children going to nursery school and kindergarten (fathers < mothers), time spent on childcare and housework on weekdays (fathers < mothers), time spent on childcare and housework on holidays (fathers < mothers), and leisure time on holidays (fathers > mothers).

Table 1. Basic characteristics of participants.

	Fathers (<i>n</i> = 360)	Mothers (<i>n</i> = 338)	<i>p</i> *
Age (years), mean (SD)	36.8 (5.5)	35.9 (4.9)	0.03
Number of children, mean (SD)	1.8 (0.7)	1.8 (0.8)	0.363
Age of the youngest child (years), mean (SD)	3.2 (1.8)	3.1 (1.7)	0.774
Working hours on weekdays (over 12 h), <i>n</i> (%)	32 (8.9)	6 (1.8)	<0.01
Self-evaluation of a low economic status <i>n</i> (%)	131 (36.4)	145 (42.9)	0.079
Children going to nursery school or kindergarten, <i>n</i> (%)	267 (74.2)	273 (80.8)	0.037
Use of childcare services, <i>n</i> (%)	31 (8.6)	29 (8.6)	0.998
Childcare and housekeeping hours on weekdays (hours), mean (SD)	2.0 (1.9)	7.9 (4.7)	<0.01
Childcare and housekeeping hours on holidays (hours), mean (SD)	5.5 (3.9)	10.8 (4.7)	<0.01
Leisure time on weekdays (hours), mean (SD)	2.2 (1.8)	1.9 (2.1)	0.103
Leisure time on holidays (hours), mean (SD)	4.1 (3.6)	2.9 (2.7)	<0.01
Sleep time on weekdays (hours), mean (SD)	6.7 (1.3)	6.7 (1.3)	0.357
Sleep time on holidays (hours), mean (SD)	7.5 (1.3)	7.3 (1.3)	0.066

Notes. * A *t*-test for continuous variables and a chi-squared test for categorical variables were conducted to compare fathers' and mothers' basic characteristics. SD = standard deviation.

Descriptive statistics for social support, marital satisfaction, and subjective well-being are presented in Table 2. Fathers' scores were significantly higher than mothers' in instrument support (Cohen's $d = 1.19$), emotional support (Cohen's $d = 0.19$), appraisal support (Cohen's $d = 0.28$), and marital satisfaction (Cohen's $d = 0.30$). In the subjective well-being scores for fathers, the mean was 13.38, and the standard deviation was 5.47, while for mothers, the mean was 11.96, and the standard deviation was 5.28. After conducting a *t*-test to compare subjective well-being scores between fathers and mothers, statistically significant differences were found (Cohen's $d = 0.26$).

Table 2. Descriptive statistics for social support, marital satisfaction, and subjective well-being of fathers and mothers.

	Fathers (<i>n</i> = 360)	Mothers (<i>n</i> = 338)	<i>p</i> *	Effect Size **
Instrumental support, mean (SD)	2.75 (0.74)	1.80 (0.84)	<0.01	1.19
Emotional support, mean (SD)	2.62 (0.81)	2.45 (1.02)	<0.01	0.19
Appraisal support, mean (SD)	2.51 (0.79)	2.26 (0.97)	<0.01	0.28
Marital satisfaction, mean (SD)	17.41 (4.25)	16.03 (4.80)	<0.01	0.30
Subjective well-being, mean (SD)	13.38 (5.47)	11.96 (5.28)	<0.01	0.26

Notes. * A *t*-test for continuous variables was conducted to compare principal variables between fathers and mothers. ** Cohen's *d* was estimated as an indicator of effect size. SD = standard deviation.

Regarding instrumental support, among fathers (Figure 1), the total effect of instrumental support on subjective well-being was significant (standardized regression coefficient [β] = 0.29); the effect of instrumental support on marital satisfaction was significant (β = 0.42); the direct effect of instrumental support on subjective well-being was significant (β = 0.18); and the indirect effect of marital satisfaction mediating the association between instrumental support and subjective well-being was significant (β = 0.12). Among mothers (Figure 1), the total effect of instrumental support on subjective well-being was significant (β = 0.35); the effect of instrumental support on marital satisfaction was significant (β = 0.37); the direct effect of instrumental support on subjective well-being was significant (β = 0.26); and the indirect effect of marital satisfaction mediating the association between instrumental support and subjective well-being was significant (β = 0.09).

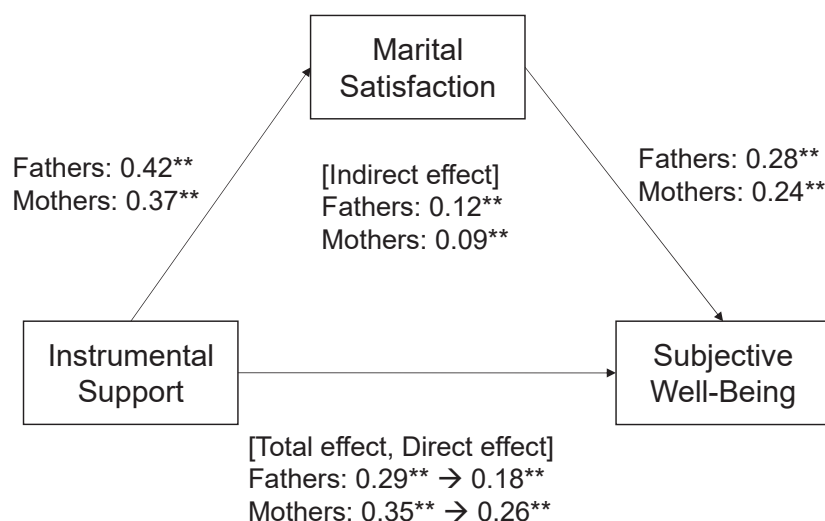


Figure 1. Mediation analysis was performed for fathers and mothers to explore the relationships between instrumental support and subjective well-being, mediated by marital satisfaction, adjusting for the father's and mother's age, number of children, age of the youngest child, children going to nursery school or kindergarten, use of childcare services, self-evaluated low economic status, and working hours on weekdays. Values indicate standardized regression coefficients. ** $p < 0.01$.

Regarding emotional support, among fathers (Figure 2), the total effect of emotional support on subjective well-being was significant (β = 0.33); the effect of emotional support on marital satisfaction was significant (β = 0.54); the direct effect of emotional support on subjective well-being was significant (β = 0.20); and the indirect effect of marital satisfaction mediating the association between emotional support and subjective well-being was significant (β = 0.13). Among mothers (Figure 2), the total effect of emotional support on subjective well-being was significant (β = 0.25); the effect of emotional support on marital satisfaction was significant (β = 0.66); the direct effect of emotional support on subjective

well-being was not significant; and the indirect effect of marital satisfaction mediating the association between emotional support and subjective well-being was significant ($\beta = 0.21$).

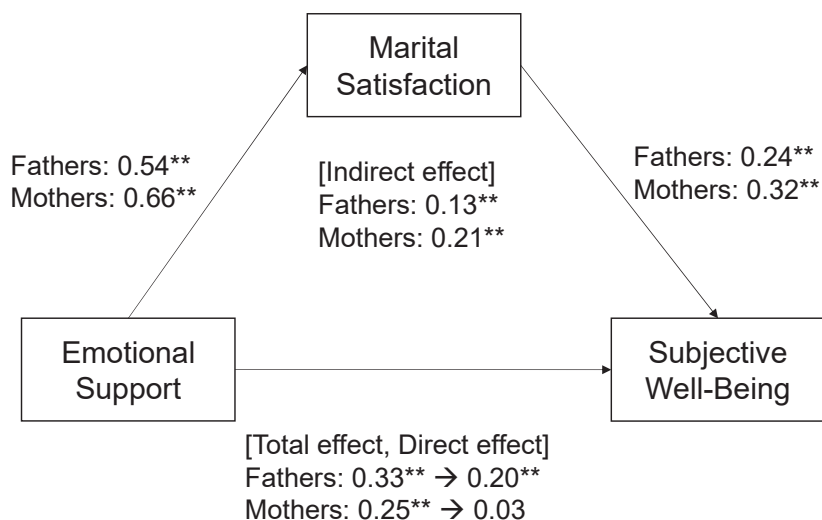


Figure 2. Mediation analysis was performed for fathers and mothers to explore the relationships between emotional support and subjective well-being, mediated by marital satisfaction, adjusting for the father's and mother's age, number of children, age of the youngest child, children going to nursery school or kindergarten, use of childcare services, self-evaluated low economic status, and working hours on weekdays. Values indicate standardized regression coefficients. ** $p < 0.01$.

Regarding appraisal support, among fathers (Figure 3), the total effect of appraisal support on subjective well-being was significant ($\beta = 0.25$); the effect of appraisal support on marital satisfaction was significant ($\beta = 0.49$); the direct effect of appraisal support on subjective well-being was not significant; and indirect effect of marital satisfaction mediating the association between appraisal support and subjective well-being was significant ($\beta = 0.15$). Among mothers (Figure 2), the total effect of appraisal support on subjective well-being was significant ($\beta = 0.20$); the effect of appraisal support on marital satisfaction was significant ($\beta = 0.57$); the direct effect of appraisal support on subjective well-being was not significant; and the indirect effect of marital satisfaction mediating the association between appraisal support and subjective well-being was significant ($\beta = 0.19$).

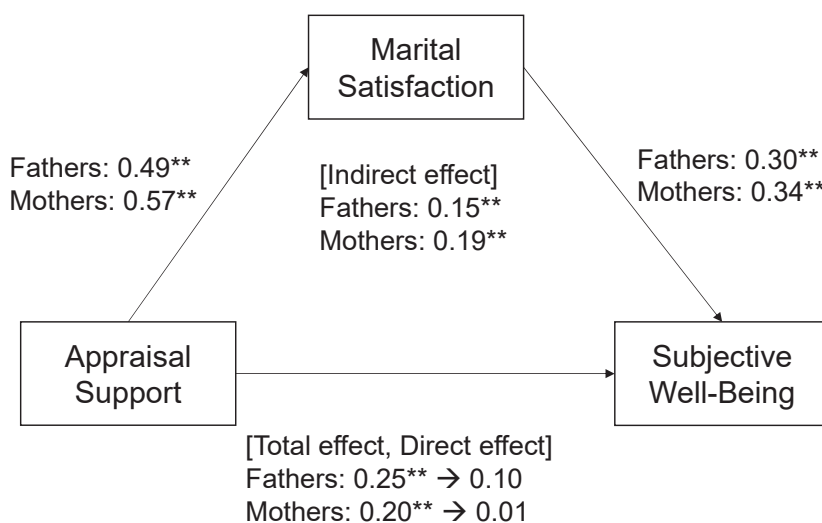


Figure 3. Mediation analysis was performed for fathers and mothers to explore the relationships between appraisal support and subjective well-being, mediated by marital satisfaction, adjusting

for the father's and mother's age, number of children, age of the youngest child, children going to nursery school or kindergarten, use of childcare services, self-evaluated low economic status, and working hours on weekdays. Values indicate standardized regression coefficients. ** $p < 0.01$.

4. Discussion

This study conducted a survey of fathers and mothers involved in child-rearing to examine the (i) conditions of subjective well-being and (ii) mediation effects of marital satisfaction on the relationship between social support from the spouse and subjective well-being among fathers, compared to mothers.

4.1. Differences in Participants' Characteristics and Principal Measurements

A comparison of subjective well-being showed higher scores in fathers than mothers. A possible explanation for this may be that mothers are exposed to very long hours of childcare and housework [11]. The study also showed that mothers spent more time on childcare and housework on weekdays and holidays, while fathers spent more leisure time on weekends and holidays, suggesting that fathers' participation in childcare should be encouraged to reduce the burden on mothers. The results also showed that fathers' subjective well-being was lower than that in previous studies, such as the Danish general population studies (mean of 17.5) [32] and a study on a population of older adults in Japan (mean of 16.5 and 16.3 among men and women, respectively) [33]. Compared to those results, fathers involved in childcare in this study were under a reasonable amount of stress due to the combined burden of family and work. Therefore, fathers' participation in childcare should be encouraged gradually and compassionately with consideration for their mental well-being, as well as measures for the mothers. As mentioned earlier, Japan's Healthy Parents and Children 21 (Tier 2) campaign sets and promotes the goal of fathers' participation in child-rearing [5]. However, a previous study claims that this is difficult to achieve because the current working hours leave little time for childcare and household chores [12]. It is important to think of childcare not as a burden on mothers alone, as was the case in the past, but as a responsibility of both the family and society. Various measures, including the enhancement of public and private childcare support services and improvement of the working environment, must be introduced to reduce this burden [34].

Fathers had higher values for emotional support, appraisal support, and marital satisfaction, but with small effect sizes. For instrumental support, fathers had greater values than mothers, with a large effect size. This outcome suggests that fathers receive more instrumental support from their wives during the child-rearing period for child-rearing and housework (i.e., fathers receive "on-the-job training" from their wives for child-rearing and housework) than do mothers from their husbands. While this is a positive point in terms of cooperative child-rearing, it may increase the burden on mothers, especially those who are physiologically prone to increased physical and mental fatigue in the early postpartum period [35–37]. Increasing opportunities for fathers to learn about childcare and housework before childbirth (e.g., by promoting parenting classes) [38] can encourage fathers' participation in childcare, as well as reduce the burden on mothers.

4.2. Mediating Role of Marital Satisfaction on the Relationship between Social Support and Subjective Well-Being

For instrumental support, the results were similar for fathers and mothers. The direct effect was smaller than the total effect, but it was statistically significant, and the indirect effect mediated by marital satisfaction was also statistically significant, suggesting that marital satisfaction partially mediated the association between instrumental support and subjective well-being. Receiving instrumental support from one's spouse improves mental health by reducing the daily burden (e.g., childcare and housework can be carried out more efficiently). The results also suggest that instrumental support from one's spouse may increase marital satisfaction and ultimately improve subjective well-being. Receiving daily instrumental support from the spouse may increase the sense of trust between the couple,

which, in turn, increases marital satisfaction [17,24], thereby improving the subjective well-being of both fathers and mothers.

The results were partially different for fathers and mothers regarding emotional support. For fathers, the direct effect was smaller than the total effect and statistically significant, and the indirect effect mediated by marital satisfaction was also statistically significant, suggesting that marital satisfaction partially mediated the relationship between emotional support and subjective well-being. Furthermore, for mothers, the total effect of emotional support was statistically significant, but the direct effect was not, suggesting that marital satisfaction completely mediated the association between emotional support and subjective well-being. In other words, emotional support may have little direct impact on subjective well-being among mothers; instead, high emotional support indirectly improves subjective well-being by improving marital satisfaction.

Similar results were obtained for fathers and mothers regarding appraisal support. Although the total effect of appraisal support was statistically significant, the direct effect was not, and the indirect effect mediated by marital satisfaction was also statistically significant, suggesting that marital satisfaction completely mediated the association between appraisal support and subjective well-being. This suggests that appraisal support may have little direct impact on subjective well-being; instead, high appraisal support indirectly improves subjective well-being through improved marital satisfaction.

4.3. Study Limitations

This study has a few limitations. First, the survey was conducted with registered members of an Internet survey company, which can be liable to “coverage error” or a discrepancy between the target population and the frame population used as a sampling method for participants [39]. Furthermore, because the survey was conducted online, participants in the current study were limited to those who could use the Internet on a daily basis, suggesting that the participants could be biased compared to the general population.

Another limitation involves the causal relationships between variables. Because this study used a cross-sectional survey design, it was not possible to prove causal relationships. That is, it was not possible to determine from the present data whether receiving social support from one’s spouse led to better subjective well-being or, conversely, whether those with better subjective well-being were more likely to receive social support from their spouses. This is also true of models that included the mediating variable (i.e., marital satisfaction). In the future, a longitudinal survey design should be conducted to test the replicability and causality of these findings.

5. Conclusions

The present study explored the association of spousal support and marital satisfaction with the subjective well-being of fathers and mothers using a mediation analysis. Among fathers, instrumental and emotional support had significant direct and indirect effects, with the latter mediated by marital satisfaction’s impact on subjective well-being; appraisal support had only significant indirect effects. Among mothers, instrumental support had significant direct and indirect effects; emotional and appraisal support had only significant indirect effects. This indicates that spousal social support has both direct and indirect protective effects on subjective well-being among parents. Our findings suggest that mutual support between spouses is essential to improve co-parenting.

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Informed Consent Statement: All participants were informed about the purpose of the study and that their participation was completely voluntary; they could withdraw at any time without facing any penalty, and no personally identifiable information would be gathered from the survey. Informed consent was obtained from all participants.

Data Availability Statement: Data that support the findings of this study cannot be publicly disclosed for ethical reasons. If you are a researcher who is interested in using these data, please request access to confidential data from the Fukushima Medical University Ethics Committee (rs@fmu.ac.jp).

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Article

Involvement of Personality and Health Status in the Psychological Wellbeing of Subjects with Chronic Disease

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Abstract: (1) Background: Psychological wellbeing correlates with improved physical and psychological health, as this construct plays a fundamental role in disease recovery and health maintenance. Hence, for healthcare professionals, understanding the factors that predict psychological wellbeing is of great interest. Thus, the objective of this study was to determine whether health status and personality traits influence psychological wellbeing. (2) Methods: The total sample (N = 600) consisted of HIV patients, individuals with diabetes, and healthy subjects from the Salamanca Clinical Hospital. The instruments used for data collection included a sociodemographic questionnaire, Ryff's Psychological Wellbeing Scale, and the Spanish version of the Big Five Taxonomy to measure personality. (3) Results: Specific personality traits, such as Emotional Stability, Extraversion, Responsibility, and Integrity were significant predictors of different dimensions of psychological wellbeing. Regarding health status, individuals with diabetes and healthy subjects, compared to HIV+ subjects, were associated with higher levels of psychological wellbeing dimensions. (4) Conclusions: Individual differences in personality traits and the diagnosis of a chronic condition may play a fundamental role in psychological wellbeing. These conclusions are of great interest for developing strategies aimed at individuals with chronic illnesses and specific personality traits associated with poorer psychological wellbeing.

Keywords: psychological wellbeing; personality; HIV; diabetes; chronic disease

1. Introduction

Psychological wellbeing has become a global concern, particularly in the context of chronic pathologies [1–3]. Chronic illnesses negatively impact the physical, mental, and social aspects of an individual's life, posing a clear stress factor that threatens their wellbeing [4,5].

However, each illness entails specific changes that have a different impact on each individual's wellbeing based on the pathology [6,7]. In this context, we emphasize HIV infection, a highly complex pathology in which individuals must cope with numerous physiological, sociocultural, economic, and psychological stressors. HIV-positive patients face social stigma, experience increased discrimination, and have reduced social support [8–10]. All of these factors can significantly affect the mental health of affected individuals.

Moreover, even in similar situations, the emotional reactions and adaptations of individuals can vary. Hence, several questions arose that motivated our study. Beyond the illness process, do other individual variables, such as personality, modulate the processes of psychological wellbeing in individuals?

Based on personality traits and psychological wellbeing, it is emphasized that conditions such as adopting an optimistic and positive outlook in the face of complications,

attempting to derive positive aspects from problems and feeling fortunate, focusing on problem solving, planning, seeking social support, self-control, and self-esteem contribute to greater personal wellbeing. Conversely, feeling guilty or responsible for problems and difficulties, as well as avoiding problems, foster personal distress [11].

Over time, various approaches have been developed to study personality traits, primarily aiming to organize, group, and categorize them to determine variability and individual differences in personality. The most widely accepted and popular model in current psychology, both empirically and theoretically, is the “Big Five Model.” Hence, it is among the most widely employed and recognized personality models [12].

Regarding psychological wellbeing, Carol Ryff is one of the principal researchers in this field. Using her multidimensional approach, she delineated six dimensions to define and assess psychological wellbeing: self-acceptance, positive relationships, autonomy, environmental mastery, purpose in life, and personal growth.

Furthermore, we justify this study’s importance by noting that psychological wellbeing has been linked to better physical health and increased longevity. It is considered an indicator of positive functioning in individuals, enabling their personal development and growth [13,14]. Data have been found regarding the relationship between psychological wellbeing and biological indicators associated with health. The reason for this relationship is not clear, although it is suspected that psychological wellbeing is associated with medium- and long-term affective regulation mechanisms through the pursuit of survival behaviors and adaptation to environmental demands. Additionally, there is a relationship between positive affect and a lower risk of disease. Therefore, there is evidence that individuals experiencing more positive emotions are less likely to develop diseases such as upper respiratory tract infections, depression, arthritis, diabetes, and cancer.

Therefore, understanding the personality characteristics associated with poorer psychological wellbeing is crucial for focusing on effective and individualized health interventions. Thus, this study aimed to determine whether health status and personality traits influence psychological wellbeing.

2. Materials and Methods

2.1. Aim and Design of the Study

This study aimed to determine whether health status and personality traits influence psychological wellbeing. We conducted a non-experimental, cross-sectional study with a correlational objective.

2.2. Participants

As shown in Table 1, the final sample comprised 600 participants. Based on the participants’ health status, three categories were identified: HIV patients ($N = 199$), individuals with diabetes ($N = 201$), and healthy subjects ($N = 200$).

Participants were required to meet the following inclusion criteria. Individuals with HIV or diabetes had to have a confirmed diagnosis of the respective disease, regardless of its stage. For healthy subjects, the criteria did not include a diagnosis of chronic illness. All participants had to be of legal age and voluntarily participating in the study. Exclusion criteria included suffering from any medical or psychological condition that would hinder the participant from completing the study or from being able to sign an informed consent form.

Table 1. Sociodemographic variables based on health status.

	HIV		Diabetes		Healthy Subjects		Total	χ^2	ET	<i>p</i>
	N	%	N	%	N	%	N			
N° participants	199	33.2%	201	33.5%	200	33.3%	600	1.548	0.051	0.461
Sex										
Woman	48	24.1%	58	28.9%	58	29.0%	164			
Man	151	75.9%	143	71.1%	142	71.0%	436	63.417	0.230	<0.001
Marital status										
Married/couple	58	29.1%	123	61.2%	124	62.0%	305			
Single/widowed/other	117	58.8%	64	31.8%	51	25.5%	232	2.858	0.069	0.240
Separated/divorced	24	12.1%	14	7.0%	25	12.5%	63			
Level of studies										
Secondary or lower	168	84.4%	160	79.6%	156	78.0%	484	10.930	0.095	0.091
Superior	31	15.6%	41	20.4%	44	22.0%	116			
Age										
43 years or younger	50	25.1%	46	22.9%	59	29.5%	155	10.930	0.095	0.091
44 to 50 years	61	30.7%	63	31.3%	55	27.5%	179			
51 to 55 years	57	28.6%	44	21.9%	38	19.0%	139			
56 years or older	31	15.6%	48	23.9%	48	24.0%	127			

N: number of subjects, %: percentage, χ^2 : chi-squared, ET: effect size, *p*: *p*-value.

Prior to data collection, the study obtained authorization from the University Assistance Complex of Salamanca and the Primary Care Management of Salamanca, and received a favorable report from the Ethics Committee “Research with Medicines in the Health Area of Salamanca,” with code CEIC: PI02/01/2018. Furthermore, participants’ participation was voluntary, and we ensured confidentiality and anonymity through the provision of an information sheet and requesting the completion of informed consent.

2.3. Data Collection

The sample was collected at the University Assistance Complex of Salamanca, specifically, at the University Hospital of Salamanca (HUS).

A subset of patients with HIV infection was obtained through incidental sampling. After obtaining the sample of HIV-positive individuals, samples of diabetic patients and healthy subjects were selected using quota sampling with equivalent age ranges, sexes, and educational levels, aiming to achieve homogeneous sub-samples. Thus, a quota sampling technique was employed for the two remaining subgroups to achieve homogeneous groups, thereby avoiding biases stemming from sociodemographic variables.

The instruments used for data collection were as follows.

2.3.1. Sociodemographic Data Questionnaire

All participants were asked to provide sociodemographic information, including age, gender, marital status, and educational level. The participants’ health status was also recorded, specifying whether they had any pathology.

2.3.2. Ryff’s Psychological Wellbeing Scale

The “Psychological Wellbeing Scale” (Scales of Psychological Wellbeing—SPWB) was developed by Ryff in 1989 and adapted by Van Dierendonck in 2004. Spanish adaptation of this scale was carried out by Díaz et al. (2006) [15].

The scale was developed to measure the dimensions of psychological wellbeing following Ryff’s model.

Table 2 displays the psychometric properties of the Spanish version of this scale, with 39 items (the original) and 29 items (the version proposed by Díaz et al.). Both versions included items written in both a direct and reverse manner. A total score can be obtained for each dimension.

Table 2. Psychometric properties of the Psychological Wellbeing Scale (Spanish version).

	39-Item Version		29-Item Version	
	N° Items	α Cronbach	N° Items	α Cronbach
Self-acceptance	6	0.83	4	0.84
Positive relations	6	0.81	6	0.78
Autonomy	8	0.73	6	0.70
Environmental mastery	6	0.71	5	0.82
Purpose in life	7	0.83	5	0.70
Personal growth	6	0.68	4	0.71

In this research, the 29-item version was chosen for two reasons: (a) its brevity, (b) its psychometric properties, which yielded better results in the abbreviated version.

2.3.3. Personality: Spanish Big Five Taxonomy

The work of Iraegui and Quevedo-Aguado (2002) was used to assess personality factors. This research involved a psycholinguistic approach to the study of personality following the ‘Big Five hypothesis.’ A principal component factor analysis was applied to the 150 mini-factors identified in this research as personality descriptors. The Kaiser rule was used to select the number of factors to retain, and varimax normalization was employed as the rotation method [16].

The five-factor solution required ten iterations for convergence and explained 19.36% of the total variance, with a Cronbach’s α of 0.88. Table 3 displays the psychometric properties of each factor, as well as its correspondence with ‘McCrae and Costa’s Big Five model’. Factor 3 showed the greatest discrepancies in the original model.

Table 3. Psychometric properties of personality dimensions.

Found Factor	Explained Variance	Correspondence
F1. Emotional Stability	4.21%	F4. Neuroticism
F2. Agreeableness	4.15%	F2. Disagreeableness
F3. Integrity	4.00%	F5. Openness
F4. Responsibility	3.64%	F3. Conscientiousness
F5. Extraversion	3.20%	F1. Extroversion

For our study, a reduced scale of 50 personality descriptors has been created, with ten descriptors for each factor (five positive and five negative). These descriptors were chosen based on their correlations with the corresponding factor.

2.4. Data Analysis

Statistical analyses were conducted using Statistical Package for the Social Sciences (SPSS) version 25 from International Business Machines (IBM Corp., Armonk, NY, USA). Linear regression analysis was employed to address the proposed objective. This technique complies with five assumptions: independence, non-collinearity, linearity, homoscedasticity, and normality.

The assumption of independence was examined through the Durbin–Watson test, where values between 1.5 and 2.5 are considered appropriate. To assess the absence of collinearity, tolerance statistics and the variance inflation factor were employed. Lack of collinearity is considered when values are above 0.10 for the former and below 10 for the latter. The next two assumptions, linearity and homoscedasticity, were evaluated through graphical analysis of partial regression plots and scatter plots, respectively. Finally, the verification of the normality assumption was conducted both graphically and statistically, using the Kolmogorov–Smirnov test. Thus, after confirming the assumptions, linear regression analysis was conducted.

3. Results

3.1. Psychological Wellbeing: Self-Acceptance

The ANOVA resulted in a significant value for the test, rejecting H_0 ($F(1) = 162.821(596)$, $p < 0.001$).

Regression analysis revealed that the best model included four variables ($R^2 = 0.579$, $R_A^2 = 0.576$, $F(1, 591) = 8.661(2, 591)$, $p = 0.025$). The predictor variables included in the final model accounted for 57.9% of the variance in the DVs.

In Table 4, it can be observed that emotional stability, responsibility, and extraversion are positively related to the self-acceptance dimension of wellbeing. Personality Factor 1 (emotional stability) had the most significant weight ($B = 0.186$, $\beta = 0.471$, $t = 11.501$, $p < 0.001$). Regarding health status, both healthy and diabetic individuals had positive and significant coefficients.

Table 4. Final model coefficients: PWB—self-acceptance.

	B	E.T.	β	t	p
Constant	1.270	0.443		2.866	0.004
F1 Emotional Stability Factor	0.186	0.016	0.471	11.501	<0.001
F4 Responsibility Factor	0.103	0.018	0.207	5.618	<0.001
F5 Extraversion Factor	0.067	0.017	0.138	3.919	<0.001
Diabetes	0.760	0.247	0.099	3.077	0.002
Healthy subjects	1.004	0.250	0.131	4.022	<0.001

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

3.2. Psychological Wellbeing: Positive Relationships

ANOVA resulted in a significant value for the test, rejecting H_0 ($F(df) = 117.851(595)$, $p < 0.001$).

Regression analysis revealed that the best model included three variables ($R^2 = 0.444$, $R_A^2 = 0.440$, $F(1, 591) = 0.031(1, 591)$, $p < 0.001$). The predictor variables included in the final model accounted for 44.4% of the variance in the DVs.

In Table 5, it can be observed that emotional stability and extraversion positively relate to the positive relationships dimension of psychological wellbeing. Personality Factor 1 (emotional stability) had the most significant weight ($B = 0.197$, $\beta = 0.352$, $t = 8.764$, $p < 0.001$). Both healthy subjects and diabetic individuals show a significant coefficient.

Table 5. Final model coefficients: PWB—positive relationships.

	B	E.T.	β	t	p
Constant	2.136	0.595		3.591	<0.001
F1 Emotional Stability	0.197	0.022	0.352	8.764	<0.001
F5 Extraversion	0.160	0.028	0.233	5.737	<0.001
Diabetes	3.229	0.397	0.298	8.136	<0.001
Healthy subjects	3.084	0.393	0.284	7.853	<0.001

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

3.3. Psychological Wellbeing: Autonomy

ANOVA resulted in a significant value for the test, rejecting H_0 ($F(df) = 69.474(596)$, $p < 0.001$).

Regression analysis revealed that the best model included four variables ($R^2 = 0.319$, $R_A^2 = 0.315$, $F(1, 592) = 4.373(1, 592)$, $p = 0.037$). These predictor variables included in the final model accounted for 31.9% of the variance in the DVs.

Table 6 shows that emotional stability, extraversion, and integrity are positively related to autonomy, while the agreeableness is negatively related to autonomy. Personality Factor 1 (emotional stability) had the most significant weight ($B = 0.227$, $\beta = 0.389$, $t = 7.769$, $p < 0.001$).

Table 6. Final model coefficients: PWB—autonomy.

	B	E.T.	β	t	p
Constant	9.084	1.423		6.384	<0.001
F1 Emotional Stability	0.227	0.029	0.389	7.769	<0.001
F5 Extraversion	0.125	0.032	0.175	3.929	<0.001
F3 Integrity	0.127	0.042	0.140	2.985	0.003
F2 Agreeableness Factor	−0.076	0.036	−0.092	−2.091	0.037

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

3.4. Psychological Wellbeing: Environmental Mastery

ANOVA resulted in a significant value for the test, rejecting H0 ($F(df) = 152.435(596)$, $p < 0.001$).

Regression analysis revealed that the best model included three variables ($R^2 = 0.507$, $R_A^2 = 0.504$, $F(gl1, gl2) = 9.007(2, 592)$, $p < 0.001$). The predictor variables included in the final model accounted for 50.7% of the variance in the DVs.

Table 7 shows that emotional stability and responsibility are positively related to the psychological wellbeing dimension of environmental mastery. Regarding health status, both healthy subjects and diabetic individuals show a significant coefficient in both cases.

Table 7. Final model coefficients: PWB—environmental mastery.

	B	E.T.	β	t	p
Constant	3.606	0.491		7.348	<0.001
F1 Emotional Stability	0.222	0.017	0.503	13.071	<0.001
F4 Responsibility	0.122	0.022	0.220	5.530	<0.001
Diabetes	1.247	0.296	0.146	4.029	<0.001
Healthy Subjects	0.812	0.299	0.095	2.717	0.007

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

3.5. Psychological Wellbeing: Personal Growth

ANOVA resulted in a significant result, rejecting H0 ($F(df) = 88.891(596)$, $p < 0.001$).

Regression analysis revealed that the optimal model included four variables, ($R^2 = 0.429$, $R_A^2 = 0.425$, $F(gl1, gl2) = 5.693(1, 591)$, $p = 0.017$). The predictor variables included in the final model accounted for 42.9% of the variance in DVs.

Table 8 shows that emotional stability, integrity, and extraversion are positively related to personal growth. Personality Factor 1 (emotional stability) had the most significant weight ($B = 0.144$, $\beta = 0.406$, $t = 8.942$, $p < 0.001$). Regarding health status, only the dummy variable for healthy subjects was significant ($B = 0.970$, $\beta = 0.141$, $t = 3.795$, $p < 0.001$).

Table 8. Final model coefficients: PWB—personal growth.

	B	E.T.	β	t	p
Constant	7.871	0.591		13.307	<0.001
F1 Emotional Stability	0.144	0.016	0.406	8.941	<0.001
F3 Integrity	0.115	0.022	0.209	5.278	<0.001
F5 Extraversion	0.043	0.018	0.098	2.386	0.017
Diabetes	0.310	0.255	0.045	1.217	0.224
Healthy Subjects	0.970	0.256	0.141	3.795	<0.001

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

3.6. Psychological Wellbeing: Purpose in Life

ANOVA resulted in a significant value for the test, rejecting H0 ($F(df) = 212.027(596)$, $p < 0.001$).

Regression analysis revealed that the best model included three variables ($R^2 = 0.589$, $R_A^2 = 0.586$, $F(df1, df2) = 0.039(1, 592)$, $p < 0.001$). The predictor variables included in the final model accounted for 58.9% of the variance in VDs.

Table 9 shows that emotional stability and responsibility are positively related to purpose in life. Regarding health status, both healthy and diabetic individuals had a significant coefficient.

Table 9. Final model coefficients: PWB—purpose in life.

	B	E.T.	β	t	p
Constant	1516	0.516		2.941	0.003
F1 Emotional Stability	0.241	0.018	0.475	13.496	<0.001
F4 Responsibility	0.174	0.023	0.272	7.512	<0.001
Diabetes	1.969	0.311	0.200	6.322	<0.001
Healthy Subjects	2.152	0.314	0.219	6.849	<0.001

B, unstandardized regression coefficients; E.T., standard error; β , standardized regression coefficients; p, p-value.

4. Discussion

The maintenance and development of psychological wellbeing may be conditioned by various factors. Among them, we highlight individual differences in personality traits and the diagnosis of a chronic pathology.

Regarding Personality, as previously explained, the Spanish Five-Factor Model hierarchically organizes five personality factors: emotional stability, agreeableness, integrity, responsibility, and extraversion. Before discussing the obtained results, we will briefly outline the evidence with the intention of synthesizing the most important conclusions.

Concerning the psychological wellbeing variable, the personality factor emotional stability was positively related to all dimensions. Additionally, responsibility was associated with higher self-acceptance, environmental mastery, and purpose in life. Extraversion was positively related to self-acceptance, positive relationships, autonomy, and personal growth. Integrity was positively associated with autonomy and personal growth. The trait of agreeableness predicted lower levels of autonomy.

Moreover, the subjects' health status was associated with all dimensions of psychological wellbeing, except for autonomy. Diabetic and healthy subjects, compared to HIV+ subjects, were related to higher levels in the dimensions of self-acceptance, positive relationships, environmental mastery, and purpose in life. Regarding personal growth, healthy subjects scored higher than HIV-positive individuals.

Thus, both health status and personality traits allowed us to predict the dimensions of psychological wellbeing most frequently used by the subjects.

If we focus on research analyzing personality traits that might predispose individuals to higher levels of psychological wellbeing, initial studies have argued that neuroticism and extraversion are the traits most closely related to psychological wellbeing [17]. Current research supports this relationship [18]. To compare this statement with our results, it is worth noting that individuals with low scores in neuroticism are positioned on the opposite side of the emotional stability factor. However, there are also more publications that, while acknowledging the strong relationship of these factors with wellbeing, add other traits related to this construct [19]. For instance, Meléndez et al. (2019) [20] argued that, besides neuroticism and extraversion, responsibility was also a trait highly related to psychological wellbeing. Neuroticism was negatively associated with all dimensions of psychological wellbeing, whereas extraversion and responsibility were positively associated. Delhom et al.'s study (2019) obtained results similar to ours, adding Integrity as an important predictor, showing a positive association with personal growth [21]. The study by Barra et al. (2013) also confirmed these results, emphasizing the strong influence of personality traits on wellbeing levels [22]. Furthermore, these projects suggested that neuroticism, or its opposite factor, emotional stability, is one of the factors most related to psychological wellbeing, which is consistent with the results of our work and those of other studies [23–29].

Thus, the evidence from studies that have examined psychological wellbeing in subjects with certain chronic diseases resembles the results of our study. Another example is the study by García-Viniegras and González (2007), who analyzed the wellbeing of breast cancer patients. This project highlighted that self-confidence, emotional stability, agreeableness, and self-esteem were associated with higher levels of wellbeing [30].

However, the research that has examined psychological wellbeing in individuals with certain chronic illnesses has primarily focused on the elements that can influence or modulate such wellbeing. On the other hand, most studies on psychological wellbeing in chronic patients concentrate on demonstrating the impact of psychological wellbeing on these individuals. An example of this is the study by Vázquez et al. on inflammatory processes, which determined that individuals with higher levels of interpersonal wellbeing and a sense of purpose in life exhibit lower levels of IL-6 [31]. Moreover, Carol Ryff, based on some of her research, has found relevant results in this area. In samples of older women, she has determined that those with better interpersonal relationships, a greater sense of personal growth, and higher levels of purpose in life present a lower cardiovascular risk, indicated by lower levels of glycosylated hemoglobin, lower body weight, higher rates of HDL cholesterol, and better endocrine regulation [32].

Therefore, regarding health status, fewer studies have focused on predicting levels of psychological wellbeing based on subjects' health status. However, our results are consistent with those published by other authors, such as Chongwo et al. (2018) and Ramkisson et al. (2016), who showed that the absence of illness and the diagnosis of diabetes are associated with higher levels of psychological wellbeing than those found in HIV subjects [33,34].

Due to the limited publications on psychological wellbeing in chronic illness and its implications for health, we consider the study of this topic to be of great importance.

Limitations: The literature is limited on the impact of diabetes and HIV diagnosis on the psychological wellbeing of subjects. This prevents the discussion and comparison of our results. Another limitation is the exclusion of sociodemographic variables such as gender, which could help predict patients' psychological wellbeing. Another limitation of the present study is the sampling method: non-random sampling. This diminishes the external validity of the study, making it challenging to generalize the results. However, given the characteristics of the sample to which we had access, conducting random sampling was impractical. Finally, we emphasize that the severity and prognosis of the disease may have also influenced the outcomes. Future research should take into account the limitations mentioned earlier to provide more specific evidence regarding the results.

5. Conclusions

In conclusion, both individual differences in personality traits and the diagnosis of a chronic condition can significantly impact the development and maintenance of psychological wellbeing. Specifically, emotional stability, extraversion, responsibility, and integrity were significant predictors of the different dimensions of psychological wellbeing. The health status of the subjects was associated with all dimensions of psychological wellbeing, except for autonomy. Diabetic and healthy subjects, in comparison to HIV-positive individuals, were related to higher levels in the dimensions of self-acceptance, positive relationships with others, environmental mastery, and purpose in life. In the dimension of personal growth, healthy subjects scored higher than HIV-positive subjects. Thus, we can confirm that diabetic and healthy subjects exhibited higher levels of psychological wellbeing compared to individuals with HIV. These conclusions may be justified by the fact that HIV is a stigmatizing and contagious condition compared with diabetes, thereby correlating with poorer levels of the studied psychological variables.

These findings hold significant importance in clinical practice, as they could assist in forecasting and anticipating lower levels of psychological wellbeing in individuals at higher risk based on their personality characteristics and the chronic conditions that they endure.

Considering the findings in conjunction with the HIV-associated stigma, future research endeavors could benefit from an exploration of the transmission methods and sexual identities of individuals living with HIV. Additionally, it would also be important to consider the limitations presented in this research. Therefore, we consider it important to conduct further studies that include sociodemographic variables, as they play a significant role in determining psychological wellbeing. Finally, considering these considerations, we aim to expand the research to encompass more chronic conditions, with the goal of facilitating tailored interventions for each specific ailment.

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