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Parenting across the Lifespan

Perinatal Mental Health, Infant Feeding,
and Child Development

Edited by
Leanne Jackson

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Parenting across the Lifespan: Perinatal Mental Health, Infant Feeding, and Child Development

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Guest Editor

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About the Editor

Leanne Jackson

Leanne Jackson is a Lecturer in Women's Health and Wellbeing at the University of Liverpool, specialising in perinatal mental health, infant feeding, moral decision making, and early child development. Her research focuses on understanding the psychosocial experiences of women and their families across the life course, with a focus on parenting transitions.

Jackson has co-authored a total of 22 empirical publications and has made significant contributions to the study of maternal guilt and shame, breastfeeding experiences, postpartum mental health, and the impact of social support on parental wellbeing. Dr Jackson was awarded with the Society of Reproductive and Infant Psychology's 2024 Doctoral Thesis Prize in recognition of her substantial contributions to this field from her doctoral thesis works. Notably, Dr Jackson's empirical work on the transition to new motherhood during COVID-19 has also contributed to a policy document which was disseminated to the Royal Society of Medicine, directly informing maternity care at a national level.

Preface

The current editorial synthesises findings from eight studies across seven countries, and examines parental mental health, social support, caregiving demands, family relationships, structural determinants (e.g., education, employment, air pollution), intervention preferences, and their effects on infant and child outcomes. The synthesis also highlights factors that influence parenting stress and burnout to inform the development of effective family-focused support services and future research.

The current editorial was motivated by the need to understand the complex interplay between parenting and child outcomes, with a particular focus on the challenges faced by parents of children with disabilities and additional support needs. Findings from the synthesised works can be used to inform policy, interventions, and support services that can enhance family wellbeing and child development.

The current editorial is of interest to a broad readership, from researchers in the field of life span and family psychology, as well as healthcare professionals, practicing psychologists, social workers, educators, policy makers, and service providers involved in child development. Current findings are also of note to those with a broad interest in family wellbeing, public health, and parenting support.

Leanne Jackson

Guest Editor



Editorial

Editorial Synthesis for, ‘Parenting Across the Lifespan: Perinatal Mental Health, Infant Feeding, and Child Development’

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1. Introduction

The first 1001 critical days, spanning from conception to two years postpartum, are a critical window for infant development (Leach, 2017). Beyond this, in a child’s years of dependency (<18; National Health Service [NHS], 2024), they experience various developmental milestones and educational transitions (Cuconato & Walther, 2015; UNICEF, 2025). These transitions and milestones are characterised by increased risks of interpersonal conflict, parent–child attachment disruption, and parental stress (Jones et al., 2021; Laursen et al., 2017). Parental emotional attunement and parenting style during these critical life transitions influence how a child learns to orientate themselves in the external world (Miller et al., 2018; Neel et al., 2018). Indeed, the quality of the parent–child relationship and early year interactions have longstanding impacts on habit formation which endure into adulthood (Kim & Bost, 2023; River et al., 2022). As habits remain relatively stable over time (Ahola et al., 2025), early interventions that adopt a holistic approach to health and wellbeing, particularly ones that recognise the familial influences on child outcomes, are essential.

Several recent developments in legislation in the UK demonstrate a growing commitment to this holistic view of children’s health and wellbeing. In July 2025, the Department for Education (Department for Education, 2025) announced their commitment to improving child development outcomes in children under five, which includes the priorities of financial investment into Best Start family hubs, childcare financial aid, increased Ofsted inspections, and ringfenced funding to promote inclusion in early years educational settings. There are also efforts being made to address childhood poverty (Department for Work and Pensions, 2025). These commitments are being advocated globally (UNICEF, 2019), reflecting broader, family-centred shifts in interventional attitudes. The articles published in the current Special Issue contribute to the growing literature base which identifies the support and wellbeing needs of new parents, with an overarching aim of nurturing positive long-term infant development outcomes.

To summarise the literature included in the current Special Issue, countries spanned Israel ($n = 1$); Italy ($n = 2$); United Kingdom ($n = 1$); Bahrain, Qatar, and Kuwait ($n = 1$); Portugal ($n = 1$); Australia ($n = 1$); and China ($n = 1$). Findling et al., Guarneri et al., Levante et al., and Xu and Zhang used quantitative, cross-sectional designs; Jackson et al. used a qualitative cross-sectional design; Saidi et al. used a retrospective time-series design on secondary data (spanning from 1990 to 2022); Fuertes et al. used a longitudinal observation design with father–infant dyads (spanning 3, 9, and 12 months postpartum); and Rofo et al. used a within-subjects experimental design. Findling et al., Guarneri et al., and Jackson et al. conducted their studies with mothers only; Fuertes et al. and Rofo et al. conducted

their studies with fathers only; Levante et al. and Xu and Zhang conducted their studies with both mothers and fathers; and Saidi et al. investigated the structural determinants of infant mortality by analysing country-level data.

Jackson et al., Levante et al., and Rofo et al. collected primary data via self-selected social media-based recruitment; Findling et al. recruited via mother–child health centres; Fuertes et al. and Guarneri et al. recruited via local hospitals; Saidi et al. conducted a secondary analysis of cross-country data; and Xu and Zhang conducted a secondary analysis on national-level data. A total of 997 pregnant women, 416 postpartum mothers, 114 fathers, and 750 parents (sex and/or gender not clarified) participated across the synthesised articles. Guarneri et al. and Xu and Zhang, 2025, conducted multivariate regression analyses on their data; Findling et al. and Saidi et al. used structural equation modelling; Fuertes et al. used a binary logistic regression; Levante et al. used multiple mediation; Rofo et al. and Xu and Zhang used a one-way repeated measures ANOVA; Xu and Zhang used a moderation analysis; and Jackson et al. used a reflexive thematic analysis.

Xu and Zhang identified parenting stress as a significant negative predictor of parental mental health, whereas objective, subjective, and social support utilisation all had significant positive effects on parental mental health. Other significant predictors of postnatal depression, identified by Guarneri et al., included prenatal attachment, the couple’s relationship quality, and emotional neglect. In Guarneri et al.’s model predicting maternal affectivity, emotional abuse and dyadic adjustment were the only significant predictors. These findings were also true across studies which investigated parental stress and parental mental health among the parents of children with additional support needs.

Xu and Zhang found that for the parents of children with a disability, the negative effect of parenting stress on parental mental health was significantly buffered by objective support, but not subjective support. In Levante et al.’s investigation into the parents of children with autism, parenting stress, but not perceived caregiver burden, significantly mediated the relationship between parental resolution and the quality of the parent–infant relationship. In this study, parental resolution was positively correlated with the quality of the parent–child relationship. In Findling et al.’s study on the parents of children With Special Needs and Disabilities (W-SND), the perceived caregiver burden strongly predicted parental burnout, with disability severity further elevating the perceived parenting burden. In the same investigation, a moderation analysis revealed that higher learned resourcefulness was associated with a significantly weaker relationship between the parenting burden and parental burnout, indicating a buffering effect. Findling et al. found that deep emotional work was significantly positively correlated with parental burnout among the mothers of children W-SND. This mirrors Jackson et al.’s qualitative investigation, in which negative feelings were found to be frequently suppressed to maintain the “good mother” identity, generating additional emotional exhaustion. In this qualitative investigation, postpartum mothers described their intense guilt and shame when their lived parenting experience deviated from societal intensive mothering expectations, which were often accompanied by ruminative thoughts.

Across the countries examined and the diverse parenting populations, parenting stress consistently predicted poorer parental mental health. This supports the existing stress-vulnerability frameworks (Duncan et al., 2024) and suggests that they apply robustly across contexts (e.g., parents with disabilities, parents of autistic children, parents of children W-SND). Perceived satisfaction with social support was a key protective factor against poor parental mental health, as was parental resolution, identifying key areas for prioritising interventions, and ringfencing financial investment in 0–5 services, particularly for the parents of children with additional support needs. The evidence from these synthesised

works also highlights the importance of considering parental dyads and/or wider family involvement in promoting positive infant outcomes, reflecting a holistic life course approach to health and wellbeing (Hosseini & Ahmadi, 2025).

Interestingly, infant temperament also plays an important role in child health outcomes. In Fuertes et al.'s longitudinal study spanning the first postpartum year, infants who were perceived to be more difficult in temperament and who were less cooperative at three months postpartum were significantly more likely to be prescribed antibiotics when compared with more "cooperative" infants. This suggests that prescribing decisions may be influenced by factors such as the caregiver's stress or the clinician's perception, which can be subject to bias, rather than clinical need alone. The integration of decision-making tools, such as digital screening, can help to standardise the process of prescribing medications and thus minimise biases (Clarke et al., 2024). Other potential solutions include providing anticipatory guidance on infant behaviour to new parents and nurturing parental resolve and resources, as identified in the studies of Findling et al. and Levante et al. Such collective efforts may serve to reduce the pathologisation of children's behaviour.

2. Structural and Environmental Determinants

Saidi et al. used 33 years of national health data to demonstrate that health resources have direct effects on infant mortality rates across Bahrain, Qatar, and Kuwait. Specifically, female employment, female educational enrolment, and lower air pollution were all found to significantly reduce infant mortality rates. Similarly, Fuertes et al. found that infants in centre-based daycare were significantly more likely to receive antibiotics than children who were not in centre-based daycare, reflecting an increased exposure to novel pathogens (Houser et al., 2024).

3. Intervention Delivery Preference

In Rofo et al., fathers consistently rated intervention programme length as a less important factor than any other programme attributes, emphasising that programme content was significantly more important than facilitator qualities or delivery modality. Of these factors, their decision to engage relied firstly on the parenting program content, followed by the cost, and then the style of participation. The top three preferred parenting programmes in Rofo et al. were all free, had practical activities as the content, and involved face-to-face delivery. No significant differences were observed between individual participation and participation with other fathers or parents.

4. Limitations and Future Research Directions

Country-level variability in population characteristics, gender proportions, financial structures, cultural practices, and health policies may limit the generalisability of the findings derived from the synthesised works in the Special Issue. Additional methodological limitations were identified; for example, Saidi et al.'s dataset possessed insufficient statistical power, Fuertes et al.'s laboratory-based observation of dyads lacked ecological validity, and the use of cross-sectional designs, such as in the study by Guarmeri et al., limited the ability to infer causal relationships.

Levante et al. advised that future research should better capture autism severity, Findling et al. recommended capturing the degree of learned resourcefulness, and Jackson et al. recommended routinely recording birth mode; collectively, these can help researchers to better consider experiential nuance when determining parental and child outcomes. Levante et al. also believed that greater representation of autistic girls was essential, and Guarmeri et al. urged an increased representation of fathers in parental research to better

acknowledge the role of the broader family unit in infant development and wellbeing outcomes. Greater consideration of potential environmental, institutional (e.g., hygiene practices, infection control policies), and individual (e.g., family health behaviours, prior illness episodes, or cultural attitudes) confounders was also recommended by Fuertes et al., which highlight the need for a greater recognition of the complexity of parental experiences and their relationship with child outcomes.

Fuertes et al., Guarmeri et al., Jackson et al., Levante et al., Rofo et al., and Xu and Zhang sampled parents who were Caucasian, undergraduate-educated or higher, employed, married or cohabiting, exhibited elevated depression and anxiety, and/or resided in areas with strong healthcare infrastructure. This pattern reflects broader inequities in perinatal psychology research related to poor participant representation (Jackson et al., 2021). In response to these limitations, researchers are encouraged to actively diversify their recruitment strategies to better include underserved parent populations, for example by building sustained partnerships within target communities (Fazli et al., 2025) and reducing reliance on social media-based recruitment, which tends to overrepresent socioeconomically privileged groups.

5. Conclusions

To summarise the findings presented, a multi-layered picture of early parenting and infant wellbeing can be observed. Parents with extraordinarily high caregiving demands, and those navigating contradictory parenting expectations, may be further strained when structural supports (e.g., flexible employment, safe environments, accessible health services) are inadequate. Similarly, infant behavioural difficulties can increase both parental emotional labour and perceived parenting burden, which can negatively affect lived experiences of parenting.

Conflicts of Interest: The author declares no conflict of interest.

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Article

Different Supports, Different Effects: Social Support Moderates the Impact of Parenting Stress on the Mental Health of Parents of Individuals with Intellectual and Developmental Disabilities

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Abstract: Parenting stress, social support, and mental health among parents of individuals with intellectual disabilities have garnered significant scholarly attention. Although existing research has extensively elucidated the relationship between parenting stress and mental health, there is limited systematic investigation into the role of social support—particularly regarding which and how social support moderates the impact of parenting stress on the mental health of these parents. Based on data from the 2020 Comprehensive Survey on Caregiving Burden and Public Service Needs of Families with Intellectual Disabilities conducted in Shenzhen, this study examines the relationships among parenting stress, social support, and mental health of Individuals with Intellectual and Developmental Disabilities. The findings reveal that overall, parenting stress exerts a significant negative effect on parental mental health, while social support has a significant positive effect. Further moderation analysis indicates that both subjective support and support utilization partially alleviate the adverse effect of parenting stress on mental health, whereas objective support primarily enhances mental health through a direct pathway. Moreover, differential patterns emerge between parents with and without disabilities: for non-disabled parents, subjective support and support utilization both directly improve mental health and reduce the negative impact of parenting stress. Objective support, however, only contributes directly to mental health and does not show a moderating effect. In contrast, among parents with disabilities, objective support effectively promotes mental health but does not mitigate parenting stress; subjective support and support utilization show neither direct nor buffering effects. These findings enrich the empirical literature on family mental health in the context of intellectual disability and offer practical implications for enhancing family support policies and improving the well-being of affected households.

Keywords: parenting stress; social support; mental health of parents of individuals with intellectual disabilities

1. Introduction

Individuals with intellectual and developmental disabilities (IDD) refer to those with intellectual disabilities, mental disorders, and those with both (Schalock, 2010). The World Health Organization stated in its 2022 “Global Report on Health Equity for Persons with Disabilities” that currently, 1.3 billion people (16% of the global population) are living with significant disabilities (World Health Organization, 2024). According to statistics from the

China Disabled Persons' Federation in 2023, the total number of registered disabled persons in China is 37.79 million, of whom 3.51 million have intellectual disabilities, 4.43 million have mental disorders, and 2.07 million have multiple disabilities (China Disabled Persons' Federation, 2024). Individuals with IDD not only face behavioral and communication difficulties but also are often accompanied by physical and mental illnesses such as epilepsy and sleep disorders, requiring continuous medical care and daily support (Kim et al., 2021; Grier et al., 2018). As the primary caregivers, parents of individuals with IDD endure multiple stresses during long-term care (Kumari & Biswas, 2024; Hayes & Watson, 2013). They face not only parenting stress but also challenges from social discrimination, financial burdens, and family role conflicts (Corrigan & Miller, 2004; McStravick & Cousins, 2025). This sustained psychological pressure has been confirmed to significantly impact caregivers' mental health (Biswas et al., 2015; Shahali et al., 2024; Dunn et al., 2019). Meanwhile, social support, as an important resource for coping with stress, plays a positive role in buffering stress and promoting psychological adaptation (Pandey & Dubey, 2019).

In addition, many studies have been conducted in the context of Western welfare, where formal support systems for families of IDD patients are relatively mature (Villaes-cusa et al., 2021). In contrast, China is characterized by a rapidly developing but still unbalanced support structure, strong family norms, and a significant amount of caregiving responsibilities borne by parents (Chao, 1994; Lei & Kantor, 2021). These features create a unique social ecology in which the interaction between parenting stress, social support, and mental health may differ from the patterns observed in Western environments. Therefore, exploring the interactive relationship between social support, stress, and mental health of parents of IDD patients in the Chinese context has important theoretical and practical significance for optimizing the support system, improving caregiver well-being, and cultural applicability.

Previous research has primarily explored the mental health issues of parents of individuals with IDD from two directions (Gill & Harris, 1991; Cramm & Nieboer, 2011). On one hand, a large body of research has confirmed that parenting stress is a key factor affecting their mental health. Parents of individuals with IDD who are at a high level of long-term parenting stress tend to experience more negative emotions, such as anxiety, self-blame, and frustration, and face more severe mental health problems (Bitsika & Sharpley, 2004; Miodrag & Hodapp, 2010; AlAnsari & Jahrami, 2018). On the other hand, social support, as a crucial external resource, has a positive impact on mental health. Empirical studies have shown that support from family, friends, and community networks can alleviate psychological stress and improve psychological resilience, thereby helping to improve the mental health status of parents of individuals with IDD (Ben-Zur et al., 2005; Israr & Ahmad, 2019). Previous studies have shown that parenting stress is significantly negatively correlated with the social support received by parents of children with disabilities (Miranda et al., 2019; Fu et al., 2023). From the perspectives of parenting stress and social support, the aforementioned studies have provided a relatively detailed explanation of their relationship with mental health. However, there is still a lack of systematic research on the role of social support in the relationship between parenting stress and mental health, and the exploration of the specific mechanism of whether social support moderates the impact of parenting stress on the mental health of parents of individuals with IDD remains insufficient.

Based on this, this study proposes the following core questions: (1) How does parenting stress affect the mental health of parents of children with intellectual and developmental disabilities? (2) Does social support, and especially how would social support (including subjective support, objective support, and support utilization), mitigate the negative impact of parenting stress on mental health through a moderating effect? Through empirical

analysis, this study aims to verify the moderating role of social support and explore the specific mechanisms of different types of support, providing a basis for designing targeted interventions and policy support.

2. Theoretical Background and Hypothesis

2.1. Parenting Stress and Mental Health

In research on families with disabilities, parenting stress is one of the most widely studied topics (Davis & Carter, 2008; Pisula, 2007). Parenting stress is the negative psychological and physiological reaction that arises when there is a mismatch between a parent's expectations of the resources needed to meet parenting demands and the available resources within the parent-child relationship system. It typically manifests as negative emotions toward oneself and one's children (Deater-Deckard, 1998; Walsh-Burke & Marcusen, 1999). Being a parent constitutes a social role that exists both within and outside the family, and this role itself is a source of stress (Alexander & Higgins, 1993). Parents must meet their own needs and those of their children, as well as the demands placed on them by other family members and society. Therefore, for some parents, the parenting stress resulting from an inability to meet these expectations can be continuous or chronic (Lepore, 1997). In addition, parental traits such as temperament, beliefs, and health status can also affect the type and severity of stressors, potentially creating additional stressors during the parenting process (Lepore & Evans, 1996).

The Parent-Child-Relationship Stress theory hypothesizes that the sources of parenting stress are composed of three independent components: stress in the parent domain related to the parent's own issues, stress in the child domain related to the child's own characteristics, and parental-child dysfunctional stress related to the degree of conflict in the parent-child relationship (Debra Bendell et al., 1989; Eyberg et al., 1993). The Daily Hassles theory further points out that the most common and impactful stressors for parents and children are those in daily life. The accumulation of these low-level, chronic small-scale stressors may be the most important factor in predicting mental health problems (Kohn, 1996). According to the Stress-Coping Model proposed by Folkman and Lazarus, stress arises from the interaction between an individual and their environment (Folkman & Lazarus, 1985). When an individual's coping mechanisms are inadequate or unable to meet the demands of the environment, stress is produced. Therefore, parenting stress is not only a reflection of objective pressure but also the result of subjective perception. Loyd and Abidin divided parenting stress into three dimensions: Parent Domain, Child Domain, and Difficult Child/Parent-Child Dysfunctional Interaction (Loyd & Abidin, 1985). Of these, the child's behavioral problems and functional impairments are the main sources of parenting stress in families with individuals with intellectual and developmental disabilities.

Compared to typical parents, parents of individuals with IDD face higher levels of parenting stress because they must undertake long-term and continuous special care responsibilities (Bouma & Schweitzer, 1990; Dyson, 1997), experience anxiety due to their children's developmental delays and behavioral problems (Beckman, 1983; Bentovim, 1972; Hastings, 2002), and worry about their children's future social adaptation and independence (Lecavalier et al., 2006).

Existing research shows that the stress endured by parents of children with IDD is multi-dimensional and long-term, primarily in the following aspects: Caregiver burden, economic stress, emotional stress, social adaptation stress, information and decision-making stress, future uncertainty. Each of these aspects is explained below. Caregiver Burden: The daily lives of children with IDD are highly dependent on their parents, requiring 24 h su-

pervision and support, including feeding, dressing, toileting, education, and rehabilitation training. This high-intensity care leads to physical and mental exhaustion for parents, often resulting in “caregiver burnout,” which is the most direct and common stressor. Research indicates that long-term care can lead to parental health problems, such as chronic fatigue and decreased immune function (Pinquart & Sörensen, 2007). **Economic Stress:** The high costs of special education, rehabilitation therapy, medical care, and assistive devices for children with IDD place a heavy financial burden on families. Research shows that the economic stress in families with children with IDD is significantly higher than in typical families and can lead to long-term financial hardship (Emerson, 2003). **Emotional Stress:** Parents often experience complex emotions such as guilt, self-blame, frustration, and anger, and feel fear due to social stigma. The child’s behavioral issues (e.g., self-harm, aggression) further exacerbate the emotional burden (Hastings, 2003). Research indicates that parental emotional stress can lead to anxiety or depressive symptoms (Singer, 2006). **Social Adaptation Stress:** Parents may face social isolation, misunderstanding, or discrimination due to their child’s special circumstances, and family internal tensions or imbalances in spousal relationships can also arise (Jellett et al., 2015). Research shows that a lack of social support significantly increases parents’ psychological burden (Bromley et al., 2004). **Information and Decision-Making Stress:** Parents must continuously learn knowledge related to IDD and face a myriad of treatment and educational choices, leading to immense decision-making pressure (Pain, 1999). Information overload and uncertainty can lead to decision fatigue. **Future Uncertainty:** Worries about the child’s independent life, employment, and social integration in adulthood constitute a long-term psychological burden. Research indicates that parental uncertainty about the future is one of the main sources of stress (Carter et al., 2014).

Long-term parenting stress can alter family relationship structures, leading to changes in parents’ social networks and a loss of a sense of life purpose (Gray, 2002; Kohut, 1966). In a chronic and multi-faceted stressful environment, parents of individuals with IDD are more likely to experience problems such as anxiety, depression, social isolation, and a decline in physical and mental health (Almansour et al., 2013; Hayes & Watson, 2013; Olsson & Hwang, 2001). Consequently, parents of individuals with IDD face higher health risks (Shahali et al., 2024; Smith et al., 2012). Among parents of individuals with IDD, parenting stress often manifests as long-term emotional tension, role confusion, feelings of helplessness in coping, and anxiety about future uncertainties (Boyd, 2002). Some studies point out that mothers experience higher parenting stress than fathers, and thus face more severe mental health issues (Olsson & Hwang, 2001; Wolf et al., 1989). Additionally, parenting stress may vary depending on the degree and type of the child’s disability (Hodapp et al., 1998; Konstantareas & Homatidis, 1989; Seltzer et al., 2004). Siklos and Kerns compared families with different types of disabilities and noted that the stressors and needs differ across these families (Siklos & Kerns, 2006). Ault et al. analyzed families of individuals with IDD in rural areas and found that due to geographical distance and a lack of resources, their family needs could not be met, leading to poor mental health outcomes under the influence of parenting stress (Ault et al., 2021).

Therefore, this study proposes that parenting stress in parents of individuals with IDD will influence their mental health problems, with greater perceived parenting stress being associated with poorer mental health (Hypothesis 1).

2.2. Social Support and Mental Health

Social support is widely considered an important psychological and social resource. It is a psychological and material resource provided by social networks that can reduce

psychological stress responses, alleviate mental tension, and improve social adaptability (Cohen, 2004; Q. Li, 1998). Research has shown that individuals who receive more social support generally have better physical and mental health (Broadhead et al., 1983). Social support not only helps individuals cope with life's pressures and crises (Wang, 2004), but also enhances their psychological adaptability and health levels (Leavy, 1983; Mitchell et al., 1982). Although the positive effect of social support on mental health has been widely confirmed (Beckman, 1983; Blazer, 1982; House et al., 1982), its specific mechanisms still require in-depth exploration (Heller et al., 1986). Cohen pointed out that the key to understanding how social support affects mental health lies in distinguishing and analyzing its different types and pathways of action (Cohen, 1988).

House et al. proposed three dimensions for measuring social support: social networks, social relationships, and social support in the narrow sense (House et al., 1988). Social networks view society as a network of nodes and connections, focusing on structural characteristics such as the size, density, and interaction frequency of an individual's network. Social relationships evaluate the number and type of existing relationships. Social support in the narrow sense evaluates the types and functions of support resources, such as emotional, instrumental, and informational support. Cohen et al. further distinguished social support into structural support (e.g., marital status, number of relationships) and functional support (e.g., emotional support, material assistance) (Cohen & Syme, 1985). The former reflects objective existences like social networks and relationships, while the latter reflects the actual help an individual receives. Accordingly, House and Kahn's social networks and social relationships can be classified as structural social support, while social support in the narrow sense can be classified as functional social support. Social support influences an individual's mental health by affecting their emotions, cognition, and behavior (Cohen, 1988).

In the context of mental health, social support helps regulate an individual's psychological response system. By conveying social expectations, norms, rewards, punishments, and specific aid, it prevents the disorder of psychological functions (Cassel, 1976; Thoits, 1986). Structural social support influences an individual's health behaviors through a certain degree of social control. For example, social networks help individuals form stronger motivations for healthy behaviors, such as quitting smoking, healthy eating, and regular exercise. The integration of social networks provides individuals with continuous positive emotional support, and meeting social role expectations helps them build a sense of self-worth (Cassel, 1976; Hammer, 1981; Thoits, 1983; Wills et al., 1985), leading to positive self-identity, thereby reducing psychological hopelessness (Thoits, 1986) and strengthening the willingness to self-care (Cohen & Syme, 1985). Functional social support focuses on the direct help an individual receives in a stressful situation. Members of a social network can provide health-related advice, emotional comfort, and material support, thereby helping the individual cope with potential risks and prevent the onset of psychological illness.

From a socio-psychological and constructivist perspective, the self is largely a reflection of how others perceive oneself (Mead, 1934), and the structure of social support reflects an individual's perception of the external society. The social relationships an individual has within their social network may not in themselves provide actual support, but the individual's subjective perception of the amount of social support available can largely influence mental health (Lakey et al., 1996). An individual's belief that others "can provide support when needed" can effectively mitigate their emotional and physiological stress responses to stressful events. Zhu et al. pointed out that perceived support can account for up to 24% of the variance in mental health levels (Zhu et al., 2014). Perceived support strengthens positive beliefs about the self, which in turn has a beneficial effect on health. People who perceive a higher level of social support tend to show fewer emotional problems

or mental illnesses (Cohen & Syme, 1985; Rosengren et al., 1993). Conversely, negative expectations of perceived support are likely to overlap with negative self-evaluations, thus inducing emotional distress and mental health problems (Baldwin & Holmes, 1987; Lakey & Cassady, 1990).

Regarding the mechanism by which social support affects mental health, existing studies generally believe there are two main models. The first is the main effect model, which posits that a higher level of social support directly promotes mental health, enhancing well-being and life satisfaction, regardless of whether the individual is in a stressful situation (Cohen & Wills, 1985). The second is the buffering effect model, which emphasizes that social support can act as a moderator when an individual faces a stressful situation, protecting mental health by buffering or weakening the negative impact of stress on it (Wills et al., 1985). Although the understanding of the mechanisms differs, researchers widely agree that social support has a positive impact on mental health. We therefore speculate that social support likely influences mental health through more than one mechanism.

Specifically for parents of individuals with IDD, Sterling constructed a structural equation model that pointed to a bidirectional pathway between mental health and social support (Sterling, 1998). On one hand, a lack of social support significantly increases an individual's risk of depression, while on the other hand, depressive symptoms can, in turn, weaken an individual's ability to obtain and perceive support. Researchers generally agree that among parents of individuals with IDD, higher levels of social support are associated with lower levels of depression (Benson, 2012; Gill & Harris, 1991), stress (Tehee et al., 2009), perceived burden (Khanna et al., 2011), and higher levels of mood and health (Ekas et al., 2010; Khanna et al., 2011; Sawyer et al., 2010).

Therefore, this study proposes that there is a significant correlation between social support and the mental health of parents of individuals with IDD, and social support helps reduce mental health problems (Hypothesis 2).

2.3. Social Support, Parenting Stress, and Mental Health

Although existing studies have fully revealed the negative relationship between parenting stress and mental health, and have also confirmed the direct positive effect of social support on mental health, the relationship between parenting stress, social support, and mental health is more complex and deserves further analysis.

The discussion on the relationship between social support, parenting stress, and mental health primarily involves two representative theoretical models: the Main Effect Model and the Buffering Effect Model. The Main Effect Model emphasizes that social support generally promotes mental health, regardless of whether the individual is facing a stressful situation (Cohen & Wills, 1985). House et al. pointed out that even in the absence of a stressor, social support can directly promote mental health by providing emotional support, such as a sense of self-esteem and belonging (House et al., 1988). Individuals with higher perceived social support are significantly better off in terms of physical and mental health, whether or not they experience a stressful event (Broadhead et al., 1983). The Buffering Effect Model holds that social support, especially during stressful events, buffers their negative impact on an individual's mental health by providing informational, emotional, or instrumental support (Cutrona & Russell, 1990). Cassel proposed that social support has a "stress-buffering" effect, where a certain level of social support can mitigate the health risks brought on by stress (Cassel, 1976). Cohen noted that while the Main Effect Model emphasizes the general role of social support and the Buffering Effect Model focuses on its moderating role in stressful environments, both can function simultaneously

in different contexts to jointly explain the mechanisms by which social support influences mental health (Cohen, 1988).

Social support can buffer the impact of stress on mental health by changing coping styles and enhancing coping abilities. The key lies in the matching and availability of social support (Cohen, 1988; Cohen & Wills, 1985; Uchino et al., 1996). The Stress-Support Match Hypothesis argues that effective support should match the individual's actual needs. For example, in times of financial hardship, tangible support is most crucial, whereas emotional support is more important when a loved one passes away (Cutrona & Russell, 1990). The matching of social support and stress can guide people to reduce negative appraisals of stress, thereby mitigating the impact of stress on mental health.

Cohen and Wills proposed that the buffering effect of social support can occur at three stages of a stressful event. Before a stressor occurs, social support can reduce an individual's risk of exposure to the stressor through a preventive mechanism, for example, by providing effective information, encouraging preventive behaviors, or mobilizing social network resources for protective intervention (Cohen & Wills, 1985; Gottlieb, 1998). During a stressful event, social support can reduce the individual's subjective perception of stress and lessen the intensity of their emotional response by providing comfort, advice, or direct help (Wills et al., 1985). It can also weaken the negative impact of stress by guiding people to interpret stressful situations less negatively (Cohen & McKay, 1984; Cohen & Hoberman, 1983). After a stressful event, social support can help an individual recover and adapt better, for instance, by enhancing their adherence to a treatment plan and encouraging them to adopt active coping strategies to promote psychological recovery (Wills et al., 1985).

Some studies have also indicated that the buffering effect of social support is highly selective, with the source, type, and satisfaction of support all affecting its buffering capacity (Chisholm et al., 1986; Ganster & Victor, 1988). A mismatch between support and needs may lead to a negative buffering effect, where social support increases the negative impact of stress (Abdel-Halim, 1982; Kaufmann & Beehr, 1986; Winnubst et al., 1982). Specifically, the buffering effect primarily functions through two dimensions: direct support and perceived support. Direct support is the immediate help provided by others when an individual is facing stress, including help with daily life, medical assistance, and financial aid (Berkman, 1985; House, 1981). This support can meet an individual's practical needs during a state of stress, thereby alleviating the burden of external stressors and maintaining their mental health. Even more important is perceived support, which is the individual's subjective perception of social support. Perceived support itself is inherently positive and can regulate an individual's emotions and psychological resilience (Cohen & Syme, 1985; Kessler & McLeod, 1985).

Stress can weaken an individual's self-esteem, self-efficacy, and sense of social control, which in turn increases the risk of depression and psychosomatic illnesses (Wills et al., 1985). The intervention of social support, especially from interactions and involvement in close relationships, can not only restore an individual's psychological stability but also enhance their confidence in receiving future help (Foa, 1971). Self-esteem theory and personal control theory (Paulhus & Christie, 1981) also emphasize that an individual's perception of their own status and sense of control is crucial in stressful situations. Social support helps maintain these key psychological states, thereby promoting positive emotional responses and effective coping behaviors (Reid & Ziegler, 1981).

In the context of families with individuals with IDD, the condition has a profound and lasting impact on the family and its members (X. Li & Zhang, 2018). Consequently, parents of individuals with IDD face greater parenting stress, and their mental health levels and social support are significantly lower than the national norms (Zhang et al., 2016).

Gill and Harris conducted a more in-depth exploration of the relationship between mental health, stress, and social support among mothers of children with autism (Gill & Harris, 1991). They proposed that social support, as a predictor of mental health, has a buffering effect that can improve the impact of stress. Parsons et al. built a logistics regression model and found a significant positive correlation between the availability of social support and caregiver mental health, with the effect being more pronounced in high-stress environments (Parsons et al., 2020).

Therefore, this study proposes that social support has a moderating effect on the relationship between parenting stress and the mental health of parents of individuals with IDD, and thus social support can mitigate the negative impact of parenting stress on their mental health (Hypothesis 3).

3. Data Sources and Analysis Methods

3.1. Data Sources

The data used in this study were collected from the “Comprehensive Survey of Caregiving Burden and Public Service Needs of Families with Individuals with Intellectual and Developmental Disabilities” conducted in Shenzhen in 2020. This survey was part of a larger, nationwide baseline survey aimed at families of individuals with IDD. It aimed to systematically assess the living conditions, caregiver strain, and gaps in public services for these families. In its execution, the survey adopted a community-based convenience sampling approach. The core methodology involved establishing partnerships with well-rooted local organizations, such as parent associations, rehabilitation centers, and special needs schools, using their member families as the primary sampling frame. This was supplemented by snowball sampling, where participating families were asked to refer others. The data collection phase employed a flexible and multi-modal strategy to ensure broad participation: online questionnaires were widely distributed for convenient self-completion, while, simultaneously, trained interviewers or social workers conducted structured face-to-face interviews or provided assisted form-filling for families with limited digital access or to gather more in-depth qualitative data. Ultimately, the professionally cleaned and analyzed data yielded an evidence-based report that comprehensively detailed the families’ real-world challenges and needs, providing a critical foundation for policy advocacy and service improvement. All respondents provided written informed consent prior to data collection. During data processing, cases with missing values were removed in accordance with standard procedures. After data cleaning and preparation, a total of 750 valid cases were retained for the final analyses.

3.2. Description of Variables

3.2.1. Dependent Variable

The dependent variable is mental health. Mental health is a multidimensional concept that not only refers to the absence of mental illness but also to a continuous state in which an individual possesses vitality, positive inner experiences, good social adaptability, and is able to effectively utilize their physical and mental potential and positive social functions. This study uses the “Quality of Life Scale” section of the survey questionnaire, which adopted the World Health Organization’s Quality of Life Assessment Scale, short version (The WHOQOL Group, 1998). This scale includes 26 items covering four domains: physical, psychological, social relationships, and environment, to measure the respondents’ quality of life and health status. The psychological domain of the scale consists of 7 items, namely “Are you satisfied with your health?”, “Do you enjoy life?”, “Do you feel your life is meaningful?”, “Can you concentrate?”, “Do you think you look good?”, “Are you satisfied

with yourself?”, and “Do you have negative feelings?”. Each item is scored on a 1–5 scale, with a total score ranging from 7 to 35. A lower score indicates a poorer state of mental health.

3.2.2. Independent Variables

Parenting Stress

Parenting stress refers to the pressure that parents feel within their parent–child system. This stress often arises from various obstacles that caregivers face due to personal factors, child factors, economic factors, or problems with the support system when fulfilling their role. This study measures the level of parenting stress among parents of children with disabilities using a short form of the Parenting Stress Index (PSI-SF), which was translated and revised by Taiwanese scholar Wen (Wen, 2011). The PSI-SF includes three subscales: Parental Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), and Difficult Child (DC), with a total of 36 items. The questionnaire uses a 5-point Likert scale, with a total score ranging from 36 to 180. A higher score indicates a more severe degree of perceived parenting stress.

Social Support

Social support is the influence that an individual receives through social connections that can alleviate psychological stress responses, relieve mental tension, and improve social adaptability. This study uses the Social Support Rating Scale developed by Xiao (Xiao, 1994). This scale has a total of 10 items and includes three dimensions: subjective support, objective support, and support utilization. Subjective support refers to an individual’s emotional experience and satisfaction with being respected, supported, and understood in society, and is closely related to their subjective feelings. Objective support refers to objective, visible, or actual support, including direct material assistance and the existence and participation in social networks and group relationships; this type of support is independent of the individual’s subjective feelings. Support utilization refers to how an individual utilizes the available support. Among the items, there are 12 single-choice matrix questions, each scored from 1 to 4 points. There are also 2 multiple-choice questions: if “no source” is selected, the score is 0; otherwise, the score equals the number of sources selected, with a maximum of 9 points. The sum of the scores for the 10 items is the total social support score, which ranges from 12 to 66. A higher total score indicates more social support received.

3.2.3. Measurement Reliability and Validity

The study used three standardized instruments: the Quality of Life Scale (WHOQOL-BREF, psychological domain), the Parenting Stress Index Short Form (PSI-SF), and the Social Support Rating Scale (SSRS). To ensure the robustness of the analyses, the validity and reliability of each scale were systematically assessed (see Table 1). For reliability, internal consistency was evaluated using Cronbach’s alpha coefficients, with α values above 0.70 considered acceptable. All three scales demonstrated satisfactory internal consistency, with Cronbach’s alpha coefficients ranging from 0.783 to 0.945. Validity was examined using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett’s test of sphericity to assess the appropriateness of factor analysis. KMO values above 0.7 and significant Bartlett’s test results ($p < 0.001$) indicate good construct validity. All three scales met these criteria, supporting their suitability for the current sample. These reliability and validity statistics were calculated based on the present study’s sample of 750 participants.

Table 1. Reliability and Validity Test Results.

Dimension	Reliability	Validity		Items
	Cronbach's Alpha	KMO & Bartlett Test	Sig	
Quality of Life Scale (Psychological Domain)	0.845	0.847	0.000	7
Parenting Stress Index (Short Form)	0.945	0.952	0.000	36
Social Support Rating Scale	0.783	0.812	0.000	10

3.2.4. Control Variables

Prior research has shown that sociodemographic factors are associated with parents' mental health and may influence levels of parenting stress and social support (Simon, 1995; Miodrag & Hodapp, 2010; Ben-Zur et al., 2005; Blazer, 1982). The control variables in this study include gender, marital status, employment status, health status, and years of education. Gender was converted into a dummy variable, with 1 for female and 0 for male. Marital status was also converted into a dummy variable, with 1 for married (first marriage/remarriage) and 0 for other statuses. Similarly, health status was converted into a dummy variable, with 1 for having a disability and 0 for no disability. Years of education refer to the length of time parents have received formal education, with the standard being: illiterate = 0, primary school = 6, junior high school = 9, high school = 12, associate degree = 15, bachelor's degree = 16, master's degree = 18, and doctoral degree = 21.

3.3. Analysis Methods

3.3.1. Parameter Testing

To explore differences in mental health levels among groups with different demographic characteristics, this study used an independent samples *t*-test (for dichotomous variables), one-way analysis of variance (ANOVA) (for categorical variables with multiple levels), and the least significant difference (LSD) method. This analysis helps to reveal the vulnerable situations of specific social groups in terms of mental health.

The formula for the independent samples *t*-test is

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{\sigma_{12}^2}}$$

where the variance is σ_{12}^2 , and the mean of the normal distribution is $\mu_1 - \mu_2$.

The formula for one-way ANOVA is

$$x_{ij} = \mu + a_i + \varepsilon_{ij} \quad (i = 1, 2, \dots, k; j = 1, 2, \dots, r)$$

where the unbiased estimate of μ is $\bar{x}$, and the unbiased estimate of a_i is $\hat{a}_i = \bar{x}_i - \bar{x}$.

The formula for the LSD method is

$$t = \frac{(\bar{x}_i - \bar{x}_j) - (\bar{\mu}_i - \bar{\mu}_j)}{\sqrt{MSE\left(\frac{1}{n_i} + \frac{1}{n_j}\right)}}$$

where *MSE* is the within-group variance of the observed variable, and $\bar{x}_i, \bar{x}_j$ are the sample means and n_i, n_j are the sample sizes for the *i*th and *j*th levels, respectively.

3.3.2. Regression Analysis

To further explore the influencing factors of mental health, this study employed a multiple linear regression model. The total mental health score was used as the dependent variable, parenting stress and social support variables as independent variables, and demographic variables as controls. This model can effectively analyze the independent effects of multiple variables on mental health and evaluate their relative importance. The regression equation is as follows:

$$Y = B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n + \varepsilon$$

where Y is the dependent variable, B_0 is the constant term, $X_1, X_2, \dots, X_n$ are the independent variables, $B_1, B_2, \dots, B_n$ are the regression coefficients for each independent variable, and ε is the error term.

3.3.3. Moderating Effect Analysis

To further explore the complex mechanisms of the relationships between variables, this study introduced a moderating effect analysis model to test whether parenting stress moderates the effect of social support on mental health. By adding the interaction term between social support and parenting stress, the significance of the moderating effect can be determined. The expression for the moderation model is as follows:

$$Y = B_0 + B_1X + B_2M + B_3XM + \varepsilon$$

where X is social support, M is parenting stress, and XM is the interaction term. If B_3 is significant, it indicates the presence of a moderating effect.

4. Results

4.1. Descriptive Statistics and Group Comparisons

First, a descriptive statistical analysis was conducted on the parenting stress, social support, and mental health of parents of individuals with intellectual and developmental disabilities (IDD). The results show that the total parenting stress scores for these parents are generally high. An F-test and t-test were then performed on the parents' scores on the parenting stress, social support, and mental health scales to compare the perceived parenting stress, acquired social support, and mental health status differences they experienced while raising individuals with IDD.

Based on the results in Table 2, the following observations can be made. There were no significant differences in parenting stress, social support, or mental health based on gender and health status ($p > 0.1$). Marital status had a significant impact on social support ($p < 0.01$), with the scores of the married group being generally higher. Employment status had a significant impact on scores across multiple dimensions. The unemployed group faced significantly higher parenting stress than the employed group ($p < 0.1$), while employed parents also scored significantly higher on social support and mental health than the unemployed group ($p < 0.01$). These results indicate that marital status and employment status have a significant impact on the mental health, parenting stress, and social support of parents of individuals with IDD.

Table 2. Descriptive Statistics and Difference Comparison of Parenting Stress, Social Support, and Mental Health among Parents of Individuals with Intellectual Disabilities (M $\pm$ SD).

	Parenting Distress	Parent–Child Dysfunctional Interaction Difficult	Difficult Child	Total Parenting Stress	Subjective Support	Objective Support	Support Utilization	Total Social Support	Mental Health Score
Total score	42.04 $\pm$ 9.64	33.46 $\pm$ 9.04	33.96 $\pm$ 8.78	109.47 $\pm$ 23.76	8.09 $\pm$ 3.09	18.97 $\pm$ 4.83	6.84 $\pm$ 2.07	33.91 $\pm$ 8.14	20.77 $\pm$ 4.03
Gender	male	41.28 $\pm$ 9.86	34.34 $\pm$ 9.53	34.66 $\pm$ 9.22	8.26 $\pm$ 2.99	19.26 $\pm$ 4.71	6.69 $\pm$ 1.99	34.23 $\pm$ 7.87	21.09 $\pm$ 3.95
	female	42.44 $\pm$ 9.50	33.00 $\pm$ 8.75	33.60 $\pm$ 8.53	8.01 $\pm$ 3.14	18.81 $\pm$ 4.89	6.92 $\pm$ 2.11	33.74 $\pm$ 8.27	20.60 $\pm$ 4.06
	t	−1.56	1.93	1.57	1.08	1.21	−1.43	0.76	1.57
Marital status	married	42.08 $\pm$ 9.53	33.56 $\pm$ 8.94	34.02 $\pm$ 8.66	8.19 $\pm$ 3.11	19.29 $\pm$ 4.71	6.84 $\pm$ 2.07	34.33 $\pm$ 8.05	20.76 $\pm$ 4.03
	others	41.66 $\pm$ 10.79	32.38 $\pm$ 10.05	33.30 $\pm$ 10.08	6.98 $\pm$ 2.58	15.41 $\pm$ 4.77	6.87 $\pm$ 2.08	29.27 $\pm$ 7.76	20.87 $\pm$ 4.11
	t	−0.32	−0.97	−0.61	−2.97 **	−6.18 ***	0.11	−4.75 ***	0.19
Employment status	employed	43.63 $\pm$ 9.05	33.73 $\pm$ 8.70	33.93 $\pm$ 8.42	7.51 $\pm$ 2.90	18.47 $\pm$ 4.82	6.66 $\pm$ 2.10	32.65 $\pm$ 7.88	20.23 $\pm$ 3.83
	unemployed	40.05 $\pm$ 9.99	33.12 $\pm$ 9.45	34.00 $\pm$ 9.23	8.82 $\pm$ 3.17	19.59 $\pm$ 4.77	7.07 $\pm$ 2.02	35.49 $\pm$ 8.19	21.45 $\pm$ 4.18
	t	5.15 ***	0.92	−0.11	−5.83 ***	−3.15 **	−2.70 **	−4.81 ***	−4.13 ***
Health status	Without Disability	41.96 $\pm$ 9.68	33.43 $\pm$ 9.03	33.93 $\pm$ 8.84	8.11 $\pm$ 3.10	19.02 $\pm$ 4.80	6.83 $\pm$ 2.07	33.97 $\pm$ 8.10	20.84 $\pm$ 4.03
	With Disability	43.75 $\pm$ 8.59	34.00 $\pm$ 9.31	34.60 $\pm$ 7.50	7.75 $\pm$ 2.79	17.90 $\pm$ 5.47	6.96 $\pm$ 2.22	32.63 $\pm$ 8.88	19.21 $\pm$ 3.81
	t	−1.94	−0.34	−0.43	0.64	1.29	−0.35	0.92	2.28
Years of education	Mean	12.11	Std	4.37	Min	0	max	21	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.2. Correlation Analysis

Using Pearson correlation analysis, we examined the relationship between parenting stress, social support, and the mental health of parents of individuals with intellectual and developmental disabilities. The results of Table 3 show a significant negative correlation: There was a significant negative correlation between parenting stress and mental health ($r = -0.482, p < 0.05$), indicating that the greater the parenting stress perceived by parents of individuals with IDD, the poorer their mental health. A significant negative correlation existed between parenting stress and social support ($r = -0.272, p < 0.05$), indicating that the less social support parents of individuals with IDD perceive, the greater their perceived parenting stress. A significant positive correlation was found between social support and mental health ($r = 0.257, p < 0.05$), indicating that the higher the social support parents of individuals with IDD perceive, the better their mental health.

Table 3. Correlation Matrix.

	M $\pm$ SD	Parenting Stress	Social Support	Mental Health
Parenting Stress	109.47 $\pm$ 23.76	1		
Social support	33.91 $\pm$ 8.14	−0.272 **	1	
Mental health	20.77 $\pm$ 4.03	−0.482 **	0.257 **	1

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4.3. Regression Analysis Results

We further used a linear regression analysis to examine the predictive effects of parenting stress and social support on mental health. To distinguish the influences of multiple factors, such as parenting stress, social support, marital status, and years of education on the mental health of parents of individuals with IDD, four models were constructed. Model 1 examined the effects of marital status, employment status, and years of education on mental health. Model 2 examined the effect of social support on mental health. Model 3 examined the effect of parenting stress on mental health. Model 4 examined the combined effects of both parenting stress and social support on mental health.

The results (see Table 4) showed that after including control variables such as gender, marital status, employment status, health status, and years of education in Model 1, the model's explanatory power (R^2) was only 0.033. Of the variables, employment status had a significant positive effect on mental health ($\beta = 0.129, p < 0.01$), and health status had a significant negative effect ($\beta = -0.081, p < 0.05$). The effects of gender, marital status, and years of education were not significant ($p > 0.1$). In Model 2, with the addition of the social support variable, the model's explanatory power (R^2) increased to 0.086. Social support had a significant positive predictive effect on mental health ($\beta = 0.242, p < 0.01$), while the effects of employment status ($\beta = 0.093, p < 0.05$), health status ($\beta = -0.076, p < 0.05$) remained significant.

In Model 3, with the introduction of the parenting stress variable, the model's explanatory power (R^2) significantly increased to 0.249. Parenting stress had the strongest negative predictive effect on mental health ($\beta = -0.475, p < 0.01$). In the final Model 4, where both social support and parenting stress were included, the model's explanatory power (R^2) further increased to 0.264. Parenting stress remained the most significant negative predictor ($\beta = -0.443, p < 0.01$), while social support still had a positive effect on mental health ($\beta = 0.128, p < 0.01$). Both were significant predictors based on the control variables. Hypothesis 1 and Hypothesis 2 were both confirmed.

Table 4. Results of Linear Regression Analysis.

	Model 1	Model 2	Model 3	Model 4
Gender	0.012 (0.345)	−0.006 (0.336)	−0.022 (0.304)	−0.030 (0.302)
Marital status	−0.013 (0.532)	−0.056 (0.526)	−0.002 (0.469)	−0.025 (0.474)
Employment status	0.129 *** (0.350)	0.093 ** (0.343)	0.103 *** (0.309)	0.085 ** (0.308)
Health status	−0.081 ** (0.712)	−0.076 ** (0.693)	−0.068 ** (0.628)	−0.066 ** (0.623)
Years of education	−0.064 (0.036)	−0.028 (0.035)	−0.014 (0.032)	−0.028 (0.032)
Social support		0.242 *** (0.018)		0.128 *** (0.017)
Parenting stress			−0.475 *** (0.005)	−0.443 *** (0.006)
Constant	19.772	16.916	29.601	27.440
N	750	750	750	750
Adj-R ²	0.033	0.086	0.249	0.264

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The results above indicate that the negative effect of parenting stress on mental health is significant, and although the effect of social support weakened after including parenting stress in the model, it still plays a positive role in mental health. This suggests that social support may, to some extent, buffer the negative impact of parenting stress on mental health. Therefore, this study will further test the moderating effect of social support on the relationship between parenting stress and mental health to gain a deeper understanding of their interaction mechanism.

4.4. Moderation Effect Analysis Results

Given that social support is a multidimensional concept and different types of support may play distinct roles in the buffering mechanism, this study disaggregated social support into three dimensions for analysis: subjective support, objective support, and support utilization. To explore the specific moderating effects of these three types of support on the relationship between parenting stress and mental health, the scores for each type of support were centered and then included as moderating variables in the regression equation for testing.

Based on the moderation analysis results (see Table 5), subjective support showed a degree of moderating effect on the relationship between parenting stress and mental health. In model 5, parenting stress significantly negatively predicted mental health ($\beta = -0.446$, $p < 0.01$), while subjective support significantly positively predicted mental health ($\beta = 0.110$, $p < 0.01$). This indicates that the higher the level of subjective support parents feel, the better their mental health, and the higher the parenting stress, the poorer their mental health. The model's explanatory power was $R^2 = 0.260$, suggesting that both variables can, to some extent, explain the changes in mental health levels. In Model 6, after adding the interaction term between parenting stress and subjective support, the main effects of parenting stress ($\beta = -0.445$, $p < 0.01$) and subjective support ($\beta = 0.123$, $p < 0.01$) remained significant. Additionally, the interaction term reached a marginal significance

level ($\beta = 0.063$, $p < 0.1$), and the model's explanatory power increased to $R^2 = 0.264$, with a change in R^2 of 0.004. This result suggests that subjective support has a certain buffering effect on the relationship between parenting stress and mental health. Specifically, in situations of high parenting stress, subjective support can partially weaken the negative impact of stress on mental health, thereby playing a protective moderating role. Subjective support not only directly and positively influences mental health but also moderates the negative impact of parenting stress, meaning that when parents face high parenting stress, a high subjective perception of available support can mitigate the declining trend of their mental health (Figure 1). Subjective support, therefore, plays a dual positive role in maintaining the mental health of parents of individuals with IDD.

Table 5. Results of Moderation Effect Analysis.

	Objective Support		Subjective Support		Support Utilization	
	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Gender	−0.028 (0.303)	−0.026 (0.302)	−0.024 (0.303)	−0.020 (0.303)	−0.032 (0.304)	−0.032 (0.303)
Marital status	−0.015 (0.470)	−0.019 (0.470)	−0.023 (0.480)	−0.025 (0.480)	−0.003 (0.467)	−0.004 (0.466)
Employment status	0.082 ** (0.311)	0.081 ** (0.310)	0.096 ** (0.308)	0.095 ** (0.307)	0.095 ** (0.307)	0.093 ** (0.307)
Health status	−0.067 ** (0.624)	−0.071 ** (0.624)	−0.066 ** (0.625)	−0.067 ** (0.625)	−0.070 ** (0.625)	−0.070 ** (0.624)
Education level	−0.021 (0.032)	−0.020 (0.032)	−0.023 (0.032)	−0.021 (0.032)	−0.027 (0.032)	−0.029 (0.032)
Parenting stress	−0.446 *** (0.006)	−0.445 *** (0.006)	−0.459 *** (0.006)	−0.464 *** (0.006)	−0.455 *** (0.006)	−0.457 *** (0.006)
Subjective support	0.110 *** (0.044)	0.123 *** (0.045)				
Parenting stress × Subjective support		0.063 * (0.002)				
Objective Support			0.093 *** (0.028)	0.095 *** (0.028)		
Parenting stress × Objective support				0.052 (0.001)		
Support Utilization					0.102 *** (0.064)	0.106 *** (0.064)
Parenting stress × Support Utilization						0.056 * (0.002)
N	750	750	750	750	750	750
Adj-R ²	0.260	0.264	0.257	0.260	0.259	0.262
ΔAdj-R ²		+0.004		+0.003		+0.003

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In model 7, parenting stress significantly negatively predicted mental health ($\beta = -0.459$, $p < 0.01$), and objective support significantly positively predicted mental health ($\beta = 0.093$, $p < 0.01$). This indicates that even after controlling for education, marital status, and employment status, parenting stress and objective support can still significantly explain the variance in mental health levels. The positive main effect of objective support suggests that tangible support resources obtained from social networks have a positive effect on improving parental mental health. However, after adding the interaction term

between parenting stress and objective support in the second step of the regression, the main effects of parenting stress ($\beta = -0.464, p < 0.01$) and objective support ($\beta = 0.095, p < 0.01$) remained significant, but the interaction term did not reach a significant level ($\beta = 0.052, p > 0.1$). The model's explanatory power only slightly increased to $R^2 = 0.260$, with a change in R^2 of 0.003. This result indicates that, despite its direct positive effect on mental health, objective support does not play a significant buffering role in moderating the relationship between parenting stress and mental health.

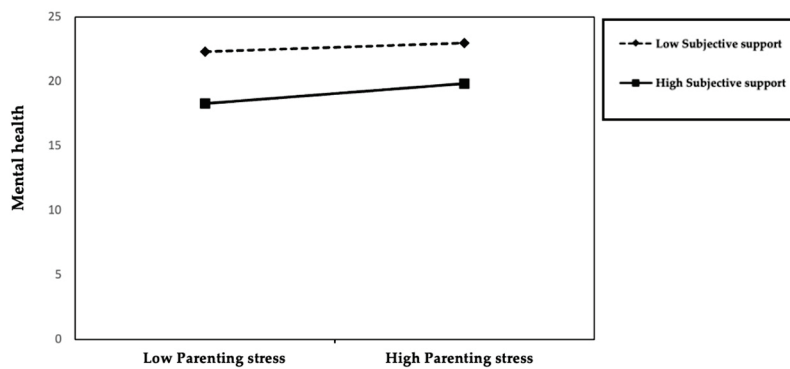


Figure 1. The moderating effect of Subjective Support.

Support utilization also showed a degree of moderating effect on the relationship between parenting stress and mental health. In model 9, parenting stress significantly negatively predicted mental health ($\beta = -0.455, p < 0.01$), while support utilization significantly positively predicted mental health ($\beta = 0.102, p < 0.01$). This indicates that after controlling for variables like education, marital status, and employment status, the higher an individual's support utilization, the better their mental health, and the greater the parenting stress, the poorer their mental health. In model 10, after introducing the interaction term between parenting stress and support utilization, the main effects of parenting stress ($\beta = -0.457, p < 0.01$) and support utilization ($\beta = 0.106, p < 0.01$) remained significant. The interaction term ($\beta = 0.056, p < 0.1$) was also significant, and the model's explanatory power increased to $R^2 = 0.262$, with a change in R^2 of 0.003. This result suggests that support utilization may have a certain buffering effect between parenting stress and mental health (Figure 2). That is, in situations of high parenting stress, if parents can more actively and consciously use or mobilize existing social resources, the extent to which their mental health is negatively affected may be relatively lower. Therefore, support utilization not only improves mental health through a direct path but may also, to some extent, mitigate the negative impact of parenting stress on mental health. Hypothesis 3 was almost confirmed.

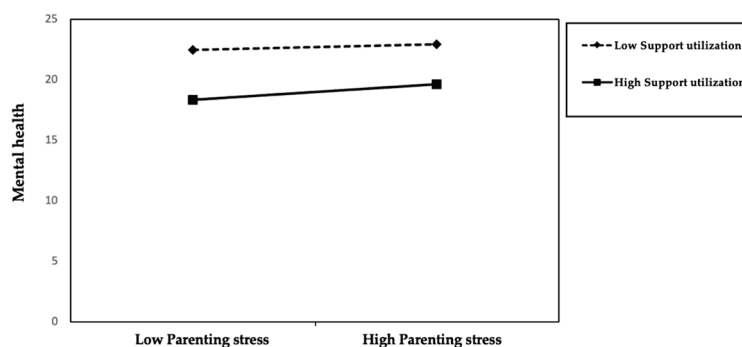


Figure 2. The moderating effect of Support Utilization.

Considering that the effects of social support and parenting stress on mental health may differ between parents with disabilities and those without, we constructed separate models for each group. The results (shown in Table 6) indicate that for parents without disabilities (Models 11–16), parenting stress had a significant negative effect on mental health, suggesting that higher parenting stress is associated with lower mental health levels. Among the three types of social support, subjective support ($\beta = 0.107, p < 0.01$), objective support ($\beta = 0.084, p < 0.1$), and support utilization ($\beta = 0.115, p < 0.01$) all showed significant positive effects on mental health, indicating that all three dimensions of social support effectively enhance mental health in parents without disabilities. Additionally, the interaction terms of subjective support ($\beta = 0.070, p < 0.1$) and support utilization ($\beta = 0.059, p < 0.1$) with parenting stress were both significant, supporting the buffering hypothesis of social support. In contrast, the interaction term of objective support ($\beta = 0.049, p > 0.1$) was not significant, which is consistent with the earlier analysis.

Table 6. Results of Between-Group Comparison Analysis.

	Parents Without Disability						Parents with Disability					
	Objective Support		Subjective Support		Support Utilization		Objective Support		Subjective Support		Support Utilization	
	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22
Sex	−0.023 (0.311)	−0.020 (0.311)	−0.018 (0.311)	−0.015 (0.312)	−0.028 (0.311)	−0.027 (0.311)	−0.302* (1.609)	−0.254 (1.587)	−0.258 (1.530)	−0.252 (1.561)	−0.254 (1.704)	−0.266 (1.770)
Marital status	−0.014 (0.489)	−0.018 (0.489)	−0.022 (0.501)	−0.024 (0.501)	−0.002 (0.486)	−0.003 (0.485)	−0.059 (1.849)	−0.058 (1.796)	−0.015 (1.672)	−0.011 (1.703)	0.045 (1.859)	0.043 (1.893)
Employment status	0.072* (0.321)	0.071* (0.321)	0.086* (0.318)	0.085* (0.318)	0.083* (0.317)	0.082 (0.316)	0.397* (1.490)	0.487* (1.511)	0.453* (1.443)	0.449* (1.468)	0.389* (1.530)	0.383* (1.564)
Years of education	−0.014 (0.032)	−0.013 (0.032)	−0.014 (0.033)	−0.013 (0.033)	−0.022 (0.033)	−0.024 (0.033)	−0.194 (0.169)	−0.247 (0.167)	−0.314 (0.174)	−0.290 (0.186)	−0.148 (0.175)	−0.134 (0.183)
Parenting stress (PS)	−0.456*** (0.006)	−0.454*** (0.006)	−0.470*** (0.006)	−0.473*** (0.006)	−0.462*** (0.006)	−0.465*** (0.006)	−0.370* (0.031)	−0.345* (0.031)	−0.376* (0.030)	−0.391* (0.031)	−0.372* (0.033)	−0.370* (0.033)
Subjective support (SS)	0.107*** (0.045)	0.123*** (0.046)					0.227 (0.246)	0.324* (0.253)				
PE × SS		0.070* (0.002)						−0.295 (0.012)				
Objective support (OS)			0.084* (0.029)	0.086* (0.029)					−0.376* (0.030)	0.354* (0.124)		
PE × OS				0.049 (0.001)						0.070 (0.007)		
Support utilization					0.115*** (0.065)	0.119*** (0.065)					−0.083 (0.327)	−0.090 (0.335)
PE × SU						0.059* (0.002)						0.055 (0.015)
N	750	750	750	750	750	750	750	750	750	750	750	750
Adj-R ²	0.261	0.266	0.258	0.260	0.264	0.267	0.275	0.342	0.338	0.342	0.237	0.239

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

For parents with disabilities (Models 17–22), the negative effect of parenting stress remained significant, but the role of social support was relatively weaker. Neither the main effects nor the interaction terms of subjective support and support utilization reached significance, with only the main effect of objective support being significant ($\beta = -0.376$, $p < 0.1$). This implies that for parents with disabilities, objective social support plays a more critical role.

A comparison between the two groups revealed that the negative effect of parenting stress on mental health was significant in both groups, indicating that, regardless of disability status, higher parenting stress significantly reduces mental health levels (Table 7).

Table 7. Overview of Different Model Results (Models 11–22).

Group	Model	Variables	Significant	Adj-R ²	ΔAdj-R ²
Parents without disability	Model 11	Subjective support	Yes	0.261	-
	Model 12	Subjective support	Yes	0.266	+0.005
		Interaction term:	Yes		
	Model 13	Objective support	Yes	0.258	-
	Model 14	Objective support	Yes	0.260	+0.002
		Interaction term:	No		
	Model 15	Support utilization	Yes	0.264	-
	Model 16	Support utilization	Yes	0.267	+0.003
		Interaction term:	Yes		
Parents with disability	Model 17	Subjective support	No	0.275	-
	Model 18	Subjective support	Yes	0.342	+0.067
		Interaction term:	No		
	Model 19	Objective support	Yes	0.338	-
	Model 20	Objective support	Yes	0.342	+0.004
		Interaction term:	No		
	Model 21	Support utilization	No	0.237	-
	Model 22	Support utilization	No	0.239	+0.002
		Interaction term:	No		

ΔAdj-R² represents the change in adjusted R² after adding the interaction term.

However, there were notable differences in the promoting and buffering effects of social support between parents with and without disabilities. For parents without disabilities, both subjective support and support utilization not only directly promoted mental health but also mitigated the negative impact of parenting stress. In contrast, objective support primarily contributed to mental health without demonstrating a buffering effect. For parents with disabilities, objective support effectively promoted their mental health but did not alleviate parenting stress. Subjective support and support utilization, on the other hand, showed neither direct promoting effects nor indirect buffering effects.

5. Discussion and Conclusions

5.1. Discussion

This study investigates the impact of social support on the mental health of parents of individuals with IDD by analyzing comprehensive survey data on family caregiving burdens and public service needs. Based on the results of the data analysis, this paper identifies new pathways through which social support influences the mental health of these parents.

Firstly, the study finds that parenting stress significantly increases mental health problems among parents of individuals with IDD. Regression analysis shows that higher parenting stress is associated with poorer mental health outcomes. This finding aligns closely with existing research, which consistently indicates that parents of individuals with IDD face elevated parenting stress due to factors such as long-term caregiving burdens, lack of social support, and strained family resources. These factors contribute to persistent and significant psychological stress. When this stress exceeds an individual's coping capacity, it is likely to trigger mental health issues such as depression and anxiety. For instance, Zhang et al. found that low levels of social support are a key factor contributing to poor mental health among family members of individuals with depression (Zhang et al., 2016). Similarly, Australian research shows that over 80% of parents of individuals with IDD report feeling "overwhelmed by stress," exhibiting anxiety and depression levels above the norm (Bitsika et al., 2013). Studies from the United States, the United Kingdom, and Sweden also confirm that parenting stress exacerbates mental health problems for these parents (Hastings, 2002; Kohut, 1966; Olsson & Hwang, 2001).

Secondly, this study verifies the positive effect of social support on mental health. Social support is significantly positively correlated with the mental health of parents of individuals with IDD, supporting the main effect model's view that social support has a broadly positive impact. The results indicate that subjective social support, objective social support, and support utilization directly promote parents' mental health, mitigating negative emotions in stressful situations and reducing the adverse impact of parenting stress on mental health. This finding is consistent with prior research. For example, Weiss found that mothers' perceptions of social support were significantly associated with reduced depressive symptoms in a study of mothers of children with autism (Weiss, 2002). Similarly, Ekas noted that perceived support was directly or indirectly related to parents' distress and well-being (Ekas et al., 2010). However, this study also reveals limitations in the social support available to families of individuals with IDD. The overall support scores for the sample were generally low, particularly for support utilization, with a mean score of only 6.84, indicating that these families struggle to effectively mobilize social resources in daily life.

Thirdly, this study further validates the moderating role of social support in the relationship between parenting stress and mental health. Existing research has confirmed that social support can alleviate mental health problems when parents face excessive parenting stress (Israr & Ahmad, 2019; Kessler & McLeod, 1985; Winnubst et al., 1982). However, prior studies have not clarified how social support functions in stressful situations to improve mental health. By disaggregating social support into subjective support, objective support, and support utilization, this study finds that the moderating mechanisms are not uniform. Subjective support and support utilization exhibit a moderating effect, with subjective support showing a particularly significant impact. This suggests that individuals' subjective perceptions of support and their ability to utilize it play a critical role in mitigating the effects of stress.

The mechanisms of subjective support may operate in two ways. On the one hand, subjective support helps alleviate parents' emotional distress. Existing research indicates that a key pathway of social support is reducing negative emotions and enhancing emotional regulation (Wills et al., 1985). This study finds that mental health scores are significantly better among groups with higher subjective support, possibly because, in high-pressure caregiving environments, subjective support fosters a belief that others understand and can provide help, reducing feelings of helplessness. On the other hand, subjective support enhances parents' sense of self-worth and control. Parents of individuals with IDD often

feel marginalized due to role-related stress and social isolation, and emotional interactions and support to help maintain their self-esteem and confidence. Thus, in these families, subjective support may play a deeper role in sustaining long-term mental health compared to objective support. In contrast, while objective support has a direct positive effect on mental health, its moderating effect is not significant. This suggests that the mechanisms of different types of social support vary: compared to merely possessing external resources, individuals' subjective perceptions and proactive support utilization are more critical in alleviating the psychological burden caused by stress. Simply providing resources or services may not sufficiently address psychological distress.

Fourthly, the study finds differences in the promoting and buffering effects of social support between parents with disabilities and those without. For non-disabled parents, subjective support and support utilization not only directly promote mental health but also buffer the negative impact of parenting stress on mental health. Objective support primarily promotes mental health but lacks a buffering effect. For parents with disabilities, objective support effectively promotes mental health but does not buffer the impact of parenting stress, while subjective support and support utilization neither directly promote mental health nor provide indirect buffering effects. These findings refine the understanding of social support's mechanisms across different groups, addressing gaps in prior research regarding variations in these mechanisms and enabling a more precise exploration of social support's pathways.

These results align with both the main effect and buffering effect models of social support. Overall support contributes directly to better mental health, consistent with the main effect model, while the differentiated impact of subjective and objective support under varying family conditions illustrates the buffering effect, showing how support moderates the relationship between caregiving stress and parental mental health. This conceptual integration highlights the dual role of social support, informing targeted interventions that address both general well-being and stress-specific needs.

These findings provide clear directions for improving the mental health of parents of individuals with IDD at the policy level. First of all, mental health services should be integrated into support systems for special-needs families. Current support systems for children with IDD often focus on the children themselves, overlooking the long-term caregiving burden on parents, which can lead to accumulated negative emotions and increased risks of anxiety and depression. Professionals should proactively identify parents at risk through regular mental health assessments and tailor interventions to their specific needs. Policymakers should allocate funding to ensure these services are accessible and affordable. Community services, disability organization programs, and public health systems should incorporate mental health screenings and interventions for these parents. Furthermore, a systematic social support network for families of individuals with IDD should be established. Through collaboration between government and social organizations, multi-level support services—such as parent support groups, community companionship services, mental health hotlines, and educational and legal consultations—can enhance parents' ability to identify, mobilize, and utilize social resources. Family support programs should offer structured training for parents on coping strategies, stress management, and navigating available social resources, ensuring that knowledge and practical skills are effectively transferred. Finally, the value of social support lies not only in direct assistance but also in its buffering effect on mental health in high-pressure situations. Interventions should shift from merely providing resources to facilitating their effective use, emphasizing proactive emotional care and psychological empowerment for parents. Mechanisms such as respite care and substitute caregiving should be established to provide parents with periodic

breaks, helping maintain psychological resilience, reducing psychological exhaustion from long-term caregiving, and fundamentally mitigating the negative impact of stress on mental health. Policymakers and program designers should prioritize developing policies and programs that enable equitable access to these mechanisms, especially for families in under-resourced communities. Notably, for typical families with IDD, prioritizing subjective social support is key, while for families with disabled parents, increasing objective social support is more effective. Implementing these differentiated approaches ensures that interventions are both targeted and evidence-based, maximizing positive outcomes for parents' mental health.

Despite achieving expected results, this study has limitations due to objective constraints. First, although the data were systematically collected multi-level data from parents of individuals with IDD, the study relies on self-report data, which may introduce reporting biases. Second, it relies on cross-sectional data, which cannot capture the dynamic and fluctuating nature of parents' mental health, necessitating longitudinal data for future analysis. Third, although employment status was included as a control variable in the analytical models, the study was unable to further examine the underlying differences in income levels and the associated economic resources that might influence parental stress and mental health. Future research should incorporate more comprehensive economic measures to better elucidate how socioeconomic conditions affect the mental health of parents of individuals with intellectual disabilities. Moreover, the sample primarily consists of parents from Shenzhen, a city with advanced economic development and robust social security systems. Families in such areas often have better access to social support and policy coverage than those in less developed regions, so the data may not fully represent the situation nationwide. Additionally, while comparisons were made with Western studies, China's unique family structures, cultural values, and public service systems—such as a tendency for parents to internalize responsibility and suppress stress—may amplify the negative effects of parenting stress on mental health and influence the mobilization and acceptance of social support. Thus, whether the moderating pathways and psychological impact mechanisms identified in this study apply to other cultural contexts requires further cross-cultural research.

5.2. Conclusions

This study concludes that parenting stress in parents of individuals with IDD significantly increases their mental health problems; and underscores the critical role of social support in mitigating the mental health challenges faced by parents of individuals with IDD, revealing distinct pathways through which subjective support, objective support, and support utilization influence psychological well-being. The findings highlight that subjective support and its utilization are particularly effective in buffering the negative impact of parenting stress, especially for non-disabled parents, while objective support plays a more significant role for parents with disabilities. These insights emphasize the need for tailored interventions that prioritize psychological empowerment and resource utilization over mere provision of services. It also recommends that future policies should integrate mental health screenings, respite care, and multi-level support networks to bolster psychological resilience in these families, with particular attention to cultural and individual differences in support needs. In addition to its relevance within the Chinese context, this study contributes to the international literature on families of individuals with intellectual and developmental disabilities. The findings regarding the main and buffering effects of support provide insights applicable across cultural contexts, offering guidance

for interventions and policy design in other countries supporting families of individuals with IDD.

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Article

What Do Dads Want in a Parenting Program? Improving Father Engagement in Parenting Education and Support

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Abstract: Father engagement in parenting programs is vital for positive child development and family wellbeing, yet fathers remain underrepresented in parenting programs. This study examines factors influencing fathers' participation using two discrete choice experiments. Experiment 1 identified key attributes affecting engagement, including program content, cost, and delivery modality. Experiment 2 refined these insights, showing a preference for cost-free, face-to-face programs with practical activities. Findings highlight the importance of addressing financial barriers; offering flexible, relevant content; and designing father-friendly programs to improve accessibility and inclusivity. By prioritising fathers' needs and preferences, parenting programs can better support child and family outcomes, fostering greater engagement and promoting equality across diverse family systems.

Keywords: fathers; parenting programs; engagement; decision making

1. Introduction

"If a community values its children, it must cherish their parents."—John Bowlby

One of the most influential relationships a person will experience in their lifetime is arguably the relationship they share with their parents (Frosch et al., 2019). The parent–child relationship has a profound and pervasive impact on a child's development, influencing a broad spectrum of areas including language and communication, executive function and self-regulation, sibling and peer relationships, academic attainment, and mental and physical health (Sanders & Turner, 2018). In this way, parenting is one of the primary tools to promote positive development across domains for children, including emotional, behavioural, and psychological wellbeing, and respond when these areas of functioning are compromised (Hoghughi, 1998).

In this context, parenting programs play a crucial role. 'Parenting programs' as a general term refers to programs that are designed to provide intervention and education to parents, equipping them with the skills and knowledge necessary to parent effectively, improve their relationship with their children, and promote positive developmental outcomes. The importance of these programs cannot be overstated; they are vital for ensuring that parents are adequately prepared to support their children's growth and wellbeing as both preventative and intervention measures (Jeong et al., 2021). Throughout this article, universal parenting programs will be of focus, that is, programs that parents voluntarily engage with for preventative and early- and mid-stage intervention to address issues relating to

parenting and the family system. Mandated programs, typically aimed at addressing acute issues in parenting or the family system, fall outside of the scope of the current article.

There is a distinct benefit to all members of the family system when parents engage in parenting programs. For fathers, participation in these programs has been shown to boost their confidence and sense of self-efficacy in parenting. Fathers who engage in these programs tend to develop more positive attitudes towards parenting, experience greater satisfaction in their parenting role, and report improved overall wellbeing alongside decreased stress (Bayse et al., 1991; Kaaresen et al., 2006; Wilczak & Markstrom, 1999). Their parenting partners benefit from improved relationship satisfaction and an increased sense of support from their male partners (Cookston et al., 2007), as well as prolonged gains from their own participation in parenting programs when their male partner is involved (Bagner & Eyberg, 2003).

The positive impact extends to children as well. The children of fathers who engage in parenting programs benefit from a more consistent approach to parenting from mum and dad, which leads to fewer behavioural problems, improved compliance, and stronger parent-child relationships (Webster-Stratton, 1985). Fathers who participate in these programs become more receptive to their children's cues, communicate more effectively with them, and are more involved in their lives (Burgess, 2016; McBride, 1991; Levant & Doyle, 1983; Pugh, 2008). Furthermore, engagement in these programs reduces ineffective and harmful parenting practices, such as coercive parenting (McAllister et al., 2004), thereby enhancing both the short-term and long-term outcomes for children, including their social, psychological, and physiological health (Kendrick et al., 2013; Meek, 2007).

Despite the clear benefits of engagement in these programs, fathers remain a distinctly underserved population. On the Australian front, compared to mothers, fathers enrol in parenting programs at a rate five times lower, and their dropout rate can be alarmingly high, reaching up to 100% (Fletcher et al., 2011). This disparity exists on a global scale. In the United Kingdom, an evaluation of the Parenting Early Intervention Pathfinder, which was a government funded program promoting access to several evidence-based parenting programs, found that of 3575 parents engaged in a parenting program only 12% were fathers (Lindsay et al., 2008). Similarly concerning, an evaluation of a second government funded program promoting access to a universal parenting program for parents in the UK revealed that of 2956 participating parents, fathers only made up 9% (Lindsay et al., 2014). In the United States, an early review of parent engagement in parenting programs revealed that fathers make up just 13% of parenting program participants (Budd & O'Brien, 1982), putting in stark relief that this issue has not been appropriately ameliorated from the 20th century to now. More recently in the United States, Gonzalez et al. (2023) reveal in a review that many parenting intervention studies consistently reported father engagement below 50%, if they report it at all. This disparity, seen across decades and on an international scale, is concerning given the significant role effective parenting plays in ensuring the wellbeing of children and the positive outcomes that follow from engaged parenting. Addressing this gap in father engagement is therefore of critical importance.

However, current research falls short in this area. The broader trend in parenting program research has been to develop a wide range of programs targeting specific issues faced by children and their families (e.g., Bearss et al., 2013; Elder et al., 2011; Harrison et al., 2004; Nelson et al., 2016; Tonge et al., 2014; Wetterborg et al., 2019), with little focus on how to effectively engage parents, particularly fathers, in these programs. The research that does exist often asks fathers to consider isolated aspects of parenting programs when identifying factors that support or deter their engagement (e.g., Tully et al., 2017). Across this existing literature, several insights have been gained about factors that can support

father engagement in parenting programs. These insights provide a solid foundation for the current article to further build upon. Freeman's (2023) study clearly outlines a range of preferred program characteristics that work to align with fathers' wants and needs when considering a parenting program. These include low cost or free of cost programs, program content that provide both activities and information to participants, face-to-face delivery of program content, and the opportunity to participate with other men. Whilst preliminary insights have been established in this area of research, undoubtedly further investigation is warranted given the pressing problem, and the need for the transition of research insights into practice in the family and child health and wellbeing industry. Not until research can be more effectively translated to practice recommendations can the issue of father under-engagement in parenting support services be further ameliorated.

To address this gap, the current study aims to explore the program features that facilitate or deter father engagement in parenting programs. This research takes a novel approach by employing a methodology that allows for deeper insights into fathers' decision-making processes regarding their engagement in these programs. Two discrete choice experiments were conducted to determine fathers' preferences for various parenting program features, considering these features within the context of holistic programs rather than as isolated factors. In Experiment 1, a global-level approach is taken wherein we gather broad, preliminary insights with the aim of informing the development of a more focused approach in Experiment 2. Through this process, we arrive at a set of actionable outcomes that can be clearly and easily translated into clinical practice.

A discrete choice experimental (DCE) design was used across both studies in this article (for overview, see Louviere et al., 2000). This methodology, traditionally applied in fields such as economics and cognitive and health psychology to examine individual's decision making in regard to utilising health services, provides a structured way to examine decision-making processes in much greater detail. Its application to the context of child and family health, a field within which the current research is situated, is relatively novel, offering a unique lens through which to explore preferences in program engagement, and gain detailed insights that can be more effectively translated into practice recommendations.

For clarity, the term "experiment" is used throughout this article to describe the two studies. This aligns with standard DCE terminology, where participants are presented with hypothetical scenarios composed of systematically varied attributes. By observing how participants make trade-offs between these alternatives, researchers can infer preferences and estimate the relative importance of specific program features, from which valuable insights are gained.

2. Experiment 1

Experiment 1 aimed to explore the general features of parenting programs that influence men's decisions to engage. This broad scope was reflected in both the study design and the participant sample, which included both current fathers and non-parent adult men. The intent was to gather wide-ranging insights from a population that is traditionally underrepresented in both parenting research and service provision.

The rationale for this inclusive recruitment approach within Experiment 1 was grounded in the urgent need to better understand and address male under-engagement in child and family health services. Fathers continue to be significantly underrepresented in parenting programs on an international scale, consistently making up the minority by a large margin in many programs. This issue is mirrored in the research literature, where fathers are often absent or marginalised in studies on parenting support, even when their perspectives are directly relevant (e.g., Gonzalez et al., 2023).

By including non-parent men alongside fathers in Experiment 1, we sought to amplify the voices of a broader population of men whose insights are rarely captured. While these participants may not yet be parenting, their willingness to engage in a study on this topic suggests that parenting is relevant to them—whether as a current consideration, future goal, or area of personal reflection. These perspectives are important, particularly given the lack of male representation in this field.

We acknowledge that this broad approach reduces the generalisability of Experiment 1's findings, as insights from non-parents are not grounded in current parenting experience. However, we view this as a justified and deliberate trade-off, made in the service of promoting inclusivity and equity. Our aim was not to produce definitive conclusions about fathers as a clinical subgroup, but to create a strong foundation for further inquiry which we go on to do in Experiment 2, wherein we take a more targeted approach to the participant sample recruited.

It is important to highlight that Experiment 1 and Experiment 2 were designed as a series, with the first informing the second. Insights from the broader participant pool in Experiment 1 directly shaped the focus and attributes tested in Experiment 2.

As the research base focusing on identifying father's preferences in relation to improving parenting program engagement continues to develop, we aim to take an exploratory approach to the investigation of attributes influencing the engagement decision in Experiment 1. Based on general trends across key literature, we do expect to see that fathers will show strong preferences for parenting program attributes related to cost and content (Frank et al., 2015; Freeman, 2023; Panter-Brick et al., 2014; Tully et al., 2017). Similarly, we expect facilitator qualities to be less consistently preferred, reflecting the distinct variation in fathers' perspective towards this attribute across the existing literature (e.g., Frank et al., 2015; Freeman, 2023; Glynn & Dale, 2015).

3. Method

3.1. Design

The design of Experiment 1 adopted a broad, global-level approach to exploring the program characteristics, hereafter referred to as program attributes in line with DCE conventions, that influence men's preferences for parenting programs.

A within-subjects experimental design using a best–worst scaling method was employed, whereby each participant completed the full set of best–worst choice tasks and provided preference data across all program attributes. Further details regarding the construction and implementation of this experiment are provided in the Materials section below.

3.2. Participants and Recruitment

Participants in Experiment 1 were eligible to take part if they were male, were aged 18 years or older, and resided within Australia. Recruitment occurred in 2024 via online advertising on social media platforms (i.e., Facebook). As compensation for participating, participants were invited to enter a prize draw to win one of three \$60 digital gift cards.

Notably, prior participation in a parenting program was not required for eligibility. This was a deliberate design decision. Restricting the sample to men who had already accessed parenting programs would likely have biased the sample towards those who already feel able to access support and navigate available services. In contrast, including men who had not previously engaged allowed the study to capture perspectives from those who may feel excluded, unsupported, or unaware of relevant services, representing groups whose insights are essential for designing more accessible and inclusive parenting support.

The authors consider the inclusion of both engaged and non-engaged participants a strength of the study, allowing for a more comprehensive understanding of the barriers and enablers to program engagement. This inclusive approach supports the broader aim of informing service design in a way that better meets the diverse needs of fathers, mothers, and other caregivers.

A total of 54 participants began the experiment, with 45 completing all tasks in full. Concerns about sample size and statistical power must be considered within the context of DCE methodology, which differs from traditional survey-based designs. DCEs analyse how participants make trade-offs between different program attributes by presenting them with systematically varied choice tasks. This method allows researchers to estimate the relative importance of each attribute and model decision-making preferences in detail.

Notably, DCEs can yield valid results with smaller sample sizes than other quantitative methods, since DCEs obtain repeated observations for each participant for each measured construct. Many DCEs successfully operate with sample sizes between 100-200 or lower, particularly those with focused populations of interest. For instance, a widely cited review by de Bekker-Grob et al. (2015) reported that 32% of health-related DCEs used fewer than 100 participants, particularly where the number of choice tasks and attributes was modest.

Further, our sample size targets were informed by expert guidance in the field. Lancesar and Louviere (2008) note that reliable models can often be estimated with as few as 20 respondents per version of a questionnaire, particularly where the goal is preference estimation rather than subgroup comparisons, congruent with de Bekker-Grob and colleagues' recommendations. Johnson and Orme (2003) and Orme (1998) also suggest that sample size adequacy depends on the number of choice tasks, alternatives, and model parameters rather than absolute numbers alone. These considerations were integral to our planning, especially given the well-documented issue of father under-engagement in both service provision and research.

Within this context, we considered 45 complete responses in Experiment 1 to be acceptable, albeit at the lower bound of typical DCE studies. We acknowledge this as a limitation, particularly with respect to generalisability, and this is further discussed in the General Discussion. However, we maintain that these findings provide valuable preliminary insights and served their intended purpose of informing the more focused Experiment 2, which benefited from a larger and more targeted sample, discussed further on in this article.

3.3. *Materials*

All materials used in the research presented across the current article are described in full within the article; no protected or proprietary materials were used.

3.3.1. Demographic Questionnaire

Participants completed demographic questions asking about their age, education, employment, ethnic background, relationship status, number of children, and previous experience participating in parenting programs. These demographic characteristics were divided into levels, outlined in Table 1. Age included four levels, education and employment included six levels each, ethnicity included eight levels, relationship status included three levels, number of children below 18yrs of age included four levels, and previous engagement in a parenting program was a dichotomous yes/no question.

Table 1. Participant demographic data from Studies 1 and 2.

Demographic Domain	Demographic Category	Experiment 1 (N = 45) N (%)	Experiment 2 (N = 97) N (%)
Age	18–30	32 (71)	18 (19)
	31–40	4 (9)	38 (39)
	41–50	6 (13)	29 (30)
	51+	3 (7)	12 (12)
Education	Less than a high school diploma	3 (7)	5 (5)
	High school graduate, diploma or the equivalent	17 (38)	12 (12)
	Some university credit, no degree	13 (29)	7 (7)
	Trade/technical/vocational training	2 (4)	11 (11)
	Bachelor's degree	7 (16)	37 (38)
	Postgraduate degree	3 (7)	25 (26)
Employment	Unemployed/unable to work	3 (7)	2 (2)
	Full time employment	17 (38)	86 (89)
	Part time/casual employment	13 (29)	4 (4)
	Student	2 (4)	3 (3)
	Homemaker	7 (16)	1 (1)
	Retired	3 (7)	1 (1)
Ethnicity	Aboriginal/Torres Strait Islander	2 (4)	4 (4)
	Arab	0 (0)	0 (0)
	Asian	2 (4)	8 (8)
	Black/African	0 (0)	7 (7)
	Caucasian/Australian	32 (71)	53 (55)
	European	9 (20)	11 (11)
	Other	0 (0)	13 (13)
	Prefer not to say	0 (0)	1 (1)
Relationship status	Single/never married	27 (60)	9 (9)
	Married/domestic partnership	14 (31)	82 (85)
	Divorced/Separated	4 (9)	6 (6)
No. of children (under 18 years)	0	21 (47)	0 (0)
	1	15 (33)	11 (11)
	2	8 (18)	34 (35)
	3+	1 (2)	52 (54)
Previous engagement in a parenting program	Have previously engaged in a program	3 (7)	25 (26)
	Have not previously engaged in a program	42 (93)	72 (74)

3.3.2. Experiment

In Experiment 1, participants' preference towards six global-level parenting program attributes in the context of considering engagement in a parenting program were explored. These six attributes are outlined in Table 2 (Experiment 1). To capture these preferences, we used the Best–Worst Scaling method (Louviere et al., 2015). This method presents participants with a series of options, and for each option they are asked to indicate both the 'best' and 'worst' attribute. When a participant identifies an attribute as the 'best', they are indicating that this is their most preferred attribute, whilst an attribute identified as the 'worst' is their least preferred out of the attributes presented to them in that hypothetical option. A D-optimal design was used for the Best–Worst Scaling questions, which optimises the amount of information gained while reducing the number of choices participants are required to make. Each question presented participants with three of the possible six attributes (see Table 2). Each of the six program attributes were presented to participants ten times each across the 20 questions, and each program attribute was presented with every other program attribute an equal number of times. The order of the 20 questions

was randomised across participants to prevent fatigue effects. An example question is displayed in Figure 1.

Table 2. Parenting program attributes and attribute levels that appear in Experiment 1 and Experiment 2, respectively.

Experiment 1: Program Attribute	Experiment 2: Attribute Levels	Description
Program content	(a) General parenting information (b) Specific information about a child concern (c) Practical, hands-on activities	How general or specific, and hands-on the content is. Receiving general information about parenting, specific information about a child's problem, engaging in hands-on learning activities, or receiving a mix of information and activities
Cost of the program	(a) \$0 (b) \$50 (c) \$100	The cost of participating in the parenting program
Style of participation	(a) Individually (b) With other fathers (c) With other parents and carers	Choosing to participate in the program individually, in a group of other dads, or with your partner/co-parent
Delivery modality	(a) Face-to-face (b) Online (asynchronous) (c) Telehealth (synchronous)	Choosing to receive the program face-to-face, through a website, through an app, via video call (e.g., Zoom), or via SMS updates
* Facilitator qualities	N/A	The background experience and gender of the person facilitating the program
* Length of the program	N/A	The amount of time and sessions the program runs over

* attributes excluded in Experiment 2.

* Please select a 'least' important and 'most' important option

Step 1 of 1

Least

Most

☐
☐



Cost of program
The cost of participating in the parenting program

☐
☐



Program content
How general or specific, and hands-on the content is

☐
☐



Facilitator qualities
The background experience and gender of the person facilitating the program

Figure 1. Example of a question from Experiment 1. Note. The term 'best' maps to most preferred option, and the term 'worst' maps to least preferred option out of the options presented to the participant. Red * is part of the website formatting, and simply denotes that the participant is required to answer each question when they enrol in the study. The website - prolific - has this function to ensure participants don't accidentally skip a question when scrolling through. It is not meaningful for the purpose of this article.

3.4. Procedure

Participants completed the experiment on the QuestionPro survey hosting website. The experiment was anonymous, and participants provided consent to participate at the beginning of the experiment. If they did not indicate their consent, they were automatically exited from the QuestionPro site. Participants first completed the demographic questions followed by the DCE.

3.5. Data Analysis

Descriptive statistics were calculated for the demographic data and are reported in Table 1.

A Best–Worst scaling standardised score was calculated for each participant for each of the six program attributes as a measure of preference (least preferred attribute to most preferred attribute). This standardised score is calculated by subtracting the number of ‘worst’ votes (i.e., participants voted this attribute as least preferred X number of times) for a single attribute from the total number of ‘best’ votes (i.e., participants voted this attribute as most preferred X number of time) for that same attribute. This value is then divided by the total number of appearances of that attribute to participants (Louviere et al., 2015). This formula (best-worst)/appearances results in a value that ranges from -1 to 1 for each attribute and reflects the overall strength of participants preference for that attribute. Scores towards 1 indicate that this attribute was more important in participants’ decision making, while scores towards -1 indicate this attribute was not important/had little influence on participants’ decision making when considering engaging in a parenting program (Flynn et al., 2007). Practically, this data allows us to consider how much different program attributes influence individuals’ decision to engage in a program, (e.g., if the program has an associated enrolment cost, for instance, how much is this a make-or-break factor for men considering enrolling in that program or not).

To analyse differences in preferences between the six program attributes, a one-way repeated measures ANOVA and subsequent post hoc tests were performed.

4. Results and Discussion

Participants who did not complete the survey after beginning were excluded, leaving a sample of forty-five data points, which comprise the following analysis.

4.1. Demographic Characteristics

Descriptive statistics derived from the demographic data are presented in Table 1. Participants ranged in age from 18 to 52 years (Mean age = 28 years, SD = 11 years). The majority of participants were between 18–30 years of age (71%), with most having achieved a high school diploma (38%) and enrolling in university (29%). Similarly, most participants were employed part-time (29%) or full-time (38%). Seventy-one percent of participants were from a Caucasian/Australian background, and 60% reported being single/never married. Just under half (47%) of participants reported having 0 children under the age of 18 years, the remaining 53% (cumulatively) reported having one or more child currently under the age of 18 years.

Most participants (93%) reported having never engaged in a parenting program before, with three participants reporting previous engagement. Across these three participants, previous parenting programs included 1, 2, 3 Magic, which is a program designed to help parents and caregivers manage challenging child behaviours, particularly those of children aged 2–12, and focuses on teaching parents how to respond to unwanted behaviours with a simple “1-2-3” counting method and how to coach children through their emotions. The

second program participants reported previous involvement with was a free parenting education and support service delivered by the New South Wales public health system in Australia, likely referring to one of the ‘Positive Birth and Parenting workshops’ offered by the public health system (although this was unnamed by the participant in the current experiment). One participant reported having previously engaged in a parenting program, but did not describe or indicate which program he had engaged in. This trend is in line with the rate reported across the literature, with men reportedly engaging significantly less than mothers (Fletcher et al., 2011).

4.2. Parenting Program Preferences

The average standardised score for each of the six attributes was calculated using the method described in Section 3.5 and is reported in Table 3. General trends for participants’ preferences across the six attributes can be observed, with program content being considered the most important attribute by participants in the decision to engage in a parenting program, whereas program length surprisingly had very little influence on participants’ decisions. This was followed by facilitator qualities similarly being of little importance to participants decision making. Style of participation and program cost were considered moderately important to participants, and delivery modality was of neutral importance to participants.

Table 3. Fathers’ preferences for parenting program attributes, as measured by average standardised scores.

	Program Content	Cost	Style of Participation	Delivery Modality	Facilitator Qualities	Program Length
Average standardised score	0.343	0.155	0.062	−0.006	−0.081	−0.419
Standard deviation	0.534	0.454	0.476	0.547	0.492	0.612

Table 3 can be interpreted by understanding that rated strength of preference of each attribute moves from least preferred (meaning the attribute does not play a part in decision making much at all) on the right, moving towards the middle which represents participants being mixed about whether these attributes were important for their decision making process, to the far left where these attributes play a very important part in participants’ decision making and are considered the most preferred (as in, the participant puts the most weight on these attributes when considering engagement in a parenting program).

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in participants’ preferences across the six program attributes. Mauchley’s test indicated that the assumption of sphericity was violated ($\chi^2(14) = 32.47, p = 0.003$); therefore, degrees of freedom were corrected using the Greenhouse–Geisser estimate of sphericity ($\epsilon = 0.76$). The results of the corrected ANOVA revealed that there was a significant effect of program attribute on participant’s preference between at least two of the attributes ($F(3.773, 166.026) = 10.34, p < 0.001$).

Post hoc tests (using the Holm correction to adjust p) indicated that participants consistently rated program length as less important than any of the five other attributes (all pairwise comparisons $p < 0.05$). Further, participants rated that program content was significantly more important than both facilitator qualities ($p = 0.002$), and delivery modality ($p = 0.04$).

A consideration of the general preference trends, results of the one-way repeated measures ANOVA, and post hoc testing revealed participants placed the highest importance on the content of the parenting program in their decision to engage, followed by the cost,

and then the style of participation. Results indicate that these three attributes do impact men's decisions regarding engaging in a program, and they look at these attributes in a potential program to ensure what is on offer (in regard to these attributes) meets their needs.

The delivery modality was of neutral importance, likely indicating that the sample was split between those who found this attribute important to consider, and those who did not care about delivery modality.

Finally, participants found the length of the program unimportant when considering engaging in a hypothetical program, denoting the sample largely agreed they did not care about this attribute in their decision-making process. Similarly, facilitator qualities were of little importance to participants decision making. Practically, this likely suggests that when men come across a program that effectively meets their needs regarding their most preferred attributes (i.e., program content offered, cost of the program, and the style of delivery), then they are less concerned about how long the program spans for or who is facilitating it.

5. Experiment 2

Much of the current research on effectively engaging fathers in the field of family and child health, particularly in recruiting and retaining more fathers in parenting programs, tends to examine fathers' preferences in isolation. Experiment 1 continued this trend, contributing insights from an Australian male sample. This approach, while contributing to the growing field of father-focused research, does not effectively translate into practice, as an individual's decision to engage in a parenting program is complex and multidimensional, and needs to be considered as such.

Experiment 2 built directly upon the findings of Experiment 1 by incorporating the program attributes that participants had indicated a preference for, thereby introducing an important element of co-design from the population of interest. In this second experiment, a more specific and focused approach was adopted to gain deeper insight. While Experiment 1 deliberately employed a broad sampling strategy which invited both current fathers and non-parent men to reflect on factors influencing their engagement decisions, Experiment 2 was limited to current fathers of children under the age of 18 years. This shift in focus was a purposeful decision made by the researchers.

A central aim of the current article is to contribute to the growing body of work seeking to improve equality and accessibility within parenting support services for fathers, who remain significantly under-engaged and under-served in this space. Casting a wide net in Experiment 1 allowed the inclusion of diverse male perspectives, especially from individuals who may be considering fatherhood as well as fathers who have not yet accessed services. In this way, the intention was for Experiment 1 to provide a broad theoretical foundation that could inform the development and design of Experiment 2 whilst providing a voice to fathers and men. Experiment 2 represents the focal point of the current article, offering insights that are more directly applicable to fathers specifically.

A second way in which we increased the detail and specificity in Experiment 2 was in the methodological approach. In this discrete choice experiment, attribute levels were introduced, and fathers were asked to consider multiple levels of each attribute together in the context of a hypothetical, holistic parenting program, compare the hypothetical programs, and trade-off the components of each program to select their preferred overall program. This approach allows for deeper insight into how fathers make decisions about participating in parenting programs and how different aspects of a program could be integrated for the father considering his engagement in a program.

In the interest of incorporating elements of co-design, and navigating the risk of cognitive fatigue, which is heightened in Experiment 2 as further choice options are added through the inclusions of attribute levels, resulting in more complex choice tasks for fathers to complete, insights about program attributes that were revealed to have little impact on fathers decision making regarding program engagement were used to inform the design of Experiment 2 (Krosnick, 1999).

Program content, cost, and style of participation were identified as key factors fathers consider in their decision to engage, and the sample was largely split regarding delivery modality, indicating this factor may indeed be important to some but less important to others. Conversely, facilitator qualities and program length were revealed as attributes that did not factor into the decision to engage in a parenting program.

These findings align with broader trends in the existing literature on father engagement in parenting programs. Studies have consistently reported mixed results regarding the influence of facilitator characteristics (e.g., Frank et al., 2015; Freeman, 2023; Glynn & Dale, 2015), suggesting that fathers do not express a strong or consistent preference for facilitator background, style, or characteristics. While it is possible that facilitator preferences are highly individualised, the results of Experiment 1 suggest that, for most men, facilitator qualities are simply not a salient factor when considering whether to participate. In light of this, and with the goal of reducing participant burden, facilitator qualities were excluded from Experiment 2, as its inclusion was unlikely to generate meaningful new insights beyond those already established in the literature and confirmed in Experiment 1.

The lack of importance of program length was a more unexpected outcome. In the broader parenting program literature, interventions commonly span 8–12 weeks (e.g., Bagner, 2013; Berge et al., 2010; Feinberg et al., 2010; Hoofdakker et al., 2014; Roberts et al., 2006; Sanders et al., 2000; Wilson et al., 2012). However, this standardised duration may not reflect fathers' actual preferences. In contrast to the structure of many existing programs, emerging research that focuses specifically on fathers' preferences has found that shorter programs, typically 2–4 weeks in duration, are preferred (Freeman, 2023). Program length was ranked as the least important attribute in Experiment 1. Given this, and to further reduce participant fatigue in Experiment 2, program length was also excluded from the final design. The remaining program attributes and attribute levels are outlined in Table 2.

By focusing only on the attributes identified as most relevant to men and fathers, Experiment 2 aimed to deepen insight into the decision-making processes regarding parenting program engagement. We hypothesised that practical activities would emerge as the most preferred content style, followed by specific and then general information, while cost preferences will show an increasing trend favouring free or low-cost programs over more expensive options. Additionally, we expected that fathers would prefer group settings with other fathers, followed by groups of male and female parents, and then participating individually in programs. We finally hypothesised that fathers would most prefer participating in programs face-to-face, followed by Telehealth (synchronous), and prefer online participation (asynchronous) least.

6. Method

6.1. Design

A within-subjects discrete choice experimental design was employed in which all attributes and attribute levels were presented to each participant across their completion of the online experiment.

6.2. Participants and Recruitment

Participants were eligible to take part if they were male and aged 18 years or older, were a current parent of a child under the age of 18 years, and resided within Australia. Participants in Experiment 2 were recruited during 2024 through advertising on social media (Facebook), internally through the authors' institution, and via the online experiment platform Prolific. A total of 102 participants were recruited across these three platforms. Fifty-two participants were recruited on the Prolific platform, 29 participants were recruited from social media advertising, and 21 were recruited internally through the author's institution. In line with Experiment 1, participants were not required to have previously engaged in a parenting program.

6.3. Materials

6.3.1. Demographic Questionnaire

Participants in Experiment 2 completed the same set of demographic questions used in Experiment 1 to allow a comparison of samples.

6.3.2. Experiment

Four of the original six program attributes comprised Experiment 2; these included cost, delivery modality, style of participation, and program content. Three levels were developed for each of these attributes informed by features of current validated parenting programs. Each attribute and their levels are outlined in Table 2. Each participant completed 21 choice sets, which included three hypothetical parenting programs comprising one level of each of the four attributes. Participants were required to select their most preferred hypothetical parenting program from the set of three options. An example question is displayed in Figure 2 to illustrate this design. The trials had a randomised design, meaning that each hypothetical parenting program choice comprised a random selection of levels from each of the four attributes. This randomised design was used to reduce the risk of systematic bias in the presentation of attributes to participants and to reduce overall cognitive load by allowing the use of a briefer set of decision tasks.

Which of the following options would you most prefer if you would participate in a parenting program with these characteristics?

Step 1 of 21

	Option 1	Option 2	Option 3
Cost of program	\$100.00 \$\$\$	\$100.00 \$\$\$	\$100.00 \$\$\$
Participation style	Individually (this can include your partner/ children) 	As part of a group of other dads 	Individually (this can include your partner/ children) 
Content of the program	Receiving a broad spectrum of information about helpful parent skills and techniques 	Receiving specific information about your child and their presenting concern/s only 	Engaging in practical activities to improve parenting skills 
Delivery mode	Participating in the program online through live video call/Zoom-based delivery 	Participating in the program face-to-face 	Participating in the program face-to-face 
	☐	☐	☐

Figure 2. Example of a question from Experiment 2.

6.4. Data Analysis

Descriptive statistics were calculated for the demographic data, which is reported in Table 1.

A multinomial logistic regression was conducted to analyse the data from the decision tasks. The goal was to understand the impact of four key predictors on participant's decision making when considering engaging in parenting programs: program cost, participation style, program content, and delivery modality. To this end, the regression was set up to predict the hypothetical parenting program chosen (i.e., option 1, 2, or 3) for each of the 21 trials completed by each participant. We dummy coded the three levels of each attribute for inclusion in the regression model, with one level of each attribute set as the reference level. We refer to the dummy coded regression coefficients as the utility of the attribute level, which can be thought of as a measure of how much participants preferred that attribute level, with larger and more positive values representing greater preferences. We then calculated the utility of an option as the sum of the component utilities of the attribute levels that compose the option. We repeated this for each option in each trial, and then across all trials and participants. This is an additive utilities representation that is standard practice in the analysis of discrete choice experimental data. The Apollo package in the R programming language was used for model estimation (Hess & Palma, 2019). Given the complexity of human decision-making, a random effects model was employed to account for the variability in how different participants weighed the attributes when making choices.

To help guide readers, our results are stepped across three key stages. Firstly, we present the preliminary trends in father preference that appear across the four parenting program attributes, Figure 3 helpfully visualises these trends.

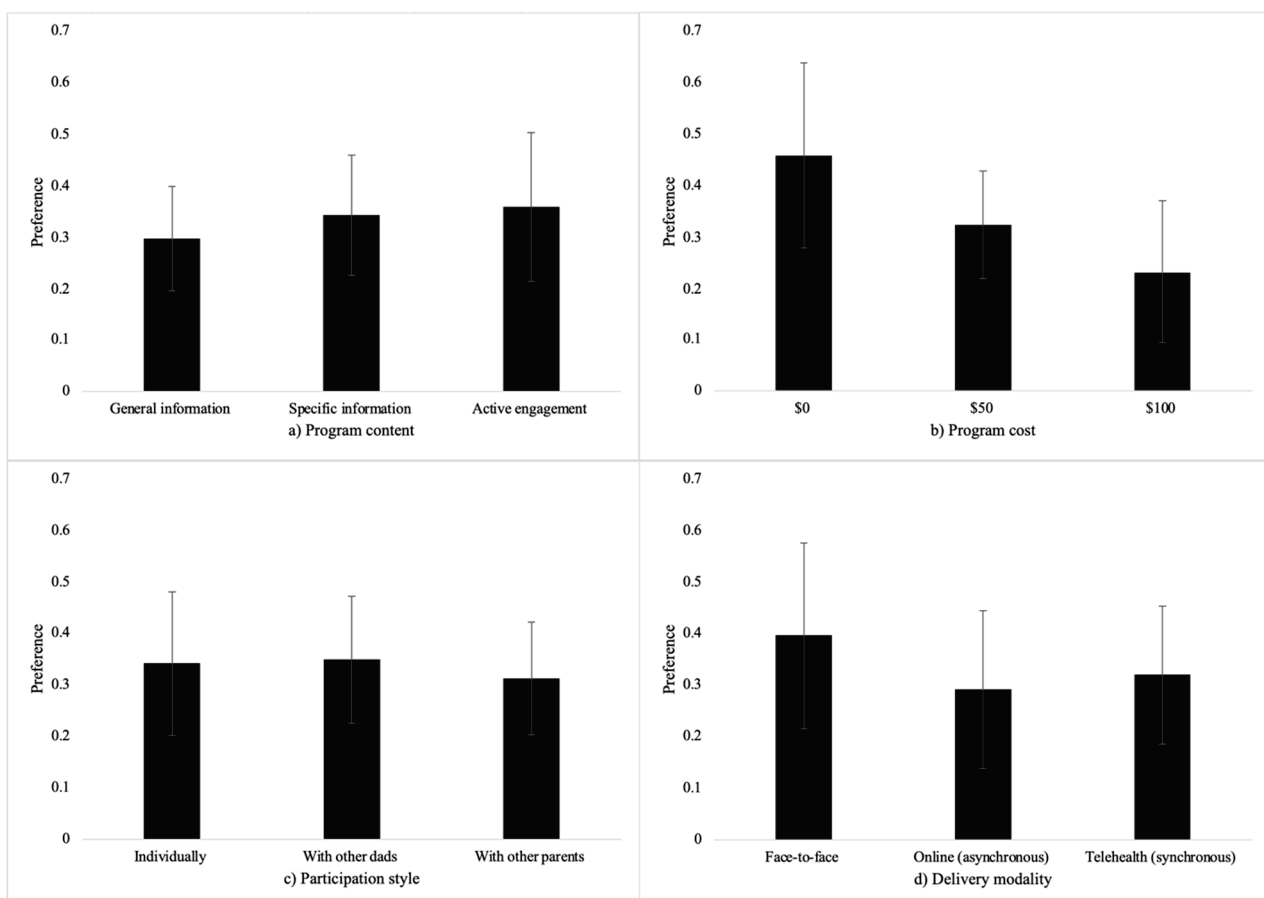


Figure 3. (a). Fathers' preferences across attribute levels of program content. (b). Fathers' preferences across attribute levels of program cost. (c). Fathers' preferences across attribute levels of participation style. (d). Fathers' preferences across attribute levels of delivery modality.

Secondly, we checked these trends utilising the above-described multinomial logical regression, allowing us to confirm the presence of these trends beyond visual inspection and examining significance of these trends.

Thirdly, we attempt to translate our findings to applicable practice recommendations for the field of child and family health and wellbeing. To do this, we adopt a model-based inference approach (described in detail below) to identify the preferred holistic parenting program design that works to meet fathers' needs and preferences as wholly as possible. In this section, two potential parenting programs are presented for consideration.

6.5. Results and Discussion

Participants who did not complete the survey after beginning were excluded, leaving a sample of 97 participants, which comprise the following analysis.

6.6. Demographic Characteristics

Descriptive statistics derived from the demographic data are presented in Table 1. Participants in Experiment 2 ranged in age from 18 to 74 years (Mean age = 39 years, SD = 10 years), making the sample in Experiment 2 comparable to that in Experiment 1, with some increased representation for older aged fathers. Demographic categories established in Experiment 1 were used in Experiment 2. All levels of education, employment and relationship status were represented. Many participants were university educated, with a large number having achieved a postgraduate level of study, resulting in participants in Experiment 2 being, on average, a more educated sample than Experiment 1. Some research in the field has shown that parent's level of education influences parenting, and is related to socioeconomic status, which similarly has been found to have a significant impact on parents' access to parenting supports. Further to this, the majority of the sample reported full time employment, which similarly may represent a more affluent or resourced sample overall (Chau et al., 2023; Crawford et al., 2016). Also of note, the majority of participants in Experiment 1 reported being single, while the majority of participants in Experiment 2 reported being married or in a de facto relationship.

In sum, the sample was from a Caucasian/Australian background, educated, in a relationship, and often had two or more children. This sample reported having previously engaged in a parenting program at a much higher rate compared to Experiment 1, with 25 out of the total 97 participants (26%) reporting previous engagement, however it may be pertinent to consider to increased and more focused sample size in Experiment 2 here.

6.7. Parenting Program Preferences

Summary statistics were calculated to explore preliminary trends in fathers' preferences for attributes of parenting programs, focusing on program cost, participation style, program content, and delivery modality. Marginal choice proportions for each attribute are displayed in Figure 3. The marginal choice proportion shows how often a specific attribute level (e.g., cost \$0) was in the parenting program that was chosen as the preferred option divided by how often a program with that level included was presented. For example, if in 16 choice sets at least one program was presented that had a \$0 cost, and in 10 of those choice sets, the participant chose the program with the \$0 cost as their preferred option, then their marginal choice proportion for a \$0 cost parenting program is $10/16 = 0.625$.

A clear pattern of preference was observed across the levels of program cost, with participants demonstrating a clear preference for free programs, followed by a preference for programs costing \$50, and the lowest preference for programs priced at \$100. In contrast, participation style showed little variation, with each of the three levels (individual participa-

tion, participation with other dads, and participation with other parents) clustered around chance selection, suggesting no strong preference for any specific style. Small amounts of variation were observed for both program content and delivery modality, indicating that fathers exhibited some preferences for these attributes. Figure 3 visualises these preference patterns, with larger values indicating stronger preference for certain attribute levels and values closer to 0 indicating weaker preferences.

6.8. Multinomial Logit Analysis

6.8.1. Model Fit

A multinomial logistic regression was conducted to examine fathers' preferences for parenting program attributes, including program cost, participation style, program content, and delivery modality as predictors. Each attribute had three levels (see Table 2). The model fit was assessed using the adjusted Rho-squared, $R^2 = 0.1802$, meaning the model explained approximately 18% of the variation in fathers' preferences for parenting programs based on the included predictors (program cost, participation style, program content, and delivery modality) and the random effects structure. For context, R^2 values in DCEs are not directly comparable to those in linear regression, as they are based on differences in log-likelihoods rather than explained variance in the dependent variable. In fact, R^2 values between 0.1 and 0.3 are generally accepted as representing good model performance in DCE literature (Louviere et al., 2000). Values closer to 0.2, as seen in the current model, suggest a meaningful and interpretable level of explanatory power, particularly given the inherent complexity and multidimensionality of human decision-making. Notably, when a random effects structure was not applied to the model, the fit was substantially decreased ($R^2 = 0.08$), suggesting considerable individual differences in preferences, with explanatory power increased when these are incorporated into the model. Parameter estimates for the model using the random effects structure are reported in Table 4.

Table 4. Parameter estimates for the multinomial logistic regression exploring program content, cost, participation style, and delivery modality and fathers' decision to engage in parenting programs.

Attribute	Level	Estimate	Robust <i>t</i> -Ratio	Robust <i>p</i> -Value (2-Sided)	Robust Standard Error
Cost	\$0	0	-	-	-
	\$50	-0.743	-7.597	<0.001	0.119
	\$100	-1.699	-9.314	<0.001	0.288
Participation	Individually	0	-	-	-
	With dads	-0.126	-1.011	0.312	0.178
	With parents	-0.159	-1.360	0.173	0.149
Content	General information	0	-	-	-
	Specific information	0.357	3.310	<0.001	0.127
	Activities	0.501	3.449	<0.001	0.193
Delivery	Face-to-face	0	-	-	-
	Asynchronous	-0.701	-3.728	<0.001	0.256
	Synchronous	-0.786	-4.344	<0.001	0.267

Note. The first listed level of each attribute acted as the reference level, with utility set to 0.

6.8.2. Pairwise Comparisons

Following assessment of the model fit, we next compared the levels of each attribute with one another using the Delta method (Daly et al., 2012). The results indicated significant differences between cost levels. Specifically, participants were more likely to prefer free

programs over those costing \$50 ($\beta = 0.74$, $t = 6.24$, S.E. = 0.12, $p < 0.001$) and \$100 ($\beta = 1.70$, $t = 5.89$, S.E. = 0.29, $p < 0.001$). Additionally, programs priced at \$50 were preferred over those costing \$100 ($\beta = 0.96$, $t = 3.76$, S.E. = 0.25, $p < 0.001$).

Regarding participation style, no significant differences were observed between individual participation and participation with other dads ($\beta = 0.13$, $t = 0.71$, S.E. = 0.18, $p = 0.478$), individual participation and participation with other parents ($\beta = 0.16$, $t = 1.06$, S.E. = 0.15, $p = 0.289$), or between participation with other dads and other parents ($\beta = 0.03$, $t = 0.22$, S.E. = 0.15, $p = 0.826$).

For program content, fathers showed a significant preference for programs providing specific information over those with general information ($\beta = 0.36$, $t = 2.81$, S.E. = 0.13, $p = 0.005$), and similarly a preference for programs providing activities and practical skills over those providing general information ($\beta = 0.50$, $t = 2.59$, S.E. = 0.19, $p = 0.01$). However, there was no significant difference between programs providing activities and practical skills and those providing specific information ($\beta = 0.14$, $t = 0.63$, S.E. = 0.23, $p = 0.529$).

Finally, fathers preferred face-to-face delivery over both online ($\beta = 0.70$, $t = 2.74$, S.E. = 0.26, $p = 0.006$) and telehealth delivery ($\beta = 0.79$, $t = 2.94$, S.E. = 0.27, $p = 0.003$). No significant differences were found between online and telehealth delivery modalities ($\beta = 0.08$, $t = 2.27$, S.E. = 0.32, $p = 0.787$).

6.9. Preferred Parenting Program

Building on insights from the multinomial logit analysis, a model-based inference approach was next employed to identify the holistic parenting program with the highest predicted preference among fathers. This method aimed to provide further insights into how parenting programs can use a more ‘father-friendly’ design to improve father engagement. By refining the model-predicted outcomes from ‘option 1’ in ‘option 2,’ the goal was to bridge the gap between theory and practice and provide research-based guidance for how the design and delivery of parenting programs can effectively work to service and engage fathers.

Using model predictions, we calculated the predicted probabilities of selection for each of the 81 unique parenting programs possible, generated by combining four attributes, each with three levels. This yielded probabilities (p) and cumulative probabilities ($p_{\text{cumulative}}$) for each of the 81 options of hypothetical parenting programs that could be presented to participants, which functionally revealed what percentage of the predicated choice share of the 81 possible programs each option accounted for.

6.9.1. Program Option 1

The top three preferred parenting programs all featured \$0 cost, practical activities as content, and face-to-face delivery, differing only in participation style (i.e., individual participation, participation with other dads, and participation with other parents). This finding aligns with prior analysis, which showed no significant differences in fathers’ preferences for delivery modality. These top three programs accounted for approximately 10% ($p_{\text{cumulative}} = 0.099$) of the total predicted choice shared among the 81 options. Table 5 presents the top 10 preferred programs, based on model-predicted choice shares.

Table 5. Top 10 Preferred Parenting Programs Based on Model-Predicted Choice Shares.

Cost	Delivery Modality	Program Content	Participation Style	<i>p</i>	Cumulative <i>p</i>
\$0	Face-to-face	Activities	Individually	0.034	0.034
\$0	Face-to-face	Activities	With dads	0.033	0.067
\$0	Face-to-face	Activities	With parents	0.032	0.099
\$0	Face-to-face	Specific information	Individually	0.028	0.127
\$0	Face-to-face	Specific information	With dads	0.028	0.155
\$0	Face-to-face	Specific information	With parents	0.026	0.181
\$0	Online	Activities	Individually	0.024	0.205
\$0	Online	Activities	With dads	0.023	0.229
\$0	Online	Activities	With parents	0.023	0.252
\$0	Telehealth	Activities	Individually	0.022	0.273

Note. The order of the columns reflects that fathers have the strongest and most consistent preferences for attributes/levels towards the left margin, and weaker more variable preferences for attributes/levels toward the right margin.

6.9.2. Program Option 2

As fathers' preferences were heterogeneous for participation style, indicating that fathers do not hold a strong preference towards this attribute as compared to other attributes considered in the current experiment, further exploratory analysis was conducted by excluding this attribute from consideration. This decision is built on the assumption that, as fathers' preference for participation style significantly varied, this attribute could vary in practice whilst still prioritising fathers' preference in parenting program design and administration.

A revised predicted choice share was calculated with participation style excluded (specifically, we marginalised over the participation style attribute). In this revised analysis, the parenting program identified above (\$0 cost, practical activities as content, and face-to-face delivery) again accounted for approximately 10% of the predicted choice share. The second most preferred program similarly included cost \$0 and face-to-face delivery but differed by including specific information as the preferred program content. Considering these top two programs together, approximately 18% ($p_{\text{cumulative}} = 0.181$) of the predicted choice share is captured. The top 10 preferred options from this second round of exploratory analysis of predicted choice shares are reported in Table 6.

Table 6. Top 10 Preferred Parenting Programs Based on Refined Model-Predicted Choice Shares Excluding Participation Style.

Cost	Delivery Modality	Program Content	<i>p</i>	Cumulative <i>p</i>
\$0	Face-to-face	Activities	0.099	0.098
\$0	Face-to-face	Specific information	0.082	0.181
\$0	Online	Activities	0.071	0.252
\$0	Telehealth	Activities	0.063	0.315
\$0	Online	Specific information	0.059	0.373
\$0	Face-to-face	General information	0.056	0.429
\$0	Telehealth	Specific information	0.052	0.481
\$50	Face-to-face	Activities	0.049	0.531
\$50	Face-to-face	Specific information	0.041	0.572
\$0	Online	General information	0.040	0.612

Note. The order of the columns reflects that fathers have the strongest and most consistent preferences for attributes/levels towards the left margin, and weaker more variable preferences for attributes/levels toward the right margin.

Based on the analysis, Program Option 2, a parenting program offered at no cost, delivered face-to-face, and incorporating active engagement with specific information, emerged as the most preferred option, capturing up to 18% of the predicted choice share. Drawing on principals outlined when discussing model fit above, this is an encouraging result and represents a meaningful portion of variability in fathers' decision making. This outcome highlights that cost and delivery modality are the most influential attributes in fathers' decision-making. Free programs were overwhelmingly favoured, and face-to-face delivery was more popular compared to online (asynchronous) or telehealth (synchronous) delivery options. Participants showed a strong preference for programs integrating active engagement and specific information. Participation style (individual, with other dads, or with other parents) appeared less important, suggesting that fathers are flexible about who they participate in parenting programs with. This aligns with pairwise comparisons, further supporting Program Option 2 as the best choice for fathers when deciding to engage in a parenting program.

7. General Discussion

Through two discrete choice experiments, the current study explored how men and fathers consider parenting program attributes when deciding whether to participate. The aim was to better understand which program features support better engagement from this population, who remain significantly under-served in the field of child and family health and wellbeing. In this way, we hoped to contribute towards the development and design of more father-friendly parenting programs in the future. In doing so, the study contributes to the developing body of literature focused on improving fathers' experiences with, and access to, child and family health and wellbeing services.

Experiment 1 provided a broad overview of men and fathers preferences relating to general program attributes. Program content emerged as the most important factor that participants considered in their decision to engage in a program. This was followed by program cost and participation style. Delivery modality appeared to hold neutral importance, suggesting participants were divided in how much this attribute played a part in the decision to engage, while facilitator qualities and program length were revealed as playing very little part in shaping engagement decisions. Building upon these findings, Experiment 2 introduced more detailed choice tasks and focused on a more specific participant sample, of current fathers of children under the age of 18 years, to gain a deeper understanding of fathers' decision-making. Findings revealed that fathers consistently preferred free programs that offered practical activities and were delivered face-to-face. These findings underscore the importance of designing accessible and relevant programs that meet fathers where they are.

This article provides important insights about how to practically design parenting support services with fathers' needs and preferences in mind. The value of these findings lies not only in improving fathers' engagement in parenting programs and in doing so supporting men as parents, but in strengthening the entire family system. Fathers contribute uniquely and meaningfully to children's development, and when they are supported to parent competently and confidently, child outcomes and the wellbeing of all family members improve. Fathers' often more physical, playful, and risk-oriented interactions help broaden children's social, emotional, and cognitive capacities (Braungart-Rieker & Planalp, 2016; Dumont & Paquette, 2012; Freeman & Robinson, 2022; Robinson et al., 2021). Moreover, research has shown that fathers meaningfully contribute to children's language development (Leech et al., 2013; Pancsofar et al., 2010). When fathers access support and their parenting skills improve, their capacity to provide support to their partners in turn

improves, enhancing relationship satisfaction and wellbeing for mothers (deMontigny et al., 2020; Kwok et al., 2013). Failing to engage fathers in available programs means that they often miss out on the same skill-building and support that mothers are more likely to access, ultimately limiting the benefits children and families could receive through better-supported paternal involvement.

While these findings offer meaningful implications, several limitations must be acknowledged. First, methodological choices in Experiment 1, including the broad sampling of both fathers and non-fathers, limited the generalisability of the findings. This decision was made deliberately to align with the study's overarching aim of improving accessibility and inclusion for men in general within the space of child and family health and wellbeing, a population historically underrepresented in both parenting support and the research conducted in this field. However, readers should interpret the findings of Experiment 1 with caution, as they do not represent the lived experiences of only active fathers.

Second, although Experiment 2 included only current fathers and provided more targeted insights, the sample was relatively homogenous. The majority of participants were Caucasian, educated, and gainfully employed Australians. These demographic characteristics are known to impact both parenting capacity and access to support resources (Kalil & Ryan, 2020; Roubinov & Boyce, 2017). Through the lens of Maslow's (1943) hierarchy of needs theory, it becomes clear that fathers from more disadvantaged backgrounds who may experience economic, psychological, or practical stressors are likely to not only be deterred by such practical and societal barriers, but also lack the psychological and emotional resources to access parenting programs, despite the desire to improve parenting skills and be actively involved in their fathering role from a competence and confident stand-point.

Another noteworthy limitation involves the prior engagement of participants in parenting programs. Fathers in Experiment 2 reported much higher rates of previous program participation compared to those in Experiment 1. While this is partially explained by the inclusion of non-parent men in Experiment 1, it also raises a broader concern: perhaps the fathers who are most under-served by parenting services remain entirely unrepresented in the research. The fathers who volunteer to participate in research like this one may be those who already demonstrate interest and motivation to engage, thereby continuing to under-engage the voices of those who feel most alienated or marginalised by the child and family health and wellbeing system. This concern is vital for future research to consider when striving to develop solutions for under-engagement. A strength of the current research arises here, in that we were able to engage men and fathers who report not having previous engagement in parenting programs, likely collecting valuable insight from these participants who previously have access to parenting support.

Despite these limitations, the findings offer key implications for both research and practice. The identification of cost, content, and modality as critical engagement factors supports the development of more accessible and inclusive parenting services. Working to reduce or eliminate program fees may lower significant barriers to entry. Offering face-to-face options, alongside flexible alternatives (e.g., online or hybrid formats), can cater to fathers with varying preferences and schedules, practical accessibility considerations such as these align closely with key findings in the field of literature (Pfitzner et al., 2017). Prioritising practical, relevant content over generic or didactic material may further enhance engagement and program effectiveness. Despite many of these recommendations seeming like small adjustments, they are able to improve inclusivity and accessibility for fathers on a broad scale. Whilst fathers are not actively discouraged from engaging in available parenting support, social, practical and structural factors work to decrease how accessible and welcoming parenting support services appear for fathers. For instance, the marketing

material for many parenting support services and programs refer to 'parents' but display images of mothers with children, delivering the message that the program is directed towards the mother as the primary caregiver (e.g., Glenelg Shire Council, n.d.). Further, social factors such as gendered biases and systemic traumatisation can silently shape father-specific engagement in parenting programs. As noted earlier in this article, our research focused on universal parenting programs in which parents voluntarily participate. However, there is also a mandated pathway into parenting services, wherein parents are recommended or required to complete parenting remediation through involvement in the family court system, often in contexts of acute family dysfunction or child safety concerns.

In considering the statistics, it is arguable that gendered differences, and, arguably gendered biases, significantly affect fathers' experiences within the family court system and thus with involuntary parenting services. For example, in Australia, mothers are granted sole care of the children, or between 87–99% of the available parenting time, in 39% of cases. In contrast, fathers are granted sole parental responsibility or 87–99% of parenting time in only 3% of cases (Australian Institute of Family Studies, 2019).

While it is essential to interpret these figures alongside the critical issue of safety in the context of domestic and family violence, they nevertheless highlight a broader social reality, that awareness of such disparities can shape how men collectively perceive and engage with parenting services. For some, these services may be seen less as supportive and more as punitive, reinforcing a perception that the important role of fathers in child development is undervalued or overlooked. This perception, in turn, may influence the willingness of fathers to engage with parenting programs in a meaningful way, or see it as hopeless or pointless from the outset because of the ingrained message that fathers are not as valuable as mothers in parenting.

Factors such as this undoubtedly contribute to the low rate of father engagement in parenting programs, and then when fathers do engage and find themselves in a group primarily comprising mothers (i.e., Lindsay et al., 2014; Tully et al., 2017), and naturally receive parenting support delivered with a majority audience of mothers in mind by program facilitators, we then are able to understand the high dropout rates of fathers from the programs they do engage in (Fletcher et al., 2011).

This research adds to a growing consensus that failing to design inclusive, equitable parenting support can undermine the very purpose of these interventions. Resources that do not account for fathers' needs and lived experiences may ultimately exacerbate disparities within family systems. The same applies to other under-serviced populations. For instance, Van Esch and De Haan (2017) and Panter-Brick et al. (2014) illustrate, and Haslam and Mejia (2018) further discuss how culturally diverse families often feel excluded from mainstream parenting programs due to poor cultural tailoring and insensitivity in program delivery. An inclusive and equitable approach to program design that recognises and responds to different experiences of marginalisation and under-servicing is crucial for improving outcomes across the full spectrum of modern family systems.

This study supports the urgent need to reconsider how we approach parenting program design, delivery, and implementation to be inclusive, flexible, and attuned to the diverse needs of all parents. While this research focuses on fathers, it illustrates broader systemic shortcomings in how parenting support is conceptualised and delivered. Future research must continue to explore the unique needs of all caregivers including mothers, fathers, co-parents, and extended kin from diverse backgrounds and with diverse experiences if parenting programs are to reach their full potential and thus provide the benefit to family systems they are designed to. By addressing barriers and fostering inclusion, we

can better serve the evolving needs of today's families and ensure that all children benefit from engaged, informed, and supported caregivers.

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Article

When a Parent Is Born: An Integrated Approach to Perinatal Mental Health and Early Risk Screening

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Abstract: This article presents the “When a Parent is Born” project, focused on early identification and intervention for psychological distress during pregnancy and postpartum. It addresses the perinatal vulnerability to depression, and psychological distress, providing psychological support for high-risk cases within a clinical setting. The sample included 997 pregnant women (Mean_{age} = 32.75; SD = 5.33). The protocol encompassed psychological distress (EPDS, PAMA), social support (MSSS), couples’ relationship (DAS), childhood maltreatment (CTQ-SF), and prenatal attachment (MAAS). Univariate and multivariate linear regression models were employed for the analyses. This study highlighted the prevalence of depressive symptoms in 24.7% of the sample, a non-clinical population, and suicidal risk in 2.4%. All predictors were associated with EPDS and PAMA scores in univariate regressions ($p < 0.005$). In the multivariate model of childhood trauma predictors, emotional abuse and neglect were significant for EPDS ($F = 19.584$, $p < 0.001$) and PAMA ($F = 17.876$, $p < 0.001$). In the multivariate regression models, the main significant associations (EPDS; $F = 17.708$, $p < 0.001$) (PAMA; $F = 19.346$, $p < 0.001$) remained for DAS ($p < 0.001$) and emotional abuse (EPDS $p = 0.005$; PAMA $p < 0.001$). These findings revealed factors associated with perinatal psychological distress and highlighted the importance of psychological screening during pregnancy to support holistic care through a multidisciplinary team. However, the study presents limitations, including the use of self-report measures, the cross-sectional nature of the data, and the limited generalizability of the findings, as the sample is restricted to Southern Italy.

Keywords: pregnancy; depression; psychological distress; screening; early intervention

1. Introduction

This article presents the ongoing project “When a parent is born”, which proposes a multidisciplinary approach to promoting well-being during the perinatal period. The project is carried out within the Department of Obstetrics and Gynecology at the Civico Hospital in Palermo and is promoted by the Department of Psychology, Educational Science, and Human Movement of the University of Palermo. Specifically, the project promotes the importance of screening psychological and social risk factors during pregnancy and

highlights the value of integrating medical and psychological perspectives for a more comprehensive vision of all dimensions that affect women during pregnancy and postpartum. Pregnancy represents a critical window of vulnerability and opportunity, during which the quality of care and support can significantly influence not only maternal health but also fetal development and the couple's well-being. The WHO (World Health Organization, 1946) asserts that health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". This holistic definition of health is particularly relevant during pregnancy, as it is a period marked by profound biological, psychological, and social changes. From this perspective, the study—and the broader project—adopts a biopsychosocial model, with particular emphasis on the psychological well-being of pregnant women, and its impact on the child and family system. However, despite the recognition of health as a multidimensional construct, perinatal research has often remained fragmented, with a stronger focus on biomedical risk factors than on psychological or relational ones (Alhusen & Alvarez, 2016; Woody et al., 2017). For instance, while systematic reviews have consistently emphasized the prevalence of perinatal depression and its detrimental consequences (Woody et al., 2017; Al-Abri et al., 2023), relatively few studies have examined how different psychosocial risks interact with protective resources in line with the WHO's biopsychosocial model.

From a clinical perspective, recent guidelines (World Health Organization, 2016) emphasize the importance of prenatal care, including the promotion of health through screening, diagnosis, and prevention. According to these guidelines, a positive pregnancy experience and a fulfilling transition to motherhood are supported by several key factors: the preservation of physical, psychological, and sociocultural well-being; the maintenance of a healthy pregnancy for both mother and baby, which includes the prevention and management of risks, illnesses, and fatalities; a successful transition to positive labor and delivery; and the development of maternal self-esteem, competence, and autonomy. These ideal conditions, however, are not always achieved.

The perinatal period, which typically begins with pregnancy and extends to one year after childbirth, involves substantial physiological and emotional adaptations. For many women, coping with the complex and demanding nature of this transition may contribute to increased vulnerability to mental health difficulties. Indeed, the perinatal period is recognized as a high-risk period for developing depression, anxiety, and other mental disorders, especially in the presence of specific risk factors (Biaggi et al., 2016). A recent meta-analysis provides an overview of the main biological, psychological, and social risk factors associated with perinatal depression (Yang et al., 2022). It particularly emphasizes the importance of not considering these factors in isolation, as some, such as low educational level, poor economic status, and a history of mental illness, are shown to be intrinsically and closely interrelated.

In the Italian context, approximately one in five women experienced some form of perinatal depression (PND). Literature defines perinatal depression as a mood disorder characterized by the onset of depressive symptoms during pregnancy and/or the postpartum period (Terrone et al., 2023; Wikman et al., 2020). Moreover, results from a meta-analysis reported the prevalence of perinatal depression to be approximately 12% (Woody et al., 2017) with a global incidence ranging from 10–20% (Nisar et al., 2020; Wang et al., 2021). Despite its frequency, perinatal depression is frequently underdiagnosed and undertreated, particularly during pregnancy. For example, a study conducted in the United States found that nearly 60% of women experiencing depressive symptoms do not receive a diagnosis, and 50% of women with a diagnosis do not receive adequate treatment (Ko et al., 2012). Similarly, in Italy, the National Institute of Health (Istituto Superiore di

Sanità, ISS) has developed guidelines outlining best practices for the screening, prevention, and treatment of perinatal depression (Istituto Superiore di Sanità, 2024). However, these remain recommendations and are, in most cases, not integrated into routine prenatal care, largely due to a predominant focus on medical and obstetric aspects.

From a research perspective, the focus has traditionally been placed on postpartum disorders. However, antenatal depression has been consistently identified in the literature as one of the strongest predictors of postpartum depression (Qi et al., 2023). This implies that implementing screening procedures and providing timely interventions during pregnancy may significantly reduce the likelihood of depressive symptoms persisting or worsening after childbirth (Al-Abri et al., 2023; McGarry et al., 2009; Sidebottom et al., 2021).

Furthermore, antenatal depressive symptoms have been found to not only predict postpartum depression (PPD) but also be associated with obstetric complications such as preterm birth (Jesse et al., 2003), low birth weight (Rahman et al., 2007), and a higher rate of cesarean sections (Chung et al., 2001).

A literature review (Ko, 2017) determined that the current risk factors for antenatal depressive symptoms primarily involved biological, psychological, and social aspects. Biological risks included genetic factors (Mahon et al., 2009), endocrine dysregulation (Yim et al., 2009), and epigenetic factors (Meltzer-Brody, 2011). Meanwhile, sociodemographic and psychosocial characteristics included low socioeconomic status (low level of education, poverty, low income, unemployment), lack of social and partner support, exposure to stressful life events, and depression and anxiety during pregnancy (Beck, 1996; Vesga-López et al., 2008).

The dimension of social support encompasses the individual's surrounding network, including family members, friends, and partners. Even after childbirth, a woman's family and social network continue to be a significant resource. According to several studies, social support is a crucial protective factor against the development of antenatal and postnatal depressive symptoms and psychological distress (Dennis & Letourneau, 2007; Dennis & Ross, 2006). Specifically, women who received strong support from their partners during pregnancy tend to present lower levels of postpartum distress (Stapleton et al., 2012).

In this regard, another important aspect is the level of relational well-being between partners. Some studies have shown that a poor relationship constitutes a psychosocial risk factor for the development of antenatal depressive symptoms. Moreover, women who perceived their partners as supportive tended to experience increased well-being in their roles as women, mothers, and partners (Hopkins et al., 1987; Misri et al., 2000). Relationship satisfaction and dyadic adjustment were key factors for maintaining psychological well-being (Thomas et al., 2017). Consequently, mothers experiencing difficulties in their relationships with their partners were at a higher risk of developing PND (Mangialavori et al., 2019).

Furthermore, the literature indicates that childhood trauma experiences are significant risk factors for the development and persistence of antenatal depressive symptoms and psychological distress (Chapman et al., 2004; Wajid et al., 2020). Childhood trauma encompasses a wide variety of negative early-life experiences that can have lasting psychological, emotional, and physical effects. These traumas include physical, sexual, and emotional abuse and emotional and physical neglect. Some of the consequences of childhood trauma experiences extend beyond an increased risk of suicidality and depressive symptoms during pregnancy (Farber et al., 1996), complications affecting both maternal and infant health postpartum (Möhler et al., 2008). These complications may include adverse birth outcomes like preterm birth, low birth weight (Smith et al., 2016), and the occurrence of physical health problems during pregnancy (Lukasse et al., 2009). Another important dimension that may be related to antenatal depressive symptoms is prenatal attachment (Alhusen, 2008; Misri & Kendrick, 2008). Attachment is the emotional connection and concern that typically develops between

the pregnant woman (or parents in general) and the unborn child (Condon & Corkindale, 1997). This bond is regarded as the most fundamental form of human intimacy, representing the initial internalized conception of the fetus, which both parents typically develop and refine throughout pregnancy. The quality of the parent–infant relationship is a crucial factor that significantly influences the child’s subsequent cognitive and emotional development (Pisoni et al., 2014). A review suggested that, despite contrasting opinions present in the literature, there was an association between prenatal attachment and depression, particularly prenatal depression (Rollè et al., 2020). Indeed, depressive symptoms were strongly associated with a sense of detachment from the child (Condon & Corkindale, 1997), but it is not clear from an analysis of the literature which of the aspects determines the other.

In summary, this project aims to investigate aspects, as identified in the literature, that are significantly linked to the onset of psychological distress during the perinatal period, with a focus on prevention and mental health promotion. This project involves the comprehensive screening and management of potentially high-risk situations.

In line with the overarching aims of the project, the present study specifically seeks to examine how the selected variables interact and jointly influence the development of perinatal psychological distress. While previous research has often explored these factors in isolation, such as the impact of childhood trauma on antenatal depression, less is known about how these variables combine and interact to influence psychological outcomes in the perinatal context. By aligning with WHO’s 2016 recommendations on antenatal care, the present study adopts a critical stance: it seeks to identify specific pathways of vulnerability and resilience that may inform preventive interventions and ultimately operationalize the WHO’s holistic vision of maternal health.

The central hypothesis of this study is that specific combinations of risk and protective factors may better predict the presence of perinatal psychological distress. In particular, it is hypothesized that experiences of childhood maltreatment (including abuse and neglect) will be associated with increased vulnerability to perinatal depressive symptoms and psychological difficulties. Conversely, protective factors such as strong perceived social support, secure prenatal attachment, and high-quality couple relationships are expected to buffer against such distress. This integrative approach may contribute to a more nuanced understanding of perinatal mental health, adopting a psychodynamic perspective, and inform the development of targeted preventive interventions.

2. Materials and Methods

2.1. Project Presentation

The project, “When a Parent is Born—Information, Screening, Prevention, and Early Treatment of Psychological Distress in Pregnancy and Postpartum Depression” (PSN2020 CUP D73C23000010003), conducted in collaboration between the Department of Psychology, Educational Science and Human Movement of the University of Palermo and the Complex Operative Unit (U.O.C.) of Obstetrics and Gynecology at the “Civico—Di Cristina—Benfratelli” Hospital of Palermo, is based on screening for psychosocial risk factors during pregnancy. Data collection occurs at two time points: during pregnancy (T0) and approximately 6 months postpartum (T1). A longitudinal approach was utilized; however, only data from T0, corresponding to the pregnancy period, were presented here. A screening protocol was developed to assess psychosocial dimensions identified in the scientific literature as relevant risk factors for the development of psychopathological outcomes during the perinatal period. This protocol was administered to patients within the hospital’s full-term pregnancy and high-risk pregnancy clinics, in addition to the routine medical assessment. The project targets pregnant women, who are invited to participate in the screening assessment with the active

involvement of psychologists and healthcare workers. Data was primarily collected through self-report instruments, using the “Google Forms” platform.

The project aims to identify and intervene early and effectively in high-risk situations, such as the presence of moderate to elevated levels of depressive symptoms, high suicide risk, and the presence of moderate to elevated levels of childhood trauma. The intervention oversees the psychological management of these patients through the support of a psychotherapist within the clinic. This aspect reflects the necessity of integrating figures like psychologists and psychotherapists into a medical equipe to ensure comprehensive care for the pregnant woman’s overall well-being.

2.2. Procedure and Ethical Aspects

The data collection was preceded by the completion and signing of informed consent forms, which briefly explained the study’s objectives and specified that individual information and responses provided were anonymous and confidential. The patients were guided and supported by the psychologists in completing the screening questionnaire. The screening protocol comprised various areas: socio-demographic information, pregnancy-related information, psychological distress, perceived social support, quality of the couple’s relationship, childhood trauma experiences, and prenatal attachment. At the end of each week, the data obtained through the screening was analyzed by psychologists to generate a list of patients in high-risk situations, which was then disclosed to medical personnel and the psychotherapist. Subsequently, those patients were contacted by the psychotherapist and followed on their course of labor, delivery, hospital stay, and postpartum.

All procedures in this study were conducted in accordance with the 2024 Declaration of Helsinki. The protocol was approved by the Bioethics Committee at the University of Palermo (167/2023) and the Ethics Committee at the “Civico—Di Cristina—Benfratelli” Hospital of Palermo (142/2022).

2.3. Sample

The sample of this study, from the beginning of the project to date, includes 997 pregnant women ($\text{Mean}_{\text{age}} = 32.75$; $\text{SD} = 5.33$), predominantly of Italian nationality and residing in the Palermo area. To be eligible, participants met three criteria: were at least 18 years old, were pregnant, and spoke fluent Italian. Most of the pregnant women in the sample (91.0%) were in their third trimester and 70.8% of pregnancies were planned. Twin pregnancies were rare (1.0%) and 5.8% of the participants had used Assisted Reproductive Technology. 27.4% of the pregnancies were considered at high obstetric risk. Previous high obstetric-risk pregnancies were reported by 4.9% of the women, 22.8% had experienced a miscarriage, 0.5% had an intrauterine death, and 5.5% had undergone a voluntary termination of pregnancy.

Sociodemographic characteristics (Table 1) showed that 36.2% of the women had a high school diploma, 27.5% had a Bachelor’s degree, and 20.3% a postgraduate degree or a master’s degree. Regarding occupational status, 51.6% had stable paid work, 21.6% were housewives, and 15.3% were unemployed. Marital status was predominantly cohabiting/married at 89.6%, with 9.6% single and 0.8% separated. 61.4% had a modest standard of living, and 29.7% perceived their status as medium-upper class, owning homes and affording travel.

The sociodemographic profile of our sample closely mirrors national statistics on perinatal mental health, as documented in the ISTISAN 23/16 report (Camoni et al., 2023b). The mean age is 33 years, 61.1% of women report a modest economic condition, 61.4% are in stable paid employment, and the majority are cohabiting or married. This alignment with national data suggests that the study population is broadly representative of the wider context, thereby strengthening the external validity of the findings.

Table 1. Characteristics of the study population (Women N = 997).

Variable	Pregnant Women
Age	N (%)
<29 years old	231 (23.5%)
36–30 years old	532 (54.1%)
48–37 years old	220 (22.4%)
data missing	14 (1.4%)
Nationality	
Italy	983 (98.6%)
Other	14 (1.4%)
Education	
None	4 (0.4%)
Primary School certificate	8 (0.8%)
Middle school certificate	148 (14.8%)
High School diploma	361 (36.2%)
Bachelor's degree	274 (27.5%)
Postgraduate specialization/Master's degree	202 (20.3%)
Employment status	
Unemployed	78 (15.3%)
Housewife	215 (21.6%)
Student	19 (1.9%)
Precarious employment	98 (9.8%)
Stable employment	514 (51.6%)
Disability pension	1 (0.2%)
Marital status	
Single	96 (9.6%)
Married/Cohabitant	893 (89.6%)
Separated/Divorced	8 (0.8%)
Economic status	
Severe problems (debts, unable to pay rent, etc.)	4 (0.4%)
Some problems (limitation of daily expenses, cannot afford vacations)	85 (8.5%)
Modest standard, but without particular difficulties	612 (61.4%)
Medium–high (own a house, frequent vacations, etc.)	296 (29.7%)
Gestational age	
First trimester	14 (1.4%)
Second trimester	76 (7.6%)
Third trimester	907 (91%)
Pregnancy	
Planned pregnancy	706 (70.8%)
Unplanned pregnancy	291 (29.2%)
First pregnancy	
Yes	611 (61.3%)
No	386 (38.7%)
Other children	
Yes	386 (38.7%)
No	611 (61.3%)
High-risk pregnancy	
Yes	273 (27.4%)
No	724 (72.6%)

Table 1. Cont.

Variable	Pregnant Women
Medically Assisted Procreation	
Yes	58 (5.8%)
No	938 (94.1%)
Psychopharmacotherapy	
Yes	13 (1.3%)
No	984 (98.7%)
Previous high-risk pregnancies	
Yes	49 (4.9%)
No	948 (95.1%)
Miscarriage	
Yes	227 (22.8%)
No	770 (77.2%)
Voluntary termination of pregnancy	
Yes	55 (5.5%)
No	942 (94.5%)
IUFD Intrauterine fetal death	
Yes	5 (0.5%)
No	992 (99.5%)
Prenatal class	
Yes	465 (46.6%)
No	532 (53.4%)
Type of pregnancy	
Single pregnancy	987 (99%)
Twin pregnancy	10 (1.0%)

2.4. Measures

- A questionnaire on the sociodemographic characteristics of the participants was administered to collect essential information such as the status of the pregnancy and any previous pregnancies, the current trimester, the estimated due date, and details about the current pregnancy to determine if it is single or multiple and if it is a high-risk pregnancy. The information collected also included educational level and the status of the romantic relationship between the parents. Additionally, it included questions on previous miscarriages, perinatal deaths, previous high-risk pregnancies, and voluntary terminations of pregnancy. Finally, it investigated the pre-existence of psychological distress (e.g., anxiety, depression) and inquired if any psychological treatment had ever been undertaken.
- Edinburgh Postnatal Depression Scale (EPDS) (Benvenuti et al., 1999; Cox et al., 1987): EPDS is a self-report questionnaire that assesses psychological distress and emotional state over the past week. It consists of 10 items with responses on a 4-point Likert scale (0–3). Item 10 is particularly significant as it evaluates the risk of suicidal ideation. Higher scores indicate greater distress (possible range 0–30): scores from 0 to 8 are categorized as no risk, 9–11 as medium risk, and 12–30 as high risk. The validated Italian translation by Benvenuti et al. (1999) was used, demonstrating favorable psychometric properties (Cronbach's Alpha = 0.7894).
- Perinatal Assessment of Maternal Affectivity (PAMA) (Baldoni et al., 2018, 2023): PAMA is a self-report questionnaire used to assess perinatal affective disorders. It consists of 11 items: the first eight items explore specific dimensions of emotional and behavioral challenges using a 4-point scale (0–3); the final three items examine whether the reported experiences are associated with parenthood. The areas covered include anxiety, depression, perceived stress, irritability/anger, relationship problems

(including those with partners, family, friends, and work colleagues), abnormal illness behavior (such as somatization, functional medical syndromes, and hypochondriacal complaints), physiological issues (like sleeping, eating, or sexual desire), addictions (including smoking, alcohol consumption, drug use, gambling, and compulsive Internet use), and other risky behaviors. A higher score indicates a greater risk for an affective disorder. The Italian version demonstrates adequate internal consistency (Cronbach's Alpha = 0.78).

- Maternity Social Support Scale (MSSS) (Dabrassi et al., 2009; Webster et al., 2000): The MSSS is a self-report questionnaire to be administered to both pregnant women and their partners. It allows the assessment of the perceived quantity of care (affection, support, etc.) women receive from their families, partners, and friends. The questionnaire consists of 6 items, and responses are on a 5-point Likert scale ranging from 1 (never) to 5 (very much) to determine how much they felt their significant others' support. The total score can range from 6 to 30. According to the cut-offs established by the authors who developed the scale (Webster et al., 2000), a score between 6–18 indicates a low level of support; a score between 19–24 indicates an intermediate level of support; and a score above 24 indicates an adequate level of support. This instrument exhibits good psychometric properties.
- Dyadic Adjustment Scale (DAS) (Garbarini et al., 2014; Gentili et al., 2002): The DAS measures relationship satisfaction through a 32-item questionnaire divided into four scales. Scores under 21 typically indicate relational distress. In this study, only the "Dyadic Cohesion" and "Dyadic Satisfaction" scales are used. This instrument is the most commonly used tool for assessing the quality of romantic relationships through responses on a 6-point scale ranging from "All the time" to "Never," which allows for the evaluation of relational well-being or distress. In the Italian version, the "Dyadic Cohesion" scale shows a Cronbach's Alpha of 0.67, while the "Dyadic Satisfaction" scale has a Cronbach's Alpha of 0.82.
- Childhood Trauma Questionnaire—Short Form (CTQ-SF) (Bernstein et al., 2003): The CTQ-SF consists of 28 items designed to assess experiences of childhood trauma, rated on a 5-point Likert scale (1 = never true, 2 = rarely true, 3 = sometimes true, 4 = often true, 5 = very often true). The questionnaire includes five clinical subscales: Physical Abuse, Emotional Abuse, Sexual Abuse, Physical Neglect, and Emotional Neglect. Moderate-severe cutoff scores for each subscale are ≥ 13 for Emotional Abuse; ≥ 10 for Physical Abuse; ≥ 8 for Sexual Abuse; ≥ 15 for Emotional Neglect; and ≥ 10 for Physical Neglect. For our study, we used the Italian version of the CTQ-SF, as translated by Sacchi and colleagues (Sacchi et al., 2018). All subscales demonstrate excellent psychometric properties, with a Cronbach's alpha > 0.87 .
- The Maternal Antenatal Attachment Scale (MAAS) (Condon, 1993): MAAS is a questionnaire designed to assess prenatal attachment. The scale consists of 19 items and uses a 5-point Likert scale to evaluate the parent's feelings towards the child along two dimensions: the quality of attachment and the intensity of concern. Higher scores indicate higher levels of attachment. This instrument exhibits good psychometric properties.

All standardized questionnaires used are summarized in Table 2.

Table 2. Summary of instruments.

Instrument	Purpose	Dimensions	Cut-Off/Interpretation
Edinburgh Postnatal Depression Scale (EPDS)	Assesses emotional distress over the past week	Single scale (10 items); item 10 screens for suicidal ideation	0–8: No risk; 9–11: Medium risk; 12–30: High risk
Perinatal Assessment of Maternal Affectivity (PAMA)	Screens for perinatal affective disorders	Emotional and behavioral difficulties (e.g., anxiety, depression, stress, addictions)	No standardized cut-off available; higher scores indicate greater risk
Maternity Social Support Scale (MSSS)	Assesses perceived social support	Single scale (support from family, partner, friends)	6–18: Low; 19–24: Intermediate; >24: Adequate support
Dyadic Adjustment Scale (DAS)	Measures romantic relationship satisfaction	Dyadic Satisfaction, Dyadic Cohesion (only these used)	<21: Relational distress
Childhood Trauma Questionnaire—Short Form (CTQ-SF)	Assesses childhood abuse and neglect	5 subscales: Emotional Abuse, Physical Abuse, Sexual Abuse, Emotional Neglect, Physical Neglect	EA $\geq$ 13; PA $\geq$ 10; SA $\geq$ 8; EN $\geq$ 15; PN $\geq$ 10 (moderate–severe trauma)
Maternal Antenatal Attachment Scale (MAAS)	Evaluates prenatal attachment	Quality of attachment; Intensity of concern	Higher scores = Higher levels of attachment

2.5. Data Analysis

Descriptive statistics were calculated for all sociodemographic and clinical characteristics, as well as for all psychological dimensions assessed. Linear regressions using the total scores of the instruments (PAMA total score, EPDS total score, MSSS total score, DAS total score, CTQ which includes Emotional Abuse, Physical Abuse, Sexual Abuse, Emotional neglect, Physical neglect, and MAAS total score) were conducted, in order to investigate associations between each independent variables (MSSS, DAS, CTQ, MAAS) and the outcome variables (EPDS and PAMA). Each predictor was initially considered separately in a series of univariate regression models. A subsequent multivariate regression model was then performed, incorporating the CTQ subscales to differentiate among various forms of abuse and neglect in relation to the outcomes. Finally, a more complex multivariate regression model was implemented, in which all independent variables were simultaneously included as a set of predictors of the outcome variables. This model was tested on a subsample of 850 women who reported data on the quality of their couples' relationship, in order to ensure greater accuracy of the analyses. Consequently, the results will be presented on two separate tables. The selected criterion of statistical significance is $p < 0.05$. Model assumptions were assessed, and no relevant violations were observed.

This study aims to explore the strength and direction of the associations between a set of independent variables—conceptualized as potential risk factors—and two outcome measures: depressive symptoms (EPDS) and psychological distress (PAMA) during pregnancy. By identifying the most significant predictors, this research seeks to highlight key areas of psychological vulnerability, thereby informing the development of targeted prevention strategies and tailored clinical interventions to reduce the risk of PND.

3. Results

3.1. Descriptive Results

The EPDS showed that 24.7% of pregnant women presented moderate to high levels of depressive symptoms (Table 3).

Table 3. Descriptive assessment instruments.

Variable	Pregnant Women
MSSS	N (%)
Low	76 (7.6%)
Moderate	327 (32.8%)
High	594 (59.6%)
CTQ	
Emotional Abuse	20 (2.0%)
Physical Abuse	21 (2.1%)
Sexual Abuse	14 (1.4%)
Emotional Neglect	30 (3%)
Physical Neglect	11 (1.1%)
MAAS	
Low (<72)	42 (4.2%)
Moderate (72–84)	555 (55.7%)
High (>84)	400 (40.1%)
EPDS	
None/low	750 (75.2%)
Moderate	113 (11.3%)
High	134 (13.4%)
EPDS	
Yes	24 (2.4%)
No	973 (97.6%)
PAMA	
Anxiety	386 (38.7%)
Depression	89 (8.9%)
Stress	215 (21.5%)
Irritability	183 (18.3%)
Relational Problems	85 (8.5%)
Psychosomatic Problems	369 (37%)
Physiological Problems	370 (37.1%)
Addictions	33 (3.3%)
DAS	
Relational well-being	805 (93.2%)
Relational distress	45 (5.3%)
Data missing	147 (14.7%)

The PAMA also revealed the potential presence of psychological distress across various domains. In this regard, the presence of anxiety was reported in 38.7% of the sample, making it the most frequently observed condition. Physiological problems, reported by 37.1% of the sample, also represented a notable finding. These results represented our primary variables of interest, as they provide a measure of the psychological distress experienced by the pregnant women in our sample.

The dimension of perceived social support, measured through the MSSS, indicates that most mothers perceived a moderate level of support (32.8%). Furthermore, the dimensions of the Dyadic Adjustment Scale (DAS) revealed a high prevalence of perceived relational well-being (93.2%) in a subsample of 850 women. However, relational distress was still present (5.3% women) and should not be overlooked.

Through an analysis of the different subscales of the CTQ, it was observed that 2.1% of women experienced physical abuse during their childhood, and 1.4% experienced sexual abuse. Of the dimensions related to neglect, emotional neglect appeared to be the most prevalent (3%).

The MAAS revealed that more than half of the pregnant women in the sample (55.7%) presented a moderate level of prenatal attachment. A low level of prenatal attachment was reported by only 4.2% of the women.

3.2. Univariate and Multivariate Models

Table 4 presents the results of the univariate and multivariate linear regression models conducted to examine the associations between the proposed predictors and the outcome variables. Specifically, the univariate regressions, each performed separately, revealed that all predictors were significantly and strongly associated with both EPDS and PAMA scores ($p < 0.005$). These associations were positive for childhood trauma dimensions and negative for social support, prenatal attachment, and couple relationship quality.

Table 4. Univariate and multivariate linear regression.

Independent Variables	Univariate Analyses			Multivariate Analyses (CTQ Subscales)		
	β	95% CI	p -value	β	95% CI	p -value
Association with EPDS						
MSSS Total score	−0.110	−0.20; −0.05	0.001 **			
MAAS Total score	−0.234	−0.25; −0.14	<0.001 ***			
Emotional abuse	0.205	0.28; 0.51	<0.001 ***	0.106	0.05; 0.35	0.006
Physical abuse	0.106	0.11; 0.44	0.001 **	−0.032	−0.30; 0.13	0.441
Sexual abuse	0.108	0.14; 0.51	0.001 **	0.057	−0.06; 0.41	0.152
Emotional neglect	0.253	0.27; 0.44	<0.001 ***	0.209	0.18; 0.40	<0.001 ***
Physical neglect	0.140	0.24; 0.62	<0.001 ***	−0.014	−0.27; 0.18	0.709
DAS Total score	−0.278	−0.28; −0.17	<0.001 ***			
Association with PAMA						
MSSS Total score	−0.090	−0.17; −0.03	0.004 *			
MAAS Total score	−0.184	−0.19; −0.09	<0.001 ***			
Emotional abuse	0.252	0.35; 0.57	<0.001 ***	0.165	0.16; 0.44	<0.001 ***
Physical abuse	0.147	0.21; 0.52	<0.001 ***	0.014	−0.16; 0.23	0.736
Sexual abuse	0.115	0.15; 0.51	<0.001 ***	0.033	−0.13; 0.32	0.413
Emotional neglect	0.235	0.23; 0.39	<0.001 ***	0.171	0.12; 0.33	<0.001 ***
Physical neglect	0.113	0.14; 0.51	<0.001 ***	−0.043	−0.34; 0.09	0.261
DAS Total score	−0.262	−0.25; −0.15	<0.001 ***			

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The multivariate model focusing exclusively on childhood trauma predictors demonstrated that only emotional abuse and emotional neglect remained significant when predicting EPDS ($F = 16.156$, $p < 0.001$) and PAMA ($F = 17.876$, $p < 0.001$). In particular, emotional neglect showed strong significance in both models ($p < 0.001$), while emotional abuse was highly significant for PAMA ($p < 0.001$) and marginally substantial for EPDS ($p = 0.006$). All other maltreatment dimensions did not reach statistical significance in the multivariate context.

A further, Table 5 presents a more comprehensive multivariate model, tested on a subsample of 850 pregnant women, including all predictors simultaneously and provides additional insight. In the model predicting EPDS ($F = 19.584$, $p < 0.001$), the variables that remained significant were prenatal attachment (MAAS; $p < 0.001$), couple relationship quality (DAS; $p < 0.001$), and emotional neglect ($p < 0.005$). The emotional abuse dimension falls at the borderline of statistical significance ($p = 0.006$). Additionally, the model predicting

PAMA ($F = 19.346$, $p < 0.001$) showed significant effects only for emotional abuse ($p < 0.001$) and DAS ($p < 0.001$).

Table 5. Multivariate linear regression (subsample: $N = 850$).

Independent Variables		Multivariate Analyses ($N = 850$)	
Association with EPDS	β	95% CI	p -value
MSSS Total score	−0.048	−0.141; 0.020	0.143
MAAS Total score	−0.120	−0.164; −0.047	<0.001 ***
Emotional abuse	0.125	0.072; 0.429	0.006
Physical abuse	−0.074	−0.483; 0.025	0.077
Sexual abuse	0.048	−0.107; 0.469	0.218
Emotional neglect	0.125	0.056; 0.310	0.005 *
Physical neglect	−0.022	−0.321; 0.176	0.565
DAS Total score	−0.226	−0.305; −0.165	<0.001 ***
Association with PAMA			
MSSS Total score	−0.032	−0.113; 0.038	0.328
MAAS Total score	−0.081	−0.122; −0.012	0.017
Emotional abuse	0.222	0.249; 0.584	<0.001 ***
Physical abuse	−0.024	−0.308; 0.168	0.564
Sexual abuse	0.019	−0.205; 0.336	0.634
Emotional neglect	0.061	−0.035; 0.204	0.167
Physical neglect	−0.068	−0.439; 0.027	0.083
DAS Total score	−0.233	−0.293; −0.161	<0.001 ***

* $p < 0.05$; *** $p < 0.001$.

The variables included in both the univariate and multivariate regression models were selected not only based on statistical considerations, but also due to their strong clinical relevance. Consequently, the statistically significant associations identified highlight key areas warranting focused attention and improvement in order to provide effective support for the prevention and management of perinatal psychological distress.

4. Discussion

In this study, we examined the dimensions highlighted in the scientific literature as potential risk factors linked to antenatal depressive symptoms and psychological distress during pregnancy.

Our results for the two main variables of interest indicated that a substantial portion of our sample, which was not a clinical sample, exhibited a moderate to high level of psychological distress. Specifically, 24.7% of women presented a moderate to elevated presence of antenatal depressive symptoms, and anxiety symptoms were present in nearly 38.7% of the sample. 24 women (2.4%) presented a suicide risk. Finding elevated levels of antenatal depressive symptoms and psychological distress during pregnancy is clinically concerning, not only because it reflects a compromised state of maternal well-being in the present, but also because antenatal depression has been widely recognized in the literature as a robust predictor of postpartum depression (PPD) (Verreault et al., 2014). The prevalence of PPD is estimated to be around 14% globally (Liu et al., 2022), and around 11% in Italy (Camoni et al., 2023a). Nevertheless, the prevalence rate goes up to 27.5% when the cutoff score > 9 for the EPDS is utilized (Benvenuti et al., 1999).

The transition from antenatal to postnatal depression is well documented, with numerous studies demonstrating that depressive symptoms during pregnancy frequently persist or even worsen in the postpartum period if left unaddressed. A comprehensive literature review by Underwood and colleagues (Underwood et al., 2016) further substantiates this

strong association, highlighting the predictive value of antenatal depressive symptoms for the onset of PPD across various populations and contexts. Notably, their review includes findings from longitudinal studies, which emphasize the temporal continuity between antenatal and postnatal depressive conditions and reinforce the importance of early identification and intervention during pregnancy to prevent the escalation of symptoms in the postpartum period. Indeed, raising awareness and implementing targeted prevention efforts helps our team to identify at-risk women early, including those whose psychological suffering may be less visible, yet still clinically significant.

The results of our study confirm the initial hypothesis, indicating that it is the interaction between different psychological dimensions, rather than the effect of individual variables, that is most associated with symptoms of perinatal psychological distress. The exception is the dimension of Social Support, which requires further investigation. This study's innovative contribution lies in its integration of risk and protective factors within a single analytical model, enabling a more comprehensive understanding of their interplay adopting a psychodynamic perspective. This approach provides a more nuanced perspective on the complexities of perinatal mental health by moving beyond reductionist models and emphasizing the importance of considering dynamic, multifactorial influences.

4.1. Association Between Childhood Maltreatment and Perinatal Outcomes

Regarding the role of childhood maltreatment as a risk factor for antenatal depressive symptoms and psychological distress, our data demonstrated that emotional neglect is the most commonly reported form of childhood trauma, followed by physical abuse and emotional abuse. It is crucial to consider due to their long-term impact, also during the perinatal period (Racine et al., 2021). Indeed, literature has shown that exposure to traumatic experiences, particularly those affecting emotional and relational domains within the family context, increase vulnerability to antenatal depressive symptoms (Choi et al., 2022; Choi & Sikkema, 2016; Racine et al., 2020; Tebeka et al., 2021).

Recent studies have demonstrated that women who early experienced emotional neglect presented higher levels of depressive symptoms during pregnancy (Can Caglayan et al., 2023; Infurna et al., 2024; Li et al., 2017) and immediately postpartum (Li et al., 2017; Tebeka et al., 2021). This may be due to the fact that pregnancy represents a unique psychological moment in which a woman is simultaneously confronted with the memory of being a child and the emerging responsibility of caring for one. For those who lack adequate caregiving experiences, this dual perspective can activate unresolved emotional wounds and internal conflicts. The absence of a reliable model of care may make it more difficult to imagine oneself as a caregiver, thereby increasing vulnerability to psychological distress during this transitional period.

In contrast, women without histories of emotional abuse or neglect are more likely to develop a coherent sense of self, effective emotional regulation skills, and the capacity to provide sensitive and attuned care to their child. This is consistently supported by the literature, which emphasizes that the development of positive internal working models (MOI) is strongly promoted by supportive caregiving experiences (Bowlby, 1988; Mikulincer & Shaver, 2007). Such positive models are fundamental for fostering the quality of the mother-child relationship and for promoting secure attachment representations, which in turn serve as a foundation for healthy relational patterns and caregiving behaviors in adulthood.

Building on this theoretical framework and the evidence highlighting the lasting impact of early relational experiences on maternal functioning, our empirical findings further support these associations. Our univariate regression models revealed a significant

association for all predictors examined. This would suggest that all the dimensions may be considered potential risk factors could indeed be related to the presence of antenatal depressive symptoms and psychological distress during pregnancy. In particular, the dimensions of emotional abuse and emotional neglect maintained a strong association with the presence of perinatal distress, in line with existing literature (Li et al., 2017). The finding that emotional abuse and emotional neglect are the most significant childhood adversities associated with perinatal outcomes highlights the critical role of emotional and relational components in the experience of pregnancy (Fu et al., 2024; Talmon et al., 2019). According to the literature, early experiences that compromise the parent–child attachment relationship may impair a mother’s ability to recognize and respond sensitively to her child’s need for care (Bowlby, 1982; Solomon & George, 2011). Women who experienced love and emotional support during childhood are generally more likely to offer similar care to their own children. In contrast, adverse childhood experiences such as emotional neglect can negatively affect their self-perception as capable and worthy parents (Kohlhoff & Barnett, 2013). Furthermore, individuals who have experienced childhood maltreatment often develop insecure internal working models, marked by mistrust and difficulty relying on others. In the context of parenting, these insecure models may lead to defensive and negatively skewed interpretations of a child’s behavior (Cassidy et al., 2013), thereby increasing the likelihood of adopting maladaptive parenting strategies (Bugental et al., 2002). From a clinical perspective, this view underscores the importance of early interventions aimed at improving emotional regulation, fostering a coherent sense of self, and consequently promoting more adaptive and functional behaviours during the transition to parenthood and in caregiving practices.

While the framework linking adverse childhood experiences to perinatal distress and later parenting difficulties is well supported, it may risk a somewhat deterministic interpretation, potentially underestimating resilience and the role of compensatory experiences or psychosocial support. Alternative explanations, such as genetic predispositions, socioeconomic stressors, and the buffering effects of partner or community support, may also contribute to the observed associations. A balanced perspective should therefore acknowledge variability in outcomes and the potential for positive change, avoiding the pathologization of individuals with adverse childhood histories.

According to the literature, which did not link physical abuse with the development of depressive risk before or after childbirth, our results confirm this aspect (Li et al., 2017; Robertson-Blackmore et al., 2013).

4.2. Social Support and Couple Relationship

In contrast to the existing literature, which consistently reports an inverse association between social support and antenatal depressive symptoms, where higher levels of perceived or received support are linked to lower levels of psychological distress during pregnancy (Dennis & Letourneau, 2007; Dennis & Ross, 2006), the present study did not identify a significant relationship between social support and antenatal depressive symptoms and psychological distress. One possible explanation for this discrepancy may lie in the characteristics of our sample, in which the majority of participants reported adequate to high levels of perceived social support. This limited variability could have reduced the likelihood of detecting statistically significant associations. Alternative explanations may derive from the use of an instrument that did not demonstrate adequate sensitivity within our specific sample, particularly considering our clinical experience, where relationships with the family of origin are commonly perceived as a pervasive and robust source of social support. One study (Laudani et al., 2014) indeed refers to the Mediterranean Model

of Family Functioning, highlighting that families in Southern Europe tend to maintain stronger familial bonds, greater economic and psychological interdependence, and view the family as central to individual life. Furthermore, according to Santarelli and Cottone (2009), intergenerational support and proximity dynamics in Italy are distinctive, reflecting the tendency of young adult to leave the parental home at a relatively late age, which often results in sustained closeness and intensive support even after their marriage.

On the other hand, the dimension of relational well-being within the couple appears to be especially linked to psychological distress. Women who perceive their partner as emotionally supportive tend to report better psychological adjustment during pregnancy (Thomas et al., 2017); whereas those involved in an unsatisfactory or conflictual relationship are more likely to exhibit elevated levels of PND (Çankaya & Alan Dikmen, 2022). Furthermore, it is crucial to emphasize that the presence of depressive symptoms in one partner significantly increases the risk of the other partner developing similar difficulties (Thiel et al., 2020). Both maternal and paternal depression, though often expressed in different ways, can negatively affect parenting capacities and the ability to provide sensitive and responsive care to the child (Rollè et al., 2020). During the transition to parenthood the couple's ability to mobilize their internal and relational resources plays a key role in promoting both parental adjustment and infant well-being. Our findings were consistent with this perspective, indicating that a satisfying couple relationship may function as a significant protective factor against the onset of perinatal psychological distress. In our sample, we identified approximately 5.3% of relational distress within the couples' relationships.

4.3. The Partner Dimensions

It is important to acknowledge that the present study did not include data from partners, which represents a relevant limitation when interpreting our findings.

Given the reciprocal influence between maternal and paternal psychological well-being, and the evidence that depressive symptoms in one partner can exacerbate vulnerability in the other (Thiel et al., 2020; Rollè et al., 2020), excluding partners' perspectives limits our ability to capture the bidirectional and dyadic nature of perinatal adjustment.

Including fathers' perspectives would be particularly valuable, given that the transition to parenthood involves psychological, relational, and identity changes for men.

These include changes to roles, adjustments to intimate relationships, and an increase in financial and caregiving responsibilities.

These dynamics may in turn affect maternal health, paternal health, and the overall quality of the couple's relationship. Future research, including both members of the couple, would therefore be essential to provide a more comprehensive understanding of the interplay between individual vulnerabilities, couple functioning, and perinatal psychological outcomes.

4.4. The Protective Role of Prenatal Attachment

Moreover, we found that the quality of prenatal attachment was a strong predictor of antenatal depressive symptoms. The emotional connection and the relationship quality with the unborn child are a considerable part of the child's development in all aspects (Pisoni et al., 2014). Investigating this aspect, therefore, enables us to address various perspectives: in the realm of the mother's psychological distress, as well as in the domain of the child's well-being and that of the entire family.

Women who exhibit low levels of prenatal attachment combined with high levels of antenatal depressive symptoms tend to show low interest in the unborn child, focusing primarily on their own psychological distress and neglecting the development of a bond

with the baby (Rollè et al., 2020). As noted by Seimyr et al. (2009), maternal awareness of the fetus, along with the feelings and perceptions directed toward the unborn child, contributes to increased maternal attentiveness to the child's future well-being. Greater maternal awareness and emotional connection to the fetus facilitates the establishment of a secure attachment bond, which plays a crucial protective role in safeguarding both maternal mental health and the child's emotional development from the risk of psychological distress (McNamara et al., 2019). In line with existing literature and supported by our findings, which suggest a potential protective role of prenatal attachment, it may be appropriate to consider the inclusion of this dimension into prenatal screening. Clinical screening tools for the assessment of prenatal attachment include standardized instruments such as the Maternal Antenatal Attachment Scale (MAAS) (Condon, 1993), which was employed in this study, as well as the Prenatal Attachment Inventory (PAI) (Muller, 1993). Integrating prenatal attachment assessment into clinical practice would facilitate the implementation of targeted psychoeducational interventions. These interventions aim to foster the development of a coherent maternal mental representation of the fetus, improve the mother's understanding of fetal development, and encourage behaviors that enhance the early maternal–fetal bond throughout pregnancy. All these findings are cause for concern from a clinical perspective and suggest the need to look carefully at women's well-being during pregnancy, starting with the attention that must be directed towards the various psychosocial risk factors that may contribute to its onset. Indeed, the most important element of screening these factors and managing high-risk situations lies precisely in its clinical relevance in terms of preventing distress and promoting physical, mental, and social well-being.

4.5. Clinical Implications

This work had highly significant clinical implications, as the data collection phase of patient screening directly informs clinical outcomes. Specifically, pregnant women who scored highly on the EPDS and PAMA scales, that evaluated perinatal depression (PND), were promptly referred for psychological support with a psychotherapist. This intervention was perceived as highly supportive by the patients, who appreciated the opportunity to receive continuous care during late pregnancy and the immediate postpartum period. The inclusion of psychologists within the obstetric and medical equipe enables targeted support for high-risk patients, as well as comprehensive care for all women both in the delivery room and postpartum. This approach facilitates a more holistic treatment of patients from both physical and psychological perspectives.

An important way to implement preventive and health-promoting interventions is through the provision of psychoeducational programs, such as prenatal education and birth preparation classes, which support expectant parents in developing coping skills and fostering emotional well-being during the transition to parenthood. In our project, these sessions are conducted within a multidisciplinary framework and involve the collaboration of various professionals, including psychologists, gynecologists, obstetricians, nutritionists, and neonatologists. Specifically, the program consists of nine sessions, four of which are led by psychologists. The first session addresses the psychological experiences of pregnancy; the second focuses on perinatal psychological distress and the significance of early attachment; the third explores couple dynamics, the changes associated with the transition to parenthood and in sexuality, as well as the redefinition of family roles; the fourth and final session discusses parental competences in the postpartum period, such as the management of crying and sleep. Each session includes experiential activities aimed at fostering participant reflection. The primary objective is to provide a supportive space

for dialogue and guidance on key areas, including infant care, parenting roles, couples' relationship quality, and the emotional and practical management of labor and childbirth.

Finally, by following up with patients approximately six months after childbirth, we can monitor their well-being and provide further psychological support if necessary. Future studies will provide additional results concerning the data collected six months postpartum with a particular focus on the role of partners.

4.6. Strengths and Limitations

This study presents preliminary findings collected during the first nine months following the launch of the project at the "Civico—Di Cristina—Benfratelli" Hospital in Palermo. As such, only data from the initial time point (T0), corresponding to the pregnancy period, have been included in the current analysis. The decision to report exclusively on T0 data at this stage was due to the ongoing nature of the study and the current sample size, which remains insufficient to support more advanced or longitudinal analyses. The data were collected through self-report questionnaires, administered under the careful supervision of clinical psychologists. While self-report measures may introduce certain biases, this method was considered the most appropriate to safeguard participants' privacy and to reduce the intrusiveness of the assessment process. One important limitation of the present study lies in its cross-sectional design, which does not allow for causal inferences to be made. Although the results point to a potential causal association between the two dimensions examined, the lack of longitudinal data prevents us from establishing a direct cause-and-effect relationship.

It is also important to note that the present results refer exclusively to pregnant women. Although a screening protocol for partners was designed and initiated, the data collected to date are insufficient for inclusion in this initial analysis. The exclusion of partner data constitutes a limitation in relation to the project's stated aim of investigating family and couple dynamics. Future analyses will incorporate partner data to provide a more comprehensive understanding of the dyadic and familial dimensions of perinatal mental health. Finally, potential selection bias should be acknowledged. Participation was voluntary and limited to a single hospital in southern Italy, which may have influenced the sociodemographic composition of the sample and limit the generalizability of the findings. Broader recruitment strategies and comparative analyses with national data will be pursued in the subsequent phases of the project.

5. Conclusions

In conclusion, this study, based on the project "When a Parent is Born," presented preliminary results of data collection that is ongoing and which will be finalized approximately six months postpartum from a longitudinal perspective.

The preliminary evidence offered insight into the risk factors most closely associated with psychological distress during the perinatal period. By screening these factors during pregnancy, it is possible to consider interventions aimed at prevention and support. Recognizing women at high risk during pregnancy is essential and can contribute to ensuring optimal maternal and family health outcomes. In such cases, targeted clinical interventions, as outlined in this project, are implemented to provide comprehensive support and address the unique psychological and emotional experiences of these women. This proactive approach suggests potential benefits in mitigating the long-term consequences of postpartum depression and broader psychological distress, with an emphasis on promoting the well-being of the woman, her partner, the child, and the family as a whole.

According to the World Health Organization, caring for individuals, especially pregnant women and their children, necessitates attention not only to medical aspects but also to the overall well-being of the individual, including psychological, physical, and social factors. For this reason, it would be useful to have more concrete and practical guidelines, to be implemented through training programs aimed at health care personnel involved in perinatal care. This could facilitate the identification of any signs of distress, ensure more effective care of pregnant women, and improve overall management during this sensitive period.

This project aims to implement a collaborative effort among various professionals working as a team to provide optimal care to each patient, without overlooking how psychological factors can influence medical outcomes, and vice versa. This initiative represents a significant advancement within the Palermo area, and it is hoped that these findings may be generalizable to the broader Italian national context. The general aim is to establish a unified metric evaluation and develop a protocol for pregnancy management. Designed for implementation within a multidisciplinary framework, the protocol aims to promote overall maternal and infant well-being by integrating it into routine health service practices. Future research will generate comprehensive data across the various components of the project and further elucidate its clinical implications. Building upon the findings presented herein, subsequent studies will integrate the perspectives of partners and employ a longitudinal design, thereby enhancing the robustness of the current models and contributing additional nuanced insights.

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Abbreviations

The following abbreviations are used in this manuscript:

PND Perinatal Depression
PPD Postpartum Depression

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Article

The Quality of the Parent–Child Relationship in the Context of Autism: The Role of Parental Resolution of the Child’s Diagnosis, Parenting Stress, and Caregiving Burden

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Abstract: Background. Parents of autistic children face challenges that can negatively affect the quality of the parent–child relationship. This study aimed to explore the potential protective role of parental resolution about positive (closeness) and negative (conflict and dependence) aspects of the parent–child relationship, with parenting stress and caregiving burden as mediators. **Methods.** A cross-sectional study (ethical approval: CE n. 92949) was conducted with 51 Italian parents of autistic children. A multiple mediation model was tested. **Results.** Parental resolution had a significant total effect ($\beta = 0.012$; BootLLCI = 0.002; BootULCI = 0.024) and a significant direct effect on the parent–child relationship ($\beta = 0.223$; BootLLCI = 0.058; BootULCI = 0.389), indicating that resolving the child’s diagnosis could potentially influence parents’ perceptions of their relationship with their child, possibly leading to views of it being somewhat closer, experiencing fewer conflicts, and involving a lower degree of dependence. An indirect effect via parenting stress was also significant ($\beta = -0.130$; BootLLCI = -0.009 ; BootULCI = -0.291), while caregiving burden did not show a mediating effect. **Conclusion:** Despite the exploratory and cross-sectional nature of this study, the findings highlight the importance of promoting family well-being in the context of autism. The findings may inform future research on parental resources and guide clinicians in developing intervention programmes to mitigate the emotional impact of receiving a child’s autism diagnosis.

Keywords: autism; parenting stress; caregiving burden; resolution of the diagnosis; parent–child relationship

1. The Quality of the Parent–Child Relationship in the Context of Autism

A large number of studies (Repetti et al., 2002; Tamis-LeMonda et al., 2004; Fonagy et al., 2016; Solak Arabaci & Demircioğlu, 2021; Pianta & Steinberg, 1992; Pianta & Stuhlman, 2004; Marchetti et al., 2013; Lecciso et al., 2011) have shown that the quality of the parent–child relationship significantly influences several aspects of a child’s development. These aspects range from language acquisition and cognitive abilities to Theory of Mind skills and socio-emotional growth, with even academic success being affected. The theoretical framework underpinning the discussion of the parent–child relationship is Bowlby’s (1969) Attachment Theory. According to Bowlby, a child’s early experiences of parental responsiveness involve seeking physical proximity and exploring the environment, which, in turn, shape the child’s

expectations of receiving help and support from the caregiver. Throughout development, the child internalises these parental behaviours and forms internal working models—mental representations of attachment bonds that guide the individual in establishing new affective relationships with other significant figures across their lifespans, such as educators, friends, teachers, and romantic partners (Bowlby, 1969; Cassibba et al., 2017; Verhage et al., 2016). Based on this theoretical foundation, parental characteristics play an essential role in shaping and maintaining the parent–child relationship.

Critical developmental contexts, especially those involving a child with a disability, may give rise to stressful challenges that compromise the parent–child relationship (Coppola et al., 2012; Hickey et al., 2020; Totsika et al., 2020). Autistic traits in particular are often associated with increased caregiving demands, which may negatively affect the quality of the parent–child relationship (Davis & Carter, 2008; Da Paz & Wallander, 2017; Hirschler-Guttenberg et al., 2015). Autism is a pervasive and lifelong neurodivergent condition characterised by an array of abilities accompanied by some challenges in social communication and repetitive behaviours (American Psychiatric Association, 2013). A positive parent–child relationship may serve as a cornerstone for an autistic child’s social, emotional, and cognitive development. For instance, a warm parent–child relationship may result in the child’s behavioural adjustment and improved competence (Koren-Karie et al., 2009). Additionally, emotional support and cohesion within the parent–child relationship positively influence the development and improvement of children’s social skills (Haven et al., 2014). Parents of autistic children who report a close parent–child relationship often adapt their communication styles, establish consistent routines, and use positive reinforcement strategies to nurture their child (Johnson & Lee, 2021). Similarly, parental involvement is positively associated with more successful therapy outcomes (Solomon et al., 2008; E. Smith et al., 2022; Colombi et al., 2023).

Evidence of the positive cascade effects related to a positive parent–child relationship highlights the need to investigate the factors affecting such a relationship in the context of autism. Although parental factors influencing the quality of the parent–child relationship have already been examined in autism research, studies involving this population remain relatively limited.

The following sections will summarise the existing literature on the role of parental resolution of a child’s diagnosis as a potential personal resource that may positively affect the quality of the parent–child relationship. Parenting stress and caregiving burden will be explored as contributing factors.

1.1. Parental Factors Affecting the Quality of the Parent–Child Relationship in the Context of Autism

1.1.1. Parental Resolution of a Child’s Autism Diagnosis and the Quality of the Parent–Child Relationship

When parents receive their child’s diagnosis, the expectations they may have held for a typically developing and healthy child need to shift to align with the reality of parenting a child with a disability (Luong et al., 2009). Parents have to deal with the new situation, which concerns not only their child’s condition, but also their experience of parenthood (Kamphorst et al., 2018). Letting go of the expectations associated with typical development causes emotional pain and may be compared to a grieving process (Main & Hesse, 1990). The parental reaction to the diagnosis is often characterised by initial shock and denial, followed by negative emotions such as guilt and shame (Kübler-Ross, 1973). This nonlinear process may lead either to resolution or a lack of resolution (Marvin & Pianta, 1996). The benefits of achieving resolution of the child’s diagnosis have been extensively demonstrated.

Parents who resolve the diagnosis tend to reorganise their daily life and family routines, becoming aware of the child's functioning (Oppenheim et al., 2009; Lecciso et al., 2013). By contrast, unresolved parents may experience persistent denial or anger, which can negatively affect family dynamics (Oppenheim et al., 2009; Lecciso et al., 2013). A lack of resolution may result in parents feeling overwhelmed, with them living in a state of permanent grieving (Marvin & Pianta, 1996).

In the context of autism, some studies have focused on the impact of parental resolution of the child's diagnosis. Evidence has shown that parental resolution enhances parents' coping strategies for dealing with stressors (Da Paz et al., 2018), increasing their supportive engagement during play interactions with their child through improved verbal and nonverbal scaffolding skills (Wachtel & Carter, 2008; Lecciso et al., 2013). A positive association between parental resolution and the quality of the parent-child relationship has also been demonstrated (Wachtel & Carter, 2008; Oppenheim et al., 2009; Lecciso et al., 2013). Parents who had resolved their child's autism diagnosis reported a warm, emotionally close relationship and a secure attachment bond. Sher-Censor et al. (2017) also found that parents who had achieved resolution were more emotionally available towards their autistic children than unresolved parents. Due to the prevalence of unresolved status among parents of autistic children and its detrimental effects on the quality of the parent-child relationship (Sher-Censor & Shahar-Lahav, 2022), research targeting this issue represents a crucial public health concern.

1.1.2. Parenting Stress and the Quality of the Parent-Child Relationship

Parenting stress refers to the psychological strain resulting from the demands associated with caring for a child (Abidin, 1992). Studies have highlighted that the main parental concerns relate to children's behaviours and development (Akister & Johnson, 2004; Reijneveld et al., 2008). Unsurprisingly, parenting stress may increase dramatically when a child is diagnosed with a disability (Barroso et al., 2018). Parenting stress has been one of the most explored factors in research on families of autistic children. In this context, parents—mostly mothers (Tehee et al., 2009)—report higher levels of stress compared to parents of typically developing children or children with other developmental delays or disorders (Catalano et al., 2018; Estes et al., 2014; Bitsika et al., 2013; Hayes & Watson, 2013; Pisula, 2007; Seymour et al., 2013; Tomanik et al., 2004). The factors influencing the level of parenting stress may be related to both the children's autistic traits and co-occurring behavioural problems (Maskey et al., 2013; Valicenti-McDermott et al., 2015; Hastings, 2003), as well as communication challenges, social isolation, and difficulties in self-care (Schieve et al., 2007). Other contributing factors to parenting stress include some sociodemographic characteristics, such as the parents' gender. For instance, mothers generally report higher stress levels than fathers (e.g., Hastings, 2003). Although the determinants of parenting stress have been widely explored (e.g., Rivard et al., 2014), its impact on parental and child domains requires further investigation. Research involving families of autistic children suggests that parenting stress negatively affects parental problem-solving and coping strategies (Fingerman et al., 2020), with detrimental effects on treatment outcomes (Osborne et al., 2008). Little is known about the impact of parenting stress on the quality of the parent-child relationship. Davis and Carter (2008) highlighted that stressed parents reported dysfunctional and difficult interactions with their children, due to the children's autistic traits. Similarly, Hickey et al. (2020) found that stressed parents reported low warmth and high conflict in the parent-child relationship. Although these findings offer valuable insights, further research on this issue is needed. No studies have yet explored the

mediating role of parenting stress on the path between parental resolution of the child's diagnosis and the quality of the parent–child relationship.

1.1.3. Caregiving Burden and the Quality of the Parent–Child Relationship

Caregiving burden refers to the negative impact that providing care may have across various life domains when supporting vulnerable individuals (Given et al., 2001). Parents of children with disabilities report a greater caregiving burden compared to parents of typically developing children (Minhas et al., 2015). Caregiving for autistic children can be overwhelming and may have a significant impact on families (Renty & Roeyers, 2006), with families of autistic children experiencing poorer mental health than the general population (Ghanizadeh et al., 2009). Parents—especially mothers—of autistic children (Bello-Mojed et al., 2013; L. E. Smith et al., 2010) spend more time providing care and less time engaging in leisure activities than parents of children without disabilities. Factors contributing to caregiving burden include parenting stress (Giallo et al., 2013; Almansour et al., 2013), the severity of the child's autism (Patel et al., 2022; Stuart & McGrew, 2009; Dardas & Ahmad, 2014; Baykal et al., 2019), and several sociodemographic characteristics, such as the parents' gender, low educational attainment, co-residence with the care recipient, and an increased number of caregiving hours (Adelman et al., 2014). The effects of high caregiving burden have been shown to be lower parental quality of life (Marsack-Topolewski & Church, 2019) and reduced life satisfaction (Cetinbakis et al., 2020). A study on parents of typically developing children reported a positive association between caregiving burden and parent–child conflict, and a negative association with parent–child closeness (Russell et al., 2020). Little is known about the direct and mediating impact of caregiving burden on the quality of the parent–child relationship in the context of autism.

This Study

The theoretical background outlined in the previous sections highlights the paucity of studies exploring the potential predictive role of parental resolution in the quality of the parent–child relationship in the context of autism, with parenting stress and caregiving burden as potential mediators.

Figure 1 shows the multiple mediation model developed to address the following research questions:

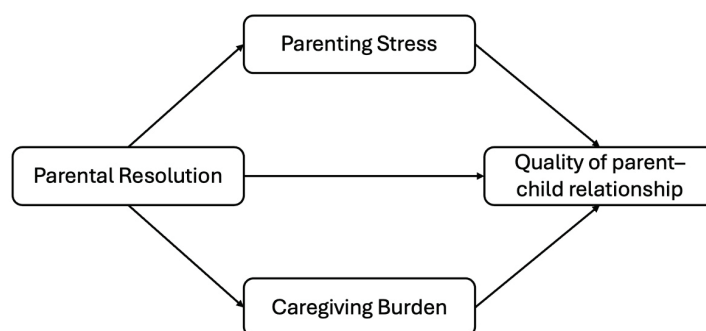


Figure 1. Hypothesised multiple mediation model.

RQ1: Is parental resolution a potential predictor of a parent–child relationship characterised by closeness, low conflict, and reduced dependence through low levels of parenting stress?

RQ2: Is parental resolution a potential predictor of a parent–child relationship characterised by closeness, low conflict, and reduced dependence through low levels of caregiving burden?

2. Materials and Methods

2.1. Procedure and Statistical Plan

This study was part of a larger research project investigating parental and sibling attitudes in families with a member diagnosed with a disability (Levante et al., 2023; Levante et al., 2024; Lecciso et al., 2025a, 2025b). It was approved by the Ethics Committee for Research in Psychology (CE n. 92949) of the Department of Human and Social Sciences at the University of Salento, Italy. Prior to completing the online questionnaire designed for this study, each participant provided informed electronic consent. If consent was denied, the system automatically blocked access to the questionnaire. A snowball sampling strategy was used for data collection through major social media platforms, including WhatsApp, Instagram, and Facebook. The inclusion criteria for the parent sample were as follows: (1) being a parent aged 18 years or older; (2) having a child with a diagnosis of autism spectrum disorder; (3) being fluent in the Italian language; (4) having no disability.

Data were analysed using SPSS v. 25 (IBM Corp, 2023) and Jamovi (The Jamovi Project, 2024). The significance level was set at $p < 0.050$. No imputation techniques were applied for missing data, as all the questionnaire items were mandatory. The Gaussianity of the data distribution and the heterogeneity of variance were also tested.

Preliminary and descriptive analyses included a table reporting descriptive statistics for the study variables (mean, standard deviation, and theoretical range). Group comparisons were conducted to test differences in the study variables between parents of boys and girls. Correlational analyses were performed to examine associations between sociodemographic characteristics (e.g., child's age, parents' age) and the study variables. These analyses informed the selection of covariates for the subsequent analyses. The main analysis involved testing the study hypotheses (Figure 1) using Model 6 of the PROCESS macro. The multiple mediation model developed examined parental resolution of the child's diagnosis as a potential predictor of the quality of the parent–child relationship, conceptualised as an aggregate variable comprising both positive (closeness) and negative (conflict and dependence) aspects of the relationship. Parenting stress and caregiving burden were included as mediator 1 and mediator 2, respectively. Although the sample size may raise concerns about the robustness of the mediation model based on conventional rules of thumb (Kline, 2023, p. 16), recent evidence suggests that such models can perform adequately even with small samples ranging from 50 to 150 participants (Aldred et al., 2012; Schiltz et al., 2021). Therefore, the use of this statistical approach was deemed appropriate.

2.2. Participants

This study included a sample of 51 parents of autistic children aged between 4 and 18 years. Table 1 shows the sociodemographic characteristics of the parents and children involved.

Table 1. Sociodemographic characteristics of the sample.

		Mean/n	SD/%	Range
Parents of Autistic Children				
Gender	Mothers	44	86.3%	25–58
	Fathers	7	13.7%	
Age (years)		43.86	5.97	
Marital status	With a partner	40	78.6%	
	Without a partner	11	21.6%	

Table 1. Cont.

		Mean/n	SD/%	Range
Parents of Autistic Children				
Education level				
	Low	3	5.9%	
	Intermediate	42	82.4%	
	High	6	11.7%	
Source of child's diagnosis communication				
	My partner	1	2.2%	
	Healthcare providers	30	58.6%	
	Myself	18	35.3%	
	I asked others	2	3.9%	
Autistic Children				
Gender				
	Females	10	19.6%	
	Males	41	80.4%	
Age (years)		10.96	3.49	4–17
Age range				
	Childhood	24	47%	
	Preadolescence	13	25.5%	
	Adolescence	14	27.5%	
Age at diagnosis (months)		42.71	18.5	18–108
Birth order				
	First born	11	21.6%	
	Second born	32	62.7%	
	Third born or later	8	15.7%	

Note: Low education level = up to 8 years of education; Intermediate education level = up to 13 years of education; High education level = 13 or more years of education.

2.3. Measures

2.3.1. Potential Predictor

Parental resolution. The 42-item Reaction to Diagnosis Questionnaire (Sher-Censor et al., 2020) is a parent-report measure assessing parental resolution compared to lack of resolution regarding a child's diagnosis. The instrument is based on the theoretical framework developed by Marvin and Pianta (1996). For the purpose of this study, the translated Italian version of the questionnaire (Cronbach's $\alpha = .83$) was used (Lecciso et al., 2025a). The scale includes 13 items reflecting the resolution of the diagnosis (e.g., "Today I can see my child's difficulties as well as their strengths and achievements"; "I feel that my feelings regarding my child's diagnosis have changed since my child received the diagnosis") and 29 reverse-coded items indicating a lack of resolution (e.g., "I am angry about everything that happened to my child and me"; "It is difficult for me to stop thinking about my child's diagnosis and difficulties"). Response options ranged from 1 ("strongly disagree") to 5 ("strongly agree"). A total score was calculated as the average of all items, with higher scores indicating a higher degree of resolution.

2.3.2. Mediators

Parenting stress. The 21-item Depression Anxiety Stress Scale (Bottesi et al., 2015) is a self-report questionnaire assessing perceived levels of depression, anxiety, and stress. For the purpose of this study, only the stress subscale was used (e.g., "I feel stressed"; "It is difficult to relax"). Response options ranged from 0 ("never") to 3 ("almost always"). The stress score was calculated as the average of the relevant items, with higher scores

indicating higher perceived stress. The Italian version of the scale (Bottesi et al., 2015) was administered (Cronbach's $\alpha = 0.87$).

Caregiving Burden. The 22-item Zarit Burden Inventory (Zarit et al., 1980) is a caregiver-report questionnaire assessing perceived burden associated with caring for a family member with a disability. Example items include “Do you feel stressed between caring for your relative and trying to meet other responsibilities for your family or work?” and “Are you afraid of what the future holds for your relative?”. Response options ranged from 0 (“never”) to 4 (“almost always”). A total score was computed by averaging the responses, with higher scores indicating greater caregiving burden. The Italian version of the measure (Chattat et al., 2011) was used (Cronbach's $\alpha = 0.90$).

2.3.3. Outcome

Quality of the Parent–Child Relationship. The 26-item Child–Parent Relationship Scale (Pianta, 1992) is a parent-report questionnaire assessing parents' perceptions of their relationship with their child. The scale measures both positive and negative aspects of the parent–child relationship through three dimensions: Closeness, Conflict, and Dependence. Closeness is considered a positive aspect of the relationship and is assessed through items such as “If upset, my child will seek comfort from me” and “My child spontaneously shares information about themselves”. Conflict is considered a negative aspect of the relationship and is measured with items such as “My child and I always seem to be struggling with each other” and “Dealing with my child drains my energy”. Dependency is considered a stressful feature of the attachment relationship and is assessed with items such as “My child reacts strongly to separation from me” and “My child is overly dependent on me”. Response options ranged from 1 (“definitely does not apply”) to 5 (“definitely applies”). Three subscale scores were calculated by averaging the items, with higher scores indicating higher levels of closeness (Cronbach's $\alpha = 0.70$), conflict (Cronbach's $\alpha = 0.82$), and dependency (Cronbach's $\alpha = 0.67$). In addition, a total score was calculated by summing all the items. The Italian version of the scale (Rinaldi et al., 2023) was used in this study.

3. Results

3.1. Preliminary and Descriptive Analyses

The Gaussianity of the data distribution was assessed using the Shapiro–Wilk test (W). The data were normally distributed for the total resolution score ($W = 0.973$; skewness = -0.280 ; kurtosis = 0.951), caregiving burden ($W = 0.982$; skewness = 0.094 ; kurtosis = -0.139), and the negative aspects of the parent–child relationship—specifically conflict ($W = 0.960$; skewness = 0.502 ; kurtosis = 0.865) and dependence ($W = 0.971$; skewness = 0.186 ; kurtosis = -0.610).

The data were normally distributed for the parenting stress score ($W = 0.953$; skewness = 0.625 ; kurtosis = 0.122) and the positive aspect of the parent–child relationship—closeness ($W = 0.937$; skewness = -0.698 ; kurtosis = 0.094).

Levene's test for equality of variances showed that variances across groups were not homogeneous. Based on preliminary exploratory analyses, nonparametric group comparisons were conducted.

Table 2 shows the descriptive statistics for the study variables.

Table 2. Descriptive statistics for the study variables.

Study Variables	M (SD)	Theoretical Range
Potential Predictor		
Resolution Total Score	3.67 (0.39)	1–5
Mediators		
Parenting Stress	0.91 (0.54)	0–3
Caregiving Burden	33.68 (14.49)	0–88
Outcome		
Quality of Parent–Child Relationship		
Closeness	17.25 (3.87)	1–25
Conflict	29.94 (7.99)	1–70
Dependence	10.27 (3.24)	1–20
Total score	85.04 (11.35)	1–115

Descriptive statistics indicated that the levels of stress reported by parents were generally non-clinical. The mean score for parental resolution was in the medium-to-high range. Regarding parenting stress and caregiving burden, mean values fell within the mild to moderate range of caregiving strain (Zarit et al., 1980). As for the quality of the parent–child relationship, parents reported a close, low-conflict, and low-to-moderately dependent relationship with their child. The overall quality of the parent–child relationship did not appear to be clinically concerning. No clinical or borderline scores were observed across the study variables.

3.2. Group Comparisons

A Mann–Whitney *U* test was performed to compare parental resolution, parenting stress, caregiving burden, and the positive (closeness) and negative (conflict and dependence) aspects of the parent–child relationship between parents of boys and parents of girls. A significant difference emerged only for the negative aspect of conflict ($U = 113.5$; $p = 0.030$), with parents of boys reporting a more conflictual relationship [$M (SD) = 31.17(7.81)$] than parents of girls [$M (SD) = 24.9(7.01)$].

In addition, a Mann–Whitney *U* test was conducted to compare the study variables based on parents' gender and children's age group (childhood, preadolescence, and adolescence). No significant differences were found for any of the study variables.

3.3. Correlational Analysis

Pearson's correlations were computed to examine the relationships between the study variables and the participants' sociodemographic characteristics (i.e., parents' and children's age). Table 3 reports the results.

Parental resolution was positively associated with closeness and negatively correlated with conflict in the parent–child relationship.

Parenting stress and caregiving burden were both positively associated with the negative aspects of the parent–child relationship—conflict and dependence. While parenting stress was negatively associated with parental resolution, it was positively correlated with closeness. Similarly, caregiving burden was negatively associated with parental resolution and positively correlated with closeness.

No significant associations were found between the study variables and either the parents' or children's age.

Table 3. Pearson correlations between study variables and participants' sociodemographic characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Parental resolution	−0.349 **	−0.464 ***	0.497 ***	−0.437 ***	−0.169	0.526 ***	−0.017	0.024
Parenting Stress (1)		0.692 ***	−0.471 ***	0.464 ***	0.376 **	−0.594 ***	0.055	0.042
Caregiving burden (2)			−0.383 **	0.441 ***	0.435 ***	−0.565 ***	0.080	0.005
Closeness (3)				−0.286 *	0.042	0.530 ***	−0.259	−0.244
Conflict (4)					0.442 ***	−0.928 ***	−0.116	0.099
Dependence (5)						−0.582 ***	−0.036	−0.197
Quality of the parent–child relationship (6)							0.003	−0.096
Parents' age (7)								0.322 *
Child's age (8)								–

* $p < 0.050$; ** $p < 0.010$; *** $p < 0.001$.

3.4. Multiple Mediation Model

Due to the lack of significant associations between sociodemographic characteristics and the study variables, the multiple mediation model was tested without covariates. More specifically, correlations showed that neither parents' nor children's age were associated with parental resolution, parenting stress, caregiving burden, or any dimension of the parent–child relationship. The comparisons by child's gender showed a significant difference for only one aspect of the quality of the parent–child relationship—conflict. As the outcome of the multiple mediation model was an aggregate variable consisting of the closeness, conflict, and dependence dimensions, the effect of child's gender may have been obscured. Based on these findings, the hypothesised multiple mediation model (Figure 1) was tested without covariates.

The multiple mediation model showed a significant total effect ($\beta = 0.012$; BootLLCI = 0.002; BootULCI = 0.024) and a significant direct effect of parental resolution on the parent–child relationship ($\beta = 0.223$; BootLLCI = 0.058; BootULCI = 0.389). Despite the small effect size, the mediation model suggests that parental resolution of the child's diagnosis could be a potential protective factor helping parents to perceive the parent–child relationship as close, low in conflict, and characterised by low dependence.

As for the role served by the two mediators—parenting stress (mediator 1) and caregiving burden (mediator 2)—only parenting stress showed a significant, albeit small, indirect effect ($\beta = -0.130$; BootLLCI = -0.009 ; BootULCI = -0.291). This means that the parenting stress may mediate the direct path: the higher the parental resolution, the higher the quality of the parent–child relationship via the lower levels of parenting stress. Regarding the second mediator, the results reported that the caregiving burden did not mediate the direct path. Nevertheless, the path between the parental resolution and the caregiving burden is significant. This means that the parental resolution may be a potential factor decreasing the negative impact of providing care to their autistic child. In sum, the results outlined that the parental resolution may be not only a potential buffer in decreasing the parenting stress levels and the caregiving burden but also a resource in improving the quality of the relationship with their child. Among the mediators, only the parenting stress served a significant role, suggesting further investigations on the role played by the caregiving role.

Figure 2 shows the beta coefficients and the corresponding bootstrap confidence intervals.

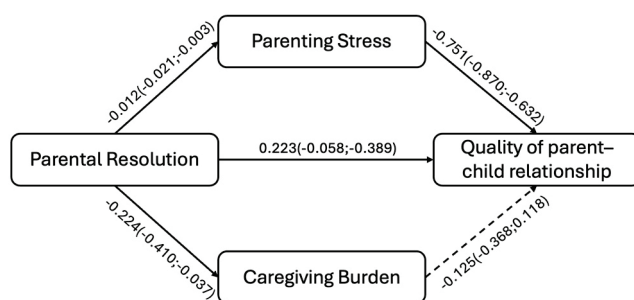


Figure 2. Tested multiple mediation model.

4. Discussion and Future Directions

This study aimed to examine the potential predictive role of parental resolution as a personal resource in fostering a high-quality parent–child relationship in the context of autism. Parenting stress and caregiving burden were tested as mediators in the pathway from parental resolution to the quality of the parent–child relationship, in terms of higher closeness, lower conflict, and reduced dependence. While the impact of parenting stress on the quality of the parent–child relationship and its detrimental effects (Yesilkaya & Magallón-Neri, 2024) have been widely demonstrated, little is known about the role of caregiving burden. In addition, limited research has investigated the potential role of parenting stress and caregiving burden as mediators in the pathway from parental resolution to the quality of the parent–child relationship. Therefore, this study aimed to explore the relationship between parental resolution and the quality of the parent–child relationship by simultaneously examining the roles of two parental risk factors, i.e., parenting stress and caregiving burden.

Based on gender discrepancy in autistic profiles (Napolitano et al., 2022), the preliminary results of this study indicated that parents of male children experienced a more conflictual parent–child relationship than parents of female children. The more pronounced and severe autistic symptoms, along with the higher prevalence of externalising comorbidities (Werling & Geschwind, 2013) observed in males compared to their female counterparts, could be a possible explanation for the result. A potential sequel is the parental perception of the relationship with their child as characterised by discordant and dysfunctional interactions. Nevertheless, it is worth noting that these results contrast with those of other studies (Zamora et al., 2014), which found that parents of autistic girls reported greater dysfunction in parent–child interactions compared to parents of boys. However, this discrepancy may stem from the challenges involved in recognising and managing the subtler autistic symptoms typically exhibited by females. The lack of consistent gender differences in this study may also be attributable to the wide age range and heterogeneity in levels of functioning among participants—two factors that should be considered in future investigations.

4.1. The Main Model

With regard to parental perceptions of resolution, stress, caregiving burden, and the quality of the parent–child relationship, the results showed no significant gender differences. These findings are not consistent with previous evidence, which highlighted that mothers report greater warmth, affection, and involvement with children compared to fathers (Fingerman et al., 2020), as well as higher levels of stress (Phetrasuwan & Shandor Miles, 2009) and heavier caregiving burden due to their primary caregiving role (van Niekerk et al., 2023). Nevertheless, the unbalanced distribution of parental gender in the sample led to a cautious interpretation of the results.

The associations identified and the results from the multiple mediation model provided pivotal insights into the research questions, indicating that parental resolution may be a personal resource in fostering a high-quality parent–child relationship. It may also serve as a potential buffer in reducing levels of parenting stress. Parents who have achieved resolution may be more aware of their child’s functioning, which may help them to manage stress more effectively, thereby improving the quality of the parent–child relationship. It is worth noting that resolution of the diagnosis was also negatively associated with caregiving burden. However, caregiving burden did not mediate the pathway between parental resolution and the quality of the parent–child relationship. Therefore, further investigation into the direct and indirect effects of parental risk factors is needed.

Parental attitudes have been shown to play a crucial role in fostering an affective parent–child relationship in both typically developing (Wang, 2023) and autistic children (Seskin et al., 2010). Such relationships, in turn, positively influence autism-specific intervention outcomes (E. Smith et al., 2022). Accordingly, the findings of this study prompt several important reflections.

4.1.1. The Role of Parenting Stress and Caregiving Burden

To begin with, parenting stress is a risk factor that negatively affects the quality of the parent–child relationship. The findings of this study align with evidence: a higher level of parenting stress may distort the parental perception of the relationship, experiencing less warmth, more conflict (Hickey et al., 2020), and particularly a dependent (McStay et al., 2014) relationship. These findings do not seem surprising, given the autistic traits and profiles observed in the sample. Autism-related traits (Pastor-Cerezuela et al., 2016) may affect the parental ability to address everyday challenges, perceiving themselves as incompetent and ineffective in understanding their child’s needs. The latter, whose needs are not met, may become defiant and/or show overt opposition, undermining the quality of the parent–child relationship and increasing parenting stress.

Regarding the role of caregiving burden, the findings of this study showed a strong correlation between caregiving burden and both parental resolution and the quality of the parent–child relationship. The mediation model supported the association between parental resolution and caregiving burden, suggesting that the resolution of the child’s diagnosis could be a potential protective factor in perceiving low stress and/or burden due to the care provided to their autistic child. However, caregiving burden did not impact the parent–child relationship and, thus, it did not significantly mediate the direct path. It is an unexpected result due to the cascade effects the caregiving burden has on parents’ lives, in terms of lower parental quality of life (Marsack-Topolewski & Church, 2019) and reduced life satisfaction (Cetinbakis et al., 2020). Nevertheless, the paucity of studies examining this relationship and the exploratory nature of the current study suggest further investigations.

4.1.2. The Role of Parental Resolution

The challenges experienced by families of autistic children may become particularly significant when parents lack the strategies and resources to cope with autism-related demands (Romero et al., 2021). This may result in burnout (Ren et al., 2024), with parents feeling overwhelmed and exhausted due to their caring for their autistic child and addressing autism-related challenges. To prevent parental burnout with detrimental effects on disengaged parenting behaviours and/or negative parent–child interactions, parental resources should be considered a key aspect of parental mental health. This study highlighted the essential role played by a positive parental attitude following a child’s autism diagnosis—a finding also supported by previous research (Naicker et al., 2023)—with

parental resolution being considered a personal resource. The multiple mediation model tested in this study showed that parental resolution directly improved the quality of the parent–child relationship. Therefore, resolution of the diagnosis may serve as a parental resource that can be leveraged in intervention programmes, not only to foster a positive parent–child relationship, but also to improve relationships between parents and siblings (Lecciso et al., 2025a), and between children/adolescents with autism and their siblings (Lecciso et al., 2025a). Parental awareness of their child’s autistic profile may reduce the parents’ stress levels, as it was found in this study. The tested multiple mediation model showed that parents who achieved resolution perceived the relationship with their child as close, non-conflictual, and characterised by low dependence, which supported the protective role of the resource.

According to ecological systems theory (Bronfenbrenner & Morris, 2007), the family is the primary context fostering early developmental processes. Stressed and unresolved parents who lack effective coping strategies to manage caregiving burden may struggle to serve as a secure base for their child. They may also tend to withdraw and avoid seeking professional support. The consequences of such an attitude may extend across personal, social, and family domains. Therefore, promoting the well-being of all family members is both a research priority and a public health imperative, especially when disability is involved.

5. Practical and Clinical Implications

The results of this study inform both scholars and clinicians. While scholars should focus their efforts on further investigating the hypothesised model, clinicians are encouraged to develop intervention programmes aimed at mitigating the detrimental effects associated with parents receiving an autism diagnosis for their child.

Regarding the research field, future studies could test the hypothesised mediation model on a larger and more gender-balanced parental sample. Although this study found no significant gender differences between mothers and fathers, prior research has demonstrated discrepancies in maternal and paternal attitudes towards resolution, stress, and caregiving burden (Ozturk et al., 2014). Additionally, future studies could test the hypothesised model on a larger, gender-balanced child sample or gender-specific groups. Due to the gender differences observed in autism profiles (Ferri et al., 2018), examining parental dispositions about the child’s gender may help to develop more targeted intervention programmes.

In terms of clinical implications, the findings of this study align with previous evidence (Wachtel & Carter, 2008), showing that parent training improved positive behavioural interactions between parents and their autistic children, increased satisfaction with parenting and social engagement, and reduced parenting stress and aggression. These results suggest that the parent–child relationship may benefit from positive parental resources, such as resolution of the child’s diagnosis. However, a recent scoping review (Sher-Censor & Shahar-Lahav, 2022) has reported that approximately 70% of parents of autistic children struggle to resolve the diagnosis. Mothers who had accepted the autism diagnosis and achieved resolution demonstrated greater cognitive and emotional involvement during play with their children (Wachtel & Carter, 2008). Furthermore, a high-quality mother–child relationship, characterised by maternal warmth and praise, has been associated with fewer comorbidities and reduced impairments in social reciprocity and repetitive behaviours (L. E. Smith et al., 2010).

Based on these findings, fostering parental resolution should be a primary aim for professionals throughout the diagnostic process and starting from the diagnosis. During the diagnosis communication process, clinicians can share with parents detailed information

regarding the child's developmental profile (Lecciso et al., 2025c) to increase their awareness about the child's strengths and challenges. In addition, from the initial stages of shock and denial, professionals can support parents in reshaping their mental representation of the parent-child relationship. Helping parents to integrate their idealised image of the child with the real child may facilitate acceptance of the autism diagnosis. As a result, parents may begin to perceive their child more accurately and realistically, becoming more aware of the child's functioning in terms of strengths and challenges. Not least, being present during the child's intervention sessions, as planned by the Parent-delivered Early Start Denver Model (Jhuo & Chu, 2022; Rogers et al., 2012), can support the parental resolution process. Parents not only see the child's enhancements but also learn strategies to implement early interventions in the home setting (Waddington et al., 2020), promoting the resolution process. Also, parent coaching sessions discussing the challenges faced by parents in everyday life settings can support the resolution process. The professionals can help parents to carefully observe the child's behaviours, understand the stimulus that triggers them, and provide parents with the strategies to grapple with the complex interplay among the child's experiences and behaviours, and environmental factors (Siller et al., 2018). Achieving resolution can also enable parents to adopt effective strategies for addressing a large number of everyday challenges, enhancing their sense of parental competence (Levante et al., 2025). Figure 3 summarises practical pathways for clinical intervention.

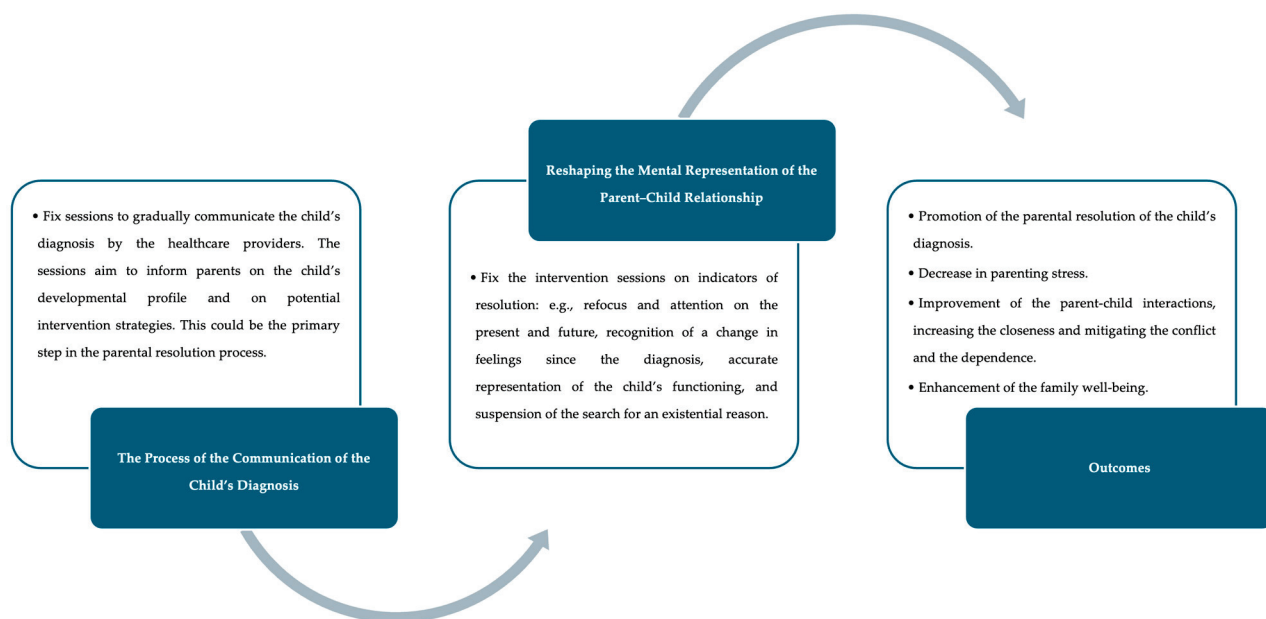


Figure 3. Practical pathways for intervention.

The timing of diagnosis is critical for promoting resolution (Okoye et al., 2023): the earlier the diagnosis, the greater the opportunity for positive adjustment and effective resolution among family members (De Carlo et al., 2024; Lecciso et al., 2025a; Martis et al., 2024). Efficient screening using reliable measures (Ali et al., 2025; Lecciso et al., 2019), as recommended by guidelines (Subramanyam et al., 2019), should be prioritised by health policymakers as part of preventive care. Early screening can drive positive cascade effects across the entire diagnostic process.

6. Limitations and Strengths

Although promising, the results of this study should be interpreted in light of several limitations. Firstly, the small and gender-unbalanced sample of parents and autistic chil-

dren/adolescents restricts the generalisability of the findings regarding fathers and autistic females. Autism severity was not considered, which limits the understanding of how this variable may affect parental dispositions. The study variables were assessed through parent reports, which reduced data variance. Although recruiting fathers and autistic girls remains a research challenge, future studies with larger and more gender- and age-balanced samples or subsamples are necessary to provide crucial insights to develop effective intervention programmes. Future research could also examine the proposed pathways using different measures and considering the impact of the child's gender on each dimension of the study variables (e.g., positive and negative aspects of the parent-child relationship)

One of the strengths of this study was its in-depth investigation of the role of parenting stress in shaping the quality of the parent-child relationship, along with the inclusion of two underexplored parental dispositions: caregiving burden and resolution of the child's diagnosis.

In conclusion, despite the preliminary and exploratory nature of this study, the results pave the way for further research not only on risk factors but also on protective factors influencing vulnerable populations. Both cross-sectional and longitudinal studies should be conducted in order to explore the role of personal resources in coping with challenging conditions. Consequently, intervention programmes should be developed to support healthy family dynamics.

Note: The authors used identity-first (i.e., autistic child) and strengths-based language when referring to the sample.

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Article

Health and Psychological Predictors of Antibiotic Use in Infancy and Fathers' Role

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Abstract: Previous research has shown that antibiotic use during the first year is associated with infants' difficult behavior, maternal low sensitivity, and infant insecure-ambivalent attachment. However, these results may depend on the extent and type of parental involvement, paternal stress related to infant care, or the infant's exposure to infections. To explore this question, we analyzed the relationship between these factors and examined potential predictors of antibiotic use among demographic, health, and psychological variables. This study included 62 Portuguese infants and their fathers as participants. Demographic and health information was collected at birth, 3, 9, and 12 months. Father–infant interactive behavior was observed in free play at 3 months and infant attachment in Strange Situation at 12 months. Parental Stress and Parents' Responsibility Scales were used at 9 and 12 months, respectively. Infants who received antibiotics in the first year were less cooperative, more difficult, and less passive in free-play interactions and were more likely to attend a center-based daycare than others. In this study, the predictors of antibiotic use are infant difficultness and daycare type.

Keywords: antibiotics; father–infant interactions; daycare attendance; paternal stress and health care involvement; father–infant attachment

1. Introduction

The discovery and development of antibiotics was a remarkable breakthrough of the 20th century. However, their overconsumption has several drawbacks. Antibiotics given to infants have been associated with obesity, asthma, and autoimmune diseases like type 1 diabetes (Mischke et al., 2018; Stewart et al., 2018; Stokholm et al., 2018). In the process of disrupting the normal development of gut microbiota, antibiotics eliminate essential bacteria that supports gut health, increasing the risk for diseases like Crohn's (Geirnaert et al., 2017). Antibiotics can also harm brain development (Champagne-Jorgensen et al., 2019; Slykerman et al., 2017, 2019). Children who receive antibiotics are more likely to develop severe mental disorders later in life. There is also a connection between early antibiotic use and neurocognitive issues, including depression and anxiety, in childhood (Diamanti et al., 2022; Duong et al., 2022; Köhler et al., 2017; Köhler-Forsberg et al., 2019; Volker et al., 2022).

Antibiotic-resistance genes in clinical and environmental bacteria have evolved globally under human-driven selective pressures (Christaki et al., 2020; Perry et al., 2016).

Besides targeting disease-causing bacteria, antibiotics also target non-pathogenic bacteria. Moreover, even non-pathogenic bacteria play a crucial role in the development of antibiotic resistance among pathogens (Dionisio et al., 2023a; Darmancier et al., 2022; Louca, 2025). As a result, bacteria resistant to available antibiotics are responsible for almost 1.3 million deaths annually (Murray et al., 2022).

An immediate solution to mitigate these disadvantages is to reduce antibiotic consumption. However, this practice may be challenging to implement because it may be difficult to determine when antibiotics are necessary. Nevertheless, over 30% of outpatient antibiotic prescriptions in 2010–2011 in the United States of America were deemed unnecessary (Fleming-Dutra et al., 2016). Antibiotic overprescription is also strongly suggested by comparing antibiotic consumption across countries. For instance, antibiotic consumption in Europe in 2021 was 125.0 mg/kg of biomass for humans (28 European Union/European Economic Area countries), ranging between 44.3 mg/kg for the Netherlands and almost four-fold more in France, 160.1 mg/kg (European Centre for Disease Prevention and Control (ECDC) et al., 2024). Even within a single country, antibiotic consumption may vary considerably (L. Shallcross et al., 2017; L. J. Shallcross & Davies, 2014). As a result, a recent study found a strong correlation between antibiotic resistance in more than 300,000 bacterial genomes and antibiotic use across countries (Louca, 2025).

Cultural, sociological, and psychological causes can explain the variability of the overuse of antibiotics between countries (Deschepper et al., 2008; Dionisio et al., 2023b; Grigoryan et al., 2008; Krockow et al., 2022). For example, the likelihood of a patient receiving antibiotics rises with the number of past prescriptions they have had (Palin et al., 2019; L. Shallcross et al., 2017). Some studies suggest that prescribers often overestimate how much patients expect antibiotics and, to comply with patients' expectations, tend to prescribe them (Macfarlane et al., 1997; Sirota et al., 2017). This dynamic involves psychological factors from both the patient and the prescriber. In another study involving nearly a thousand adults in Sweden, researchers examined the relationship between generalized trust (the confidence that most people can be trusted) and the willingness to delay antibiotic treatment. This involved situations where the health professional prescribes antibiotics but suggests waiting to see if the illness resolves itself. Additionally, the number of days most participants said they could tolerate postponing treatment affected an individual's willingness to delay taking antibiotics (Rönnerstrand & Andersson Sundell, 2015). Furthermore, social contexts, such as day care centers, have been associated with increased antibiotic use, likely due to the higher incidence of respiratory and gastrointestinal infections among children in these settings (Rooshenas et al., 2014; Thrane et al., 2001).

Also, in pediatric visits, caregivers' and infants' behaviors seem to be associated with antibiotic use. Recent research has shown a link between the use of antibiotics in the first year of an infant's life and the manifestation of challenging behavior, low maternal sensitivity, and insecure-ambivalent attachment (Fuertes et al., 2022a, 2022b; Fuertes et al., 2023b; Stern et al., 2020). Past research found that infants with an insecure-ambivalent attachment and difficult behavior overreact when facing stress and pain, which is particularly evident when infants are ill (Meredith & Strong, 2019; Pietromonaco & Powers, 2015). In previous works, we have conjectured that this could lead their mothers to seek antibiotics (Dionisio et al., 2023b; Fuertes et al., 2022b, 2023b).

As Bowlby first realized in his attachment theory, children who stay close to an attachment figure are more likely to receive care and protection when distressed or sick, increasing their chances of survival (Bowlby, 1969; Bretherton, 1992). Ainsworth found that infants use different strategies (secure, insecure-ambivalent, insecure-avoidant) to seek proximity when they feel distressed. Securely attached infants have caregivers who respond

to their needs, while avoidant infants avoid contact with often unavailable caregivers. Ambivalent infants display inconsistent behavior, making them difficult to soothe. Finally, infants with avoidant attachment do not seek comfort from their caregiver when distressed (Ainsworth et al., 1978; Madigan et al., 2024).

Attachment security is key to emotional, cognitive, and health development (Andrews et al., 2011; Feeney, 2000; Meredith & Strong, 2019). Children with chronic illnesses often have insecure attachments, and those with insecure-avoidant or ambivalent attachment styles respond differently to pain and illness (Cassibba et al., 2004; Meredith & Strong, 2019; Pietromonaco & Powers, 2015; Simmons et al., 1995). Facing diseases and pain, children with an avoidant attachment externalize less and regulate their emotions better, while ambivalent children are more reactive, express more symptoms, and need more medical attention (Andrews et al., 2011; Feeney, 2000). Conversely, infants with secure attachment have caregivers who are responsive and sensitive to their needs. These caregivers help the infant manage emotions during stressful times, offer comfort, and foster a sense of safety. As a result, both infants and parents are better able to handle challenging situations, such as illness. Nevertheless, when parents experience high levels of parental stress and have difficulty managing it, they may be less able to provide adequate support to their children during illness (Deater-Deckard, 2004).

Fathers play a fundamental role in the education, health, and development of infants. This role can be both direct and indirect. Indirectly, for example, paternal involvement in the early days of a child's life has been associated with improved maternal health outcomes—including reductions in postpartum depression—which, in turn, positively influence both the physical and mental health of the infant (Cabrera et al., 2014). Directly, greater paternal involvement has been linked to lower rates of asthma and obesity, as well as enhanced mental health and cognitive outcomes in children (Allport et al., 2018). In addition, previous research suggests that paternal factors, including attitudes and behaviors related to medication, are associated with infant antibiotic use, highlighting the need to consider fathers in research on early childhood health and health care practices. For example, a study conducted in the Netherlands involving 4250 fathers of children who did not receive antibiotics during the first five years of life and 1032 fathers of children who received antibiotics found that 9.1% of fathers in the latter group also used antibiotics, compared to 3.3% of fathers in the former group (Jong et al., 2012). Moreover, a study conducted in Brazil with 489 children (aged between 29 days and 18 years) and their parents found that antibiotic prescription in children increased with the mother's age but not the father's age. Intriguingly, antibiotic use was more likely among children whose fathers had completed 11 years of secondary education compared to those whose fathers had lower education levels, whereas maternal education was not associated with antibiotic prescription (Zhang et al., 2005).

Although a substantial body of research has focused on maternal behavior in relation to antibiotic use during infancy, studies that include fathers remain limited. Yet, considering that infant attachment to mothers and fathers develops independently, incorporating paternal behavior may yield novel insights and significantly enrich the existing body of knowledge. Indeed, an infant who is securely attached to their mother may still be insecurely attached to their father (De Wolff & van Ijzendoorn, 1997; Fuertes et al., 2016). Moreover, maternal and paternal interactive behaviors tend to differ, with research frequently describing fathers as more play-oriented partners, while mothers are more often associated with affective communication and caregiving routines (Faria et al., 2014; Lamb & Lewis, 2010; Paquette, 2004). Given that relationships function as dynamic systems, infants learn to adapt their behavior to the specific interaction styles of different caregivers and relational contexts (Tronick et al., 2020).

Caregivers and early relational experiences have profound and lasting effects on a person's psychological, emotional, and physical well-being throughout their lifespan. Understanding the interface of health and infant relationships can lead to early interventions to improve mental and physical health outcomes.

Aims

Our main goal in this study is to explore potential predictors of antibiotic use during infancy among interactive, relational, fathers' stress, fathers' involvement, and according to daycare attendance. Therefore, this experimental and longitudinal study addresses four specific aims:

Aim 1—To compare paternal and infant interactive behavior at 3 months in dyads where infants took antibiotics and dyads where infants did not take antibiotic. If infants with more sensitive mothers were less likely to take antibiotics, we expected the same result with fathers (Fuertes et al., 2022b; Stern et al., 2020).

Aim 2—To examine the prevalence of antibiotic use in relation to infant–father attachment patterns at 12 months. Previous studies with mothers have shown that ambivalently insecurely attached infants are more likely to receive antibiotic prescriptions, with significantly higher odds of antibiotic use compared to other infant (Fuertes et al., 2022a, 2022b). In this study, we expected to observe a similar effect with fathers.

Aim 3—To test possible contributors of antibiotic use in the first year of infants' life.

Parents' behavior is affected by their responsibilities (Fuertes et al., 2016) and ability to manage stress (Johansson et al., 2021). Thus, we intend to study paternal involvement in health care at 9 months and paternal stress at 12 months in dyads where infants took antibiotics and dyads where infants did not take. We expected that more involved and stressed parents would be more eager to help and find a solution to alleviate their children's symptoms, which may impact antibiotic use.

Besides infant and father factors, other factors can account for antibiotics consumption. As pointed in the literature revisions, several factors account for antibiotic use, namely the exposition to infections. Since infants attending daycare centers may have increased exposure to infectious agents (Collet et al., 1991), we expected that a longer duration in center-based daycare would be associated with a higher likelihood of antibiotic use.

Aim 4—To identify predictors of antibiotic use among the factors found in aim 1, 2, or 3. We expect that paternal and infant interactive behavior and the quality of infant attachment, based on prior studies with mothers, to influence antibiotic use (Fuertes et al., 2022a, 2022b).

2. Materials and Methods

2.1. Sample

To minimize the confounding effect of variables known to affect infant or father behavior, the inclusion criteria are: (i) infants with no congenital malformations or pathology at birth; (ii) no time in the Neonatal Intensive Unit Care, and absence of disease or infirmity at the time of testing; (iii) fathers with no severe chronic medical, psychiatric conditions, or suspected alcohol/drug abuse according to medical records; (iv) the pregnancy should have been monitored and no major medical complications associated with delivery. Our sample was composed of 62 Portuguese infant and their fathers. Among infants, 36 were girls, 26 were boys, 39 were firstborns. Both parents lived in the same household as couples. Two fathers are of Brazilian nationality (but residents in Portugal), one Venezuelan, and the other fathers are Portuguese.

Half of the infants (31 out of 62, 50%) took antibiotics in the first year of life: three infants in the first three months, 14 between the 4th and 9th months, and 14 between the 10th and 12th months. Table 1 presents the demographic information of the sample comparing both groups (infants who took antibiotics in the first 12 months of life versus infants who did not). There are no significant differences between the two groups concerning paternal age, paternal years of formal education, number of father's children, gestational weight of the baby, gestational age of the baby, Apgar 1st minute, and Apgar 5th minute.

Table 1. Demographic information of the sample comparing the two groups: infants who took antibiotics in the first 12 months of life versus the others.

	Antibiotic Use (12 Months)	N	M	SD	t	p	Hedge's g
Paternal age	Yes	31	35.0	5.86	−0.10	0.92	−0.02
	No	31	35.1	7.01			
Paternal years of formal education	Yes	31	12.1	2.74	−1.34	0.97	−0.34
	No	31	13.1	2.92			
Nr of fathers' children	Yes	31	0.35	0.55	−0.99	0.33	−0.25
	No	31	0.52	0.72			
Gestational age of the baby (weeks)	Yes	31	39.5	1.03	0.85	0.40	0.21
	No	31	39.3	1.07			
Birthweight of the baby (g)	Yes	31	3271	423	−0.42	0.68	−0.10
	No	31	3315	399			
Apgar at 1st minute	Yes	31	9.19	0.79	0.71	0.48	0.18
	No	31	9.06	0.63			
Apgar at 5th minute	Yes	31	9.94	0.25	0.72	0.47	0.18
	No	31	9.87	0.43			

2.2. Ethics

This study's procedures were conducted according to the Declaration of Helsinki ethical guidelines. Accordingly, written informed consent was obtained from mothers and fathers for their own and their children's participation before any assessment or data collection occurred. The Santarem Hospital Ethic Committee approved the study procedures, and the Faculty of Psychology Ethics and Deontology Committee approved this study (ref: 1.9/18 November 2021). Parents were invited to participate in a longitudinal study about the quality of parent–child attachment and relationships in the first year of infants' lives. The methods of collection and conditions of participation were explained to parents. To avoid contamination effects on the participants' behavior, parents were not informed of the study hypotheses (e.g., the hypothesis that infants' difficult behavior or ambivalent attachment can be associated with antibiotic use).

Our data are available at <https://osf.io/5c9k7>, (accessed on 1 September 2024).

2.3. Procedures

2.3.1. Recruitment

Health care professionals assessed the eligibility of the newborns and their parents. When they were found to be eligible, the families were contacted and asked by the health professional if they would be interested in participating in the study. Parents who responded affirmatively were then contacted by a female research assistant. Over two years, the research assistant contacted potential participants in the Maternity of Santarem Hospital when infants were born and explained the study's purpose and procedures.

We determined the minimum sample size required to test this using G*Power version 3.1.9.7 (Faul et al., 2007). Results indicated that the required sample size to achieve 80%

power for detecting a medium effect of $d = 0.7$, at significance level of $\alpha = 0.05$, was $N = 52$ for t -test. All eligible parents of newborns delivered at that maternity hospital were contacted. Of the 85 eligible parents who agreed to participate in the study, 23 dropped out or lost their eligibility (moving from the district area of the study, infant serious illness, parents' separation, etc.), resulting in a final sample of $N = 62$ fathers and infants.

2.3.2. Data Collection

In this longitudinal study, data were collected at 3, 9, and 12 months. We used these three time-points to gather and update health and demographic information from both the infants and their fathers. At 3 months, we assessed the father–infant interaction quality for the first time, as previous research reports that these interactive behaviors observed at this age are predictors of later attachment (Barbosa et al., 2021). Attachment is generally assessed at 12 months, as attachment theory predicts that by this age, the bond between the infant and their attachment figures is established (Ainsworth et al., 1978). It was important to apply the stress and parental involvement scales after 9 months, a period when families have typically returned to work after maternity leave and have settled into stable routines.

2.3.3. Fathers and Infants Demographic and Health Information

Fathers complete a demographic and health questionnaire at birth, 3 months, 9 months, and 12 months. This questionnaire was previously validated and used (Fuertes et al., 2016). The information collected included infant gender, parent's age, and education level, parents' nationality and immigration status, parents' professional status, parent's marital status, maternal health history, history of infertility, neonatal indicators (e.g., gestational age, weight, Apgar at first and fifth minutes), breastfeeding, infant health history (i.e., medical appointments, diseases, medication, and hospitalizations), and infant daycare attendance. To ensure accurate data collection, we requested parents to specify the names of the medicines used, which allowed us to verify the types of medicines administered. Medical consultations and other health information were obtained from the baby's book, a record where health professionals document all relevant information about neonatal measurements, such as gestational age, gestational weight, Apgar scores, as well as weight progression, head circumference, and general health information. This book is given to all newborns in Portugal at birth and kept by the parents. During each medical visit, these data are recorded by health professionals. Therefore, in addition to the parents' input, we had access to this information documented by health professionals. Fifty percent of the infants in our sample received antibiotics during the first 12 months of life, which aligns with findings from a previous study on the Portuguese pediatric population. The prescribed antibiotic, amoxicillin—with or without clavulanic acid, was primarily used to treat otitis and respiratory tract infections.

2.3.4. Fathers and Infants Interactive Behavior in Free Play at 3 Months

At infants' 3 months, recruited fathers were recontacted to schedule a follow-up lab visit with their infant. Father–infant dyads were videotaped in a free-play interaction.

Using the Crittenden Child–Adult Relationship Experimental Index (CARE-Index), infant and father interactive behavior was observed and coded from videotaped free-play interactions. Following the guidelines outlined in the CARE-Index manual (Crittenden, 2003), each dyad was recorded engaging in a 5 min play interaction. Fathers were encouraged to interact with their infants as they typically would at home during this session.

The CARE-Index included three adult scales, namely: Sensitivity, Control, Unresponsiveness, and four infant scales, Cooperativity, Compliant-compulsive, Difficulty, and Passivity (Crittenden, 2003). Each of these scales (paternal and infant scales) were coded in terms of facial

expressions, verbal expressions, position and body contact, affection, turn-taking contingencies, control, and choice of activity. CARE-index is a dyadic measure, meaning assessing each other's behavior considers the interactive context and its influence on the other partner.

Infant and paternal behavior were scored by two trained, reliable and blind (against antibiotic use) coders. The obtained overall average ICCs were consistently high for the CARE-Index paternal and infant scales at 3 months (paternal scales: 0.78 for sensitivity, 0.76 for control, 0.71 for unresponsiveness; infant scales: 0.88 for cooperation, 0.71 for compliant-compulsive, 0.91 for difficulty, and 0.81 for passivity). The final scores for discrepant cases were discussed and agreed upon by conferencing. To establish inter-coder reliability, one independent, external, and blind coder coded 20% of the data (randomly selected).

2.3.5. Parents' Involvement in Caregiving Activities Scale

At 9 months, fathers reported their involvement in 14 typical childcare activities with the infant (e.g., feeding, bathing, walking in the park, providing health care) using the Parents' Responsibility Scale (McBride & Mills, 1993)—Portuguese version (Lima, 2005). The scores of this Likert Scale vary from 1 (always mother), 2 (usually mother), 3 (both parents shared the task), 4 (usually father), and 5 (always father). Although mothers did not participate in this study, both parents completed the instrument together and indicated who had primary responsibility for each task, to minimize bias in this measurement, as required by the scale's manual.

2.3.6. Parental Stress Scale

The Parental Stress Scale (PSS) (Berry & Jones, 1995) was created in 1995 to capture both positive aspects (e.g., emotional benefits, personal development) and negative aspects of parenthood (e.g., demands on resources, feelings of stress). This scale may be applied to mothers or fathers; in this study we applied the scale only to fathers. PSS is a brief and easy-to-administer self-report. It is an 18-item scale on which fathers respond to statements about their typical relationship with their child. For each statement, respondents rate their level of agreement on a 5-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree). To compute the paternal stress score, the positive Items 1, 2, 5, 6, 7, 8, 17, and 18 are reverse scored, and then, all items are summed. Higher scores reflect more paternal stress. The possible range of the PSS is 18 (low stress) to 90 (high stress). The scores of the scale were reliable, with a coefficient α of 0.83 and a mean interitem correlation of 0.23. A 6-week test-retest correlation was 0.81 (Berry & Jones, 1995); the Portuguese adaptation of the scale obtained good scores for global internal consistency (Algarvio et al., 2018). In our study, a report of paternal stress was collected at the 12-month visit.

2.3.7. Father-Infant Attachment

At the 12-month visit, father-infant dyads were videotaped during the Strange Situation paradigm (SS) as developed by (Ainsworth et al., 1978). The SSP is a 21 min laboratory paradigm consisting of a sequence of eight episodes designed to place mild but increasing levels of stress on the infant and father-infant dyad (i.e., being introduced to an unfamiliar playroom, interacting with an unfamiliar adult stranger, and brief separations from and reunions with the father).

Videotapes of infants' attachment behavior during the SS were scored by two independent, blind against antibiotic use, trained, and reliable coders following the procedures developed by (Ainsworth et al., 1978) and (Main & Solomon, 1990). Infants were classified as either securely attached (B), insecure-avoidant (A), and insecure-ambivalent/resistant (C). Intercoder reliability

was good. The Cohen's kappa coefficient for ABC classification was 0.80. All cases were double-coded. Discrepant cases were discussed and agreed upon by conferencing.

2.4. Analytic Plan

Descriptive statistics for the sample's characteristics and other study variables were obtained using univariate statistics (sample size, mean and standard deviation). The Shapiro–Wilk test was used to evaluate the normality of the data; if $p > 0.05$, parametric tests were conducted. Analyses for Aim 1 and 3 utilized descriptive statistics and Student's t -tests to evaluate the differences between the two study groups according to independent variables. Also, for Aim 3, we conducted Fisher's Exact Test, followed by the determination of the effect size (Phi), the odd's ratio, and the respective confidence intervals, to determine whether there was an association between antibiotic use and the type of daycare. To test if there is an association between antibiotic use and infant–father attachment pattern (Aim 2), we conducted a Pearson's chi-square test. For Aim 4, we conducted a binary logistic regression (a forward stepwise (Wald) analysis) to identify the predictors influencing antibiotic use. We also determined the odd's ratio, the respective confidence interval, and the Nagelkerke pseudo- R^2 that adjusts the Cox and Snell pseudo- R^2 , to allow for a maximum value of 1.

3. Results

3.1. Aim 1—Differences in Fathers' and Infants' Interactive Behavior at 3 Months According to Antibiotic Use

In Table 2, we compare scores between dyads in which infants used antibiotics and those in which they did not. At 3 months, infants who took antibiotics are less cooperative ($M = 7.77$, $SD = 2.046$, versus $M = 9.29$, $SD = 1.510$), $t(53.312) = -3.301$, $p = 0.002$, $CI_{95\%}$ (mean difference) = $[-2.449, -0.598]$, more difficult ($M = 3.93$, $SD = 3.290$, versus $M = 1.10$, $SD = 1.795$), $t(44.550) = 4.161$, $p = 0.000$, $CI_{95\%}$ (mean difference) = $[1.463, 4.210]$, and less passive ($M = 1.23$, $SD = 1.851$, versus $M = 2.74$, $SD = 2.049$), $t(58.729) = -3.019$, $p = 0.004$, $CI_{95\%}$ (mean difference) = $[-2.508, -0.509]$. Hedges' g to measure the effect size between the two groups were $g = -0.839$, $CI_{95\%} [-1.354, -0.317]$ for infant cooperativity, $g = 1.062$, $CI_{95\%} [0.526, 1.589]$ for infant difficulty, and $g = -0.762$, $CI_{95\%} [-1.273, -0.245]$ for infant passivity. In the three cases, g values suggest that the three factors have a large effect on antibiotic use (Table 2).

Table 2. Fathers' and infants' interactive behavior assessed with the Care-index scale at 3 months according to antibiotic use: Means, Standard Deviations, t -tests, effect size (Hedges' g), and $CI_{95\%}$.

		<i>t</i> -Test for Equality of Means						Effect Size of Difference				
		N	M	SD	t	<i>p</i>	Mean Difference	CI _{95%} of Difference		Hedges' g	CI _{95%} of g	
Took Antibiotics								Lower	Upper		Lower	Upper
Infant cooperation	Yes	30	7.77	2.05	−3.301	0.002	−1.524	−2.449	−0.598	−0.839	−1.354	−0.317
	No	31	9.29	1.51								
Infant compulsion	Yes	30	1.07	2.35	0.649	0.519	0.357	−0.745	1.459	0.165	−0.332	0.660
	No	31	0.71	1.92								
Infant difficulty	Yes	30	3.93	3.29	4.161	0	2.837	1.463	4.21	1.062	0.526	1.589
	No	31	1.1	1.8								
Infant passivity	Yes	30	1.23	1.85	−3.019	0.004	−1.509	−2.508	−0.509	−0.762	−1.273	−0.245
	No	31	2.74	2.05								
Paternal sensitivity	Yes	30	8.37	2.3	−1.793	0.078	−0.956	−2.024	0.112	−0.455	−0.955	0.049
	No	31	9.32	1.83								
Paternal control	Yes	30	3.27	3.29	1.964	0.055	1.492	−0.03	3.015	0.499	−0.007	1.000
	No	31	1.77	2.59								
Paternal passivity	Yes	30	2.37	2.4	−0.91	0.366	−0.537	−1.717	0.643	−0.230	−0.727	0.268
	No	31	2.9	2.2								

We also measured paternal interactive behavior according to three styles: sensitivity, control, and passivity. Results indicated a marginal (but not significant) lower sensitivity of fathers of infants who took antibiotics in the first 12 months than fathers of infants who did not ($M = 8.37$, $SD = 2.297$ versus $M = 9.32$, $SD = 1.833$), $t(55.414) = -1.793$, $p = 0.078$, $CI_{95\%}$ (mean difference) = $[-2.024, 0.112]$. The effect size is medium, as indicated by the Hedges' $g = -0.455$, but with $CI_{95\%} [-0.955, 0.49]$, thus including the possibility of no effect (Table 2).

Similarly, fathers of infants who took antibiotics exhibited higher control interactive behavior than the fathers of infants that did not take antibiotics ($M = 3.27$, $SD = 3.290$ versus $M = 1.77$, $SD = 2.591$). The difference between the two groups was marginally significant, $t(55.081) = 1.964$, $p = 0.055$, $CI_{95\%}$ (mean difference) = $[-0.030, 3.015]$. The effect size is medium, as indicated by the Hedges' g value of 0.499, but with the $CI_{95\%} [-0.007, 1.000]$, which includes zero. Paternal passivity did not differ between the two groups of fathers, $t(58.142) = -0.910$, $p = 0.366$ (Table 2).

3.2. Aim 2—Antibiotic Use in the First Year of Life and Attachment Style at 12 Months

The prevalence of antibiotic use during the first 12 months of life and father–infant according to the attachment patterns was tested. The number of infants that took antibiotics did not differ according to their attachment pattern [$\chi^2(2, N = 61) = 1.347$, $p = 0.510$] (Supplementary Table S1). One infant did not exhibit a typical A, B, and C attachment according to Ainsworth Scales (Ainsworth et al., 1978), showing A strategy in the first reunion of Strange Situation and C in the second. Therefore, the total number of cases in this analysis is 61.

3.3. Aim 3—Exploring Possible Contributors to Antibiotic Use in Infancy

3.3.1. Differences in Fathers' Involvement in Health Care at 9 Months According to Antibiotic Use

To study putative associations between fathers' involvement in their infants' health care and infant consumption of antibiotics, both parents were asked to specify who had primary responsibility for each task (see Section 2). A total of 2 fathers and 13 mothers are usually responsible for their infant's primary health care. A total of 46 of the 62 fathers offer primary health care to their infants with mothers, but none of the 62 fathers is the unique provider of primary health care to their infants (Table 3). In the case of medical appointments in the first 9 months of infants' life, the trend is similar: no father and 10 mothers are usually responsible for infants' medical appointments attendance, but 51 fathers share this task with mothers. The mother of one of the infants is solely responsible for bringing the child to the medical appointment (Table 3). When the baby is unwell, 2 mothers are always responsible for caring for the infant, 20 mothers and 4 fathers are usually responsible, and 36 fathers share the responsibility with mothers (Table 3).

Table 3. Parental involvement in health care at 9 months descriptive statistics.

	Responsibility in Primary Health Care		Taking the Infant to Doctor When Sick		Caring for the Infant When Sick	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Always the mother	1	1.6	1	1.6	2	3.2
Typically the mother	13	21	10	16.1	20	32.3
Both parents	46	74.2	51	82.3	36	58.1
Typically the father	2	3.2	0	0	4	6.5
Total	62	100	62	100	62	100

No association was found between fathers' involvement in their infants' health care and infant consumption of antibiotics (Supplementary Table S2).

3.3.2. Associations Between Paternal Stress Reported When Infants Were 12 Months and Antibiotic Use

To address this point, we administered a self-report questionnaire on paternal stress. To avoid Type I errors due to conducting multiple comparisons, we adjusted the significance threshold with a Bonferroni correction, $\alpha' = 0.00278$. Thus, the stress levels of fathers of infants who took antibiotics did not differ from those of fathers of infants that did not take antibiotics (Supplementary Table S3).

These findings suggest that the stress levels of the group of fathers of infants who did not take antibiotics do not differ from those who did.

3.3.3. Daycare Attendance According to Infants' Antibiotic Use During the First Year of Life

In Portugal, center-based daycare attendance starts at 4 months of age. In our study, 60 infants attended center-based or family-based daycare between 6 and 12 months. Two families did not inform us about the type of daycare their infants attended.

Most infants (29/30 = 97%) who received antibiotics attended center-based daycare at 12 months of age, while infants who did not were more evenly distributed between attending center-based daycare (19/30 = 63.3%) and family-based daycare (11/30 = 36.7%). Conversely, just one infant among 12 attending family-based daycare took antibiotics (1/12 = 8.3%), whereas 29/48 = 60.4% of the infants attending center-based daycare took antibiotics (Table 4). Fisher's Exact Test was conducted to determine whether there was an association between antibiotic use and the type of daycare (center-based vs. family-based). Fisher's Exact Test revealed that the association was significant, $p = 0.002$, suggesting that infants attending center-based daycare were more likely to use antibiotics. The effect size, measured by the Phi coefficient, was $\Phi = 0.41$, indicating a moderate association. The odds of attending family-based care are 0.06 as likely for children who took antibiotics $CI_{95\%}$ (odds ratio) = [0.007, 0.5], indicating that infants who took antibiotics were much less likely to attend family-based care. Conversely, the odds of attending family-based care are 16.8 times higher for children who did not take antibiotics, with $CI_{95\%}$ (odds ratio) = [2, 143].

Table 4. Associations between daycare attendance at 12 months and Infant–Father Attachment Pattern: Fisher's Exact Test, effect size Φ , odds ratio and its $CI_{95\%}$ *.

Took Antibiotics	Center-Based	Family-Based	Total
No	19	11	30
Yes	29	1	30
Total	48	12	60

* $p = 0.002$, $\Phi = 0.41$, moderate association, OR = 0.06 with $CI_{95\%} = [0.007, 0.5]$.

3.4. Aim 4—Determinants of Antibiotic Prescription

We found differences in behavior of infants who received antibiotics in the first 12 months of life from those who did not: infants who took antibiotics are less cooperative, more difficult, and less passive and are likely to attend a center-based daycare at 12 months. Using these four significant variables associated with antibiotic use, we conducted a binary logistic regression (a forward stepwise (Wald) analysis) to identify the predictors influencing antibiotic use (Table 5). In the first step, Infant Difficultness at 3 months was

found to be a predictor, with a positive association with antibiotic use ($\beta = 0.394$, Wald = 11.154, $p = 0.001$). The odds ratio for Infant Difficultiness is $e^\beta = 1.483$, which is higher than 1, and with a 95% confidence interval $CI_{95\%} = [1.177, 1.868]$ that does not include the value of 1. This means that for every one-unit increase in Infant Difficultiness, the odds of antibiotic use increase by approximately 48.3%. The likelihood of the observed data under the model, -2 Log Likelihood value was 67.027. The Nagelkerke R^2 , a pseudo- R^2 (that adjusts the Cox and Snell R^2 , another pseudo- R^2 , to allow for a maximum value of 1) was 0.295 (Supplementary Table S4 presents the variables not included in the binary logistic regression).

Table 5. Summary of binary logistic regression analyses predicting antibiotic's prescription.

		β	S.E.	Wald	df	Sig.	e^β	$CI_{95\%}$ for e^β Lower Upper
Step 1 ^a	Infant Difficulty	0.394	0.118	11.154	1	<0.001	1.483	1.177 1.868
	Constant	-0.96	0.385	6.208	1	0.013	0.383	
Step 2 ^b	Infant Difficulty	0.347	0.123	7.94	1	0.005	1.415	1.111 1.801
	Daycare Attendance	-2.379	1.131	4.423	1	0.035	0.093	0.01 0.85
	Constant	1.879	1.298	2.096	1	0.148	6.546	

a. Variable entered on step 1: Infant Difficulty; b. Variable entered on step 2: Daycare Attendance.

In the second step, Infant Difficultiness ($\beta = 0.347$, Wald = 7.94, $p = 0.005$) and Daycare Attendance ($\beta = -2.379$, Wald = 4.423, $p = 0.035$) were identified as predictors of antibiotic use. The odds ratio for Infant Difficultiness is $e^\beta = 1.415$, with a 95% confidence interval $CI_{95\%} = [1.111, 1.801]$, which does not include the value of one. This suggests that, after controlling for Daycare Attendance, each one-point increase in the Infant Difficultiness score is associated with a 41.5% rise in the odds of using antibiotics. Additionally, in the second step of the model, Daycare had an odds ratio of $e^\beta = 0.093$, where $\beta = -2.379$ is the Wald, with $CI_{95\%} = [0.01, 0.85]$, which does not include the value 1. An odds ratio of 0.093 indicates that, while holding the Infant Difficultiness predictor constant, the odds of antibiotic use decreases by 90.7% ($1 - 0.093 = 90.7\%$) when infants attend family-based daycare. The -2 Log Likelihood value was 60.374, lower than in the first step, indicating a better fit of the model to the data. The Nagelkerke R^2 was 0.406, "explaining" 40.6% of the variability of antibiotic use and indicating a moderate fit of the model to the data (Table 5).

4. Discussion

Antibiotic stewardship has proven intricate as social, cultural, and psychological factors linked to antibiotic overuse have been identified (Calvo-Villamañán et al., 2022; Deschepper et al., 2008; Dionisio et al., 2023b; Grigoryan et al., 2008; Krockow et al., 2022). From the psychological factors identified, previous research has shown that maternal sensitivity, infant cooperative and difficult behavior, and infant-mother attachment patterns are associated with antibiotic use in the first months of infants' lives (Fuertes et al., 2023b). Following this line of research, we included fathers in our research, aiming to learn about their role in antibiotic use in infancy.

Attachment Theory, proposed by John Bowlby (1969), states that caregiver behaviors significantly impact the organization of attachment and the overall well-being of the infant (Bowlby, 1969). Contributing to this body of knowledge, we found that a father's ability to respond interactively to an infant's needs (paternal sensitivity and paternal control) is not associated with antibiotic use. These results contrast with previous research that found

maternal sensitivity was a predictor of infants' use of antibiotics in infants born full and preterm (Fuertes et al., 2023b, 2023a). One possible explanation for this discrepancy is that paternal sensitivity scores tend to be lower and less variable than maternal sensitivity scores, which may reduce statistical power to detect associations. Previous research has reported an average maternal sensitivity of approximately 9.92. (Barbosa et al., 2021)—even when including families at social and educational risk, who were not part of our sample—compared to a paternal sensitivity of 8.85 across all fathers in this study. Indeed, comparative Portuguese studies have shown that mothers tend to be more sensitive than fathers, and their infants are more likely to form secure attachments to them (Fuertes et al., 2016). Moreover, while both more sensitive mothers and fathers tend to be more involved in daily caregiving routines, fathers typically perform fewer caregiving tasks and dedicate less time to infant care (Fuertes et al., 2016). Acknowledging the differences between maternal and paternal caregiving in Portugal is essential to understanding these results. Portuguese legislation has ensured paternal leave rights since 1999, which has been successively increased to 30 mandatory minimum days and the same rights as mothers to stay with their children when sick. However, mothers have 6 months of maternal leave, and the adherence of working Portuguese fathers in sharing parents is only 45.7% (Fernandes et al., 2023). In sum, more comparative studies are necessary to discriminate paternal and maternal interactive behavior impact on antibiotic use during infancy.

However, it is not only parents' behavior that accounts for antibiotic uptake. As in previous studies conducted with mothers, we found that infants who took antibiotics exhibited more difficult behavior with fathers and were less cooperative during free-play interactions compared to other infants (Fuertes et al., 2023a, 2023b). First, as previous research has found, infants with fussier and more externalizing behavior tend to somatize their health symptoms of infectious diseases. Another explanation is that infants' protests (crying, reactivity, etc.) alert their parents, while more passive or cooperative behaviors worry less about their parents. Worried parents may expect medication to ameliorate the infants' health condition. Corroborating this explanation, one study has shown that when the diagnosis is uncertain, or infants are stressed, mothers wish for antibiotics to speed up their children's recovery (Bosley et al., 2022). The mothers in that study either had little knowledge of the problems associated with antibiotic use or devalued the adverse effects of these drugs.

Furthermore, we tested the prevalence of antibiotic use according to infant attachment patterns to their father at 12 months. Our study shows that infant–father attachment patterns are not associated with antibiotic use. Nonetheless, previous studies have shown that infants insecurely ambivalently attached to their mothers were more likely to take antibiotics in the first year of life (Fuertes et al., 2023a, 2023b). It would be very interesting to conduct a future study to verify the infant attachment pattern with both the mother and father and test the differences in the prevalence of antibiotic use according to the infant's attachment pattern. In fact, each relationship is unique. Since birth, infants react to their partners' social and emotional stimulus (e.g., their parent's facial expression, tone of voice, touch); parents read these responses and help infants to regulate their behavior; with time, infants learn to self-regulate and coregulate interactions (Tronick et al., 2020). Relationships result from transactional processes that lead to independent developmental and emotional paths (Madigan et al., 2024), which seems to be the case with antibiotic use and attachment between mothers and fathers. Hence, the findings of this study corroborate the hypothesis that infant–mother and infant–father relationships have different impacts on child development, well-being, and health, and, in this case, on the use of antibiotics.

Beyond the socioemotional factors, we reason that paternal stress and involvement in health care might affect their perspective on infant illness. Previous studies have shown that working-age patients are more likely to receive inappropriate antibiotic prescriptions (e.g., infections caused by viruses) (Dekker et al., 2015; Denny et al., 2019). Therefore, we hypothesize that when working fathers care for their ill infants, they may feel pressured to return to their work responsibilities. In this scenario, fathers may desire their infants to recover quickly and may unconsciously pressure general practitioners to prescribe antibiotics. To test this hypothesis, further qualitative studies should explore fathers' motivations and perceptions regarding antibiotic use. Nevertheless, our results describe fathers as individuals who approach fatherhood with little stress, and develop positive interactions with their infants, rarely perform care activities alone, and instead share care with mothers. Our findings align with a previous study indicating that fathers experience lower stress levels than mothers (Malmberg & Flouri, 2011).

Past Portuguese comparative studies have found that mothers are significantly more involved in caregiving than fathers (Fuertes et al., 2016). However, in the current sample, collected ten years later, the gap between maternal and paternal involvement appears to be smaller. In this sample, mothers provided care either alone or jointly with fathers. Notably, health care-related tasks were among the caregiving domains in which fathers were most frequently involved. However, although 74% (46/62) of fathers offer primary health care to their infants, none of the 62 fathers is the unique provider of primary health care to their infants. That may explain why we did not find an association between infants' use of antibiotics and fathers' involvement in infants' health care.

Of course, the exposition of infectious agents needs to be considered as a possible factor; therefore, we studied the prevalence of antibiotic use according to daycare attendance. It is expected that contamination of bacterial diseases will be higher in an environment with 12 infants per room, as is the case in Portuguese nurseries (center-based daycare), especially when they start crawling. Our results corroborate this hypothesis. Thus, educational authorities should properly regulate daycare centers to decrease contagion among infants (for instance, having isolation rooms for children to wait for their parents to pick them up when with fever). Center-based daycare attendance is associated with a higher risk of infectious diseases among children. For example, a study conducted in France involving 1263 children aged 3 months to 3 years revealed that the risk of developing the first episode of otitis, common cold with fever, and wheezy bronchitis was significantly higher in children who had recently started attending daycare centers compared to those who stayed at home (Collet et al., 1991). Although some of these infections are viral and self-limiting, sometimes antibiotics are prescribed (Dekker et al., 2015; Pouwels et al., 2018).

The main objective of our study was to identify predictors of antibiotic use among psychological and health factors. Two predictors of antibiotic use were found in this sample. The first and strongest is the infant's difficult behavior, as found in previous research with mothers (Fuertes et al., 2022a, 2022b). The second is the frequency of daycare centers between 6 and 12 months. If the second is expected, the first is nouvelle information that deserves careful attention. Previous studies have shown that various psychological factors contribute to antibiotic prescription, both from the perspectives of patients and health professionals. Pediatric visits present a higher level of complexity because, in addition to the health professional and the patient, there is often a third party involved: typically, the father or the mother. This fact presents a new level of complexity to this problem: finding the psychological factors leading to overprescribing antibiotics.

Last, these findings may help avoid unnecessary antibiotic use, which is crucial for both families and health care professionals. We have shown that infant behavior

(including cooperativeness, difficulty, and passivity) is associated with antibiotic use. Therefore, health care professionals should consider this factor when assessing the need for antibiotic prescriptions, such as by inquiring with parents (e.g., type and duration of symptoms, or reactions of the infant to sickness) or through additional clinical tests. This is important because overuse and misuse of antibiotics can lead to antibiotic resistance, making infections harder to treat and increasing the risk of severe illness and death. They can also disrupt the natural balance of bacteria in the body, causing side effects like gastrointestinal issues and allergic reactions. By avoiding unnecessary antibiotic use, we can protect public health, ensure effective treatments remain available, and reduce the burden of antibiotic resistance on health care systems. Preventive actions appear to be more effective in the long term. One important recommendation is the inclusion of isolation rooms in Portuguese daycare centers for children presenting with fever or other symptoms of infectious illness. Currently, in most daycare settings in Portugal, when a child shows symptoms of illness, parents are notified and expected to collect the child immediately, even though the child may remain in contact with others until pickup. Instead of requiring parents to leave work immediately, isolation rooms—for less severe cases, such as low-grade fevers—could allow families to balance professional responsibilities with caregiving demands, while simultaneously preventing the spread of illness to other children. Additionally, schools in Portugal, which may be attended by hundreds of children, should be equipped with full-time health care professionals to ensure appropriate health monitoring and early intervention. These professionals can advise and assure parents before they attend medical consultations, reducing parental stress and disinformation.

Studies Limitations, Strengths, and Future Directions

Regarding the study limitation, this is a very low biological and social risk sample; for instance, fathers had well-paid professions and higher levels of education compared to the Portuguese population. The characteristics of this sample may limit the generalizability of the findings. Another limitation is the laboratory-based nature of the father–infant interaction assessments. Although most studies have used such measures, facilitating comparisons across findings, observations conducted in naturalistic settings may better capture the spontaneity, contextual nuances, and ecological validity of everyday father–infant interactions. Therefore, future research should also include more diverse participants and measures.

Also, it is important to include couples to learn more about each parent's impact on infant antibiotic consumption. Future studies should include both parents to allow for a comprehensive understanding of each parent's contribution to decisions regarding infant health. This approach would also enable a more thorough analysis of their individual perspectives on antibiotic use, medication in general, and broader attitudes toward their child's well-being.

Despite the limitations, this study is novel in including fathers (a key caregiver that is less studied than mothers) and deepens our knowledge of the causes of infant excessive use of antibiotics in the first year of life. These findings also contribute to Attachment Theory by demonstrating how early relational experiences—reflected in infant behavior and parental functioning under stress—may influence not only socio-emotional outcomes, as traditionally emphasized, but also health-related behaviors such as antibiotic use.

5. Conclusions

Infants who were given antibiotics in their first year were less cooperative, more difficult, and less passive during free play with their fathers. They were also more likely

to attend center-based daycare. Their fathers displayed slightly lower sensitivity and more controlling behaviors than fathers of infants that did not take antibiotics. The main predictors of antibiotic use included infant difficulty and the type of daycare (family-based versus center-based). In comparison to previous studies involving mothers, paternal behavior had a weaker association with antibiotic use.

The findings suggest the potential value of early parental guidance programs aimed at emotional regulation in infants and reducing unnecessary medical interventions.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/ejihpe15050066/s1>, Table S1: Associations between Antibiotic Use at 12 Months and Infant–Father Attachment Pattern: Pearson’s χ^2 -test; Table S2: Parental involvement in health care at 9 months descriptive statistics; Table S3: Paternal Stress and Antibiotic Use; Table S4: Variables not in the Equation in each step of the binary logistic regression analyses.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Hospital de Santarém. The Faculty of Psychology Ethics and Deontology Committee approved this study (ref: 1.9/18 November 2021).

Informed Consent Statement: Written informed consent has been obtained from the participants or their parents (in the case of infants) to participate in this study and publish the results.

Data Availability Statement: Our data are available at <https://osf.io/5c9k7> without information that could identify participants.

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Abbreviations

The following abbreviations are used in this manuscript:

CI _{95%}	Confidence Interval 95%
M	Mean
SD	Standard Deviation
OR	Odds Ratio

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Article

The Impact of Social Determinants of Health, Health Resources, and Environmental Factors on Infant Mortality Rates in Three Gulf Cooperation Council (GCC) Countries

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Abstract: Worldwide, there has been a notable decline in the infant mortality rate (IMR) in the last 20 years. Regionally, the Gulf Cooperation Council (GCC) countries echo the global trends to a certain extent. This study aims to explore the impact of social determinants of health (SDOH), health resources (HRS), and environmental (ENV) factors on the IMR in Bahrain, Qatar, and Kuwait. It is a retrospective time-series study using yearly data from 1990 to 2022. Partial Least Square Structural Equation Model (PLS-SEM) was utilized to construct an exploratory model of the IMR for each country. The results showed that SDOH, HRS, and ENV factors influenced IMRs in three GCC countries. In all three countries' models, only HRS exerted a direct effect on the IMR (Bahrain: -0.966 , 95% CI -0.987 to -0.949 ; Kuwait: -0.939 , 95% CI -0.979 to -0.909 ; and Qatar: -0.941 , 95% CI -0.976 to -0.910). On the other hand, ENV factors and SDOH only influenced the IMR indirectly and negatively. Their beta coefficients ranged from -0.745 to -0.805 for ENV factors and -0.815 to -0.876 for SDOH. This study emphasizes the importance of adopting multi-faceted public health strategies that focus on improving socioeconomic conditions, expanding healthcare resources, and reducing environmental degradation. By adopting these multi-dimensional approaches, Bahrain, Qatar, and Kuwait can continue to progress in reducing IMRs and improving overall public health outcomes.

Keywords: infant mortality rates; social determinants of health; health resources; environmental; gulf cooperation council countries; GCC

1. Introduction

One of the most significant metrics that can accurately indicate a population's socioeconomic status and general health is its infant mortality rate (IMR). Worldwide, there has been a notable decline in the IMR in the last 20 years (World Health Organization, 2023). For instance, in regions like the Middle East and North Africa, the IMR decreased from 31.9 to 12.2 per 1000 live births between 1990 and 2019 (Sepanlou et al., 2022). Regionally, the Gulf Cooperation Council (GCC) countries echo global trends to some extent. Despite similar economic conditions, some disparities still exist in certain GCC countries' efforts to reduce the IMR. In Bahrain, the IMR has steadily decreased in recent years, with the current rate in

2024 being recorded at 5.0 deaths per 1000 live births, a 1.86% decline from 2023 (Macrotrends, 2024). Similarly, Qatar has significantly improved by achieving an IMR of 6.50 per 1000 live births in 2023, which is an improvement over their previously recorded records of 6.7 in 2021 and 7 in 2020 (GlobalData, 2023). Comparatively, Kuwait has documented the highest IMR among the three countries, with 8.6 deaths per 1000 live births in 2023 (UNICEF, 2024). This higher IMR suggests that Kuwait may face more challenges related to socioeconomic conditions, healthcare accessibility, and environmental factors.

The socioeconomic conditions in Bahrain, Qatar, and Kuwait have undergone significant changes and rapid modernization, creating healthcare challenges. This element has had a significant impact on public health, mainly in relation to infant mortality rates. Economic inequality is persistent despite the high GDP growth provided by oil revenue and structural reforms. This inequality affects access to healthcare and essential services, particularly among expatriates (SESRIC, 2023; World Bank, 2025). Rapid modernization has changed urban settings and improved environmental sustainability, but it has also affected health conditions owing to some non-communicable diseases (ElMassah & Hassanein, 2023). The healthcare systems present in these countries are advanced in many ways, but they continue to face challenges from non-communicable diseases and socioeconomic inequalities. This directly affects health outcomes such as IMR (Johnson et al., 2024). Several public health initiatives have been launched by these countries in an attempt to combat these issues and improve the overall health of their populations. For instance, The Qatar National Vision 2030 was launched with a multi-faceted approach to improve the health of Qatar's population as well as the country's social, economic, and environmental development (Qatar Government Communication Office, 2024). In Kuwait, the country launched a cooperation strategy with the WHO to aid in achieving their health targets, as set out in 'Vision 2035' (WHO Regional Office for the Eastern Mediterranean, 2023). Bahrain has also joined these countries, striving to attain sustainability, innovation, and fairness in providing healthcare amenities to their population by 2030. Though considerable gains have been achieved through these initiatives, IMR s are still concerning, particularly in Kuwait, with room for improvement in other countries. Hence, shedding light on areas where more effort is needed would further benefit these projects in better tailoring their strategies and reaching their 2030 and 2035 goals.

1.1. Literature Review

The literature review mainly consists of areas like social determinants of health (SDOH), health resources (HRS), and environmental (ENV) factors and their influence on the IMR. The review synthesizes global and regional research to contextualize these factors, providing insights into their role in Bahrain, Qatar, and Kuwait.

1.1.1. The Impact of Social Determinants of Health (SDOH) on Infant Mortality Rates

According to the World Health Organization (WHO), SDOH affect individual health, contribute to health inequities, and lead to unjust and preventable disparities in health between different populations (World Health Organization, 2023). SDOH typically encompass factors affecting individuals throughout their lives, and include the broader systems and structures like economic policies, political systems, and social norms (Marmot, 2005). The SDOH framework is the concept of a social gradient of health. Individuals in lower socioeconomic positions will experience worse health outcomes than those in higher socioeconomic positions. Factors such as education, income level, employment, housing conditions, and access to basic amenities can affect health equity (Marmot, 2005). For example, unemployment, poor working conditions, and inadequate access to essential services like quality healthcare can cause health disparities. Some studies have suggested that the SDOH can account for 30 to

55% of health outcomes. This emphasizes the impact of SDOH on health outcomes (Marmot, 2005). In fact, owing to its importance, the SDOH framework is one of the key cornerstones utilized by the Healthy People 2030 initiative launched by the American Office of Disease Prevention and Health Promotion to achieve their goal of improving the overall health and well-being of their population (The Office of Disease Prevention and Health Promotion, 2024).

This SDOH framework is significant for understanding health inequities in countries with various income-levels. Life and healthy life expectancy have increased globally (World Health Organization, 2023). However, some gaps exist, mainly in low- and high-income countries (Braveman et al., 2011). In 2016, over 15 million premature deaths were caused by non-communicable diseases, and the disparities between the wealthy and poor subgroups for diseases like cancer can be seen worldwide (Ishimwe et al., 2023). The under-five mortality rate is more than 8 times higher in Africa compared to Europe (Marmot, 2005). It ranged from as high as 316 deaths in Sierra Leone to as low as 3, 4, and 5 in Iceland, Finland, and Japan, respectively. Among 16 countries, twelve of which were in Africa, the IMRs experienced an exponential rise within just one year in the last decade. For example, Zimbabwe and Botswana both recorded an extreme rise of IMR by 43% and 52% in 1990, respectively (Braveman et al., 2011; Marmot, 2005).

The connection between SDOH and IMRs in both high- and middle-income nations is made by looking at several elements. These include birth and fertility rates, economic factors, and poverty. Increased birth and fertility rates are often associated with increased IMRs, mainly in socioeconomically challenged groups. Reduced fertility rates in high-income countries are mostly related to better maternal healthcare, leading to a decrease in IMRs (Kumar & Cheng, 2023). Economic conditions like unemployment are frequently linked to high stress and limited access to healthcare services, which in turn, leads to increased IMRs. Stability in the economy can help increase access to healthcare, which is crucial for the health of infants and mothers (Ishimwe et al., 2023). Another major factor that can highly impact health is poverty. In both high- and middle-income countries, poor communities have to face high IMRs as they are restricted from accessing healthcare services, proper nutrition, and education. By overcoming poverty, any specific intervention with policies can lead to a decrease in IMRs (Siah & Lee, 2015). Even if SDOH have a negative impact on IMRs, some high-income-generating countries have decreased their effects. They used healthcare policies and societal policies as a way to bring about positive impacts.

As in the GCC countries, the SDOH contribute to health as well as the growth of the economy. They also help us to analyze the roles of gender and those trends in the economy that are mainly related to women. Other factors like cultural rules, legal aspects, and economic policies can influence people and society. The GCC countries had increased economic growth by more than 7% in 2022 (World Bank, 2024). This growth has been supported by reforms that have helped to improve the investment into and the flexibility of the labor market (Yasmeen et al., 2024). These reforms are significant as they helped increase the labor market and employment for women in Saudi Arabia from 17.4% to 36.0% in 2023 (Al Boinin, 2023). The gender dynamics in GCC countries have influenced the ability of women to engage in entrepreneurial activities and are transformed by the expectations of family and society. These socio-cultural elements play a significant role in terms of opportunities and work experience for women (Al Boinin, 2023). However, youth unemployment remains a problem, and young females face higher unemployment rates than males. Because of social and cultural barriers, it is more than five times more likely that females will be unemployed (Fatima & Elbanna, 2022). This also increases economic disparities (Schwartz et al., 2023). These factors lead to health inequities that can impact the health of infants and increase mortality in the region (Eltayib et al., 2023a).

1.1.2. The Impact of Health Resources (HRS) on Infant Mortality Rates

IMRs will be affected by the access and quality of HRS. Some of the important elements are vaccination coverage, skill development, and the availability of healthcare services (Lee et al., 2022; Simmons et al., 2021). These elements can help reduce IMRs in various regions. Vaccination programs can be considered a significant element in the survival of infants because they help in preventing diseases that can lead to the death of the infant (Eltayib et al., 2023b). In some regions like sub-Saharan Africa, a fee must be paid for immunization services. The literature highlights the fact that making vaccines accessible to all is essential for lowering IMRs (Simmons et al., 2021). For the improved outcome of neonatal health, it is essential to have skilled healthcare professionals present during childbirth (Eltayib et al., 2023b). As maternal healthcare services are important, the quality of the care is also comparably important for reducing neonatal mortality rates. This indicates that improvement in both the accessibility and standard of maternal healthcare is significant for effectively lowering the number of neonatal deaths (Lee et al., 2022). However, despite all these advancements, the global disparities in healthcare quality and socioeconomic conditions can be a significant challenge, which means effort is needed to decrease IMRs (Schwartz et al., 2023).

Bahrain, Qatar, and Kuwait are members of the GCC and have similar cultural and historical backgrounds (Khan et al., 2022). However, there are distinct variations in the healthcare systems because of population size, economic development, and specific healthcare challenges. The healthcare system in Bahrain is a combination of public and private sector provision (Katoue et al., 2022). As the system is generally well established, it faces some challenges related to the efficiency and distribution of resources (Alsabah & Alsabti, 2024). In the meantime, Qatar has shown a strong commitment to developing healthcare infrastructure. This has led to increased access and utilization of healthcare services, significantly increasing the number of annual health checkups. The participation increased by 80% between 2017 and 2019 (Al-Abdulla et al., 2024). In Kuwait, people mainly rely on government-provided healthcare services and face challenges in terms of the efficiency of hospitals. The Ministry of Health has delivered 80% of care in Kuwait, but the country has experienced a decrease in technical efficiency (Alsabah & Alsabti, 2024). Regarding immunization coverage, Kuwait has made significant steps towards improving it, as the percentages of children immunized against diphtheria–pertussis–tetanus (DPT), measles, and hepatitis has risen from 67%, 48%, and 38%—respectively—in the 1980s, to around 99% for all of them in the last decade (World Bank, 2025). Similar trends occurred in both Qatar and Bahrain, with vaccination rates experiencing a jump in the percentage of the population immunized against DPT, measles, and hepatitis from around the 30s to around 99% in recent years (World Bank, 2025). A corpus of the literature has highlighted the importance of maintaining sufficient immunization coverage and its significant effect on IMRs (David, 2018; Mouteyica & Ngepah, 2023; Sanchez et al., 2023). Qatar has made considerable advancements related to the comprehensive healthcare screening initiative (Al-Abdulla et al., 2024). Similarly, Bahrain and Kuwait also operate vaccination programs, but their efforts are less documented (Johnson et al., 2024). The investment of Qatar in the healthcare infrastructure and its focus on preventive measures like health checkups and vaccination programs have provided positive results. However, Bahrain and Kuwait can benefit from further analysis of their healthcare systems to identify areas for improvement, mainly in terms of hospital efficiency and vaccination coverage (Eltayib et al., 2023b).

The Gulf states like Bahrain, Qatar, and Kuwait have a shared goal of achieving universal health coverage (Al-Abdulla et al., 2024; Katoue et al., 2022). However, their services and outcomes are different because of differing levels of efficiency. Kuwait has made a notable improvement toward universal health coverage (UHC) as their public

hospitals provide mean efficiency rates of up to 86.58%. This proves their commitment to UHC after facing challenges (Alsabah & Alsabti, 2024). Qatar has also taken steps in terms of its healthcare, and uses services and provides preventive care. This has improved the healthcare outcomes in that country (Al-Abdulla et al., 2024). Bahrain, Qatar, and Kuwait have a shared objective in terms of healthcare: universal health coverage. However, their experiences and approaches differ, so understanding these differences may help healthcare providers develop effective healthcare improvement methods.

1.1.3. The Impact of Environmental (ENV) Factors on Infant Mortality Rates

The ENV factors and IMR are connected. Some factors, such as CO₂ emissions, pollution, and resource availability, can affect the IMR (Kislyak et al., 2024). Nowadays, as of 2023, Qatar is considered one of the major contributors to CO₂ emissions from fossil fuels and industry as they produced around 38.8 tons per person (t) in that year alone. Following closely behind Qatar are the remainder of the GCC nations, with Saudi Arabia, United Arab Emirates, and Kuwait producing around 22.1 tons, 21.6 tons, and 20.5 tons, respectively. Comparatively, the major polluters worldwide have made significant efforts to reduce their CO₂ emissions. For instance, during the same year, the USA, Canada, and China managed to limit their emissions to only around 14.3 tons, 14.0 tons, and 8.4 tons, respectively (Our World in Data, 2024). Limiting pollutants in the air is an important issue as the particulate matter within it is linked to issues in the respiratory and cardiovascular regions of the body, which, in turn, lead to an increased risk of infant deaths (Kreutz et al., 2023). The toxic exposure can also cause genetic risks to infants (Kislyak et al., 2024). Air pollution can also occur through extensive energy usage via medical devices. This can indirectly affect public health by contributing to environmental degradation (Roletto et al., 2024). Environmental factors that shape lifestyle choices, such as dietary habits, have also been shown to impact overall health, which can be related to infant mortality (Touil et al., 2023). Although research emphasizes the detrimental effects of environmental factors on IMRs, it also points out that enhanced environmental regulations and healthcare practices could contribute to better health outcomes and lower IMRs over time.

The GCC region experiences significant environmental healthcare challenges because it mainly relies on oil production. The oil production industry will negatively impact air and water resources' quality, directly affecting public health metrics, mainly IMRs (Nazarpour et al., 2023). The GCC region is strongly affected by harmful air pollutants like particulate matter and nitrogen oxides, which are connected to various health problems. The increased pollution level in Saudi Arabia has been related to reduced life expectancy (Zaidan et al., 2024). Similarly, in Kuwait, there is an increase in particulate matter concentration of up to 10 µg/m³, which shows the severe health problems of air pollution in the GCC region (Alahmad et al., 2023). Economic growth has also been driven by the consumption of nonrenewable energy resources in the GCC region, negatively affecting environmental sustainability and public health (ElMassah & Hassanein, 2023). From this, we can understand the importance of improving the monitoring and regulatory system to reduce environmental health risks effectively.

1.2. Aim and Objectives of the Study

This study aimed to understand the direct and indirect impact of the SDOH, HRS, and ENV factors on IMRs in Bahrain, Qatar, and Kuwait. The primary objective is to develop a best-fitting model for each country for IMRs. The second objective is to analyze these factors and compare their impact on IMRs across the three nations by creating an

exploratory model using the Partial Least Square Structural Equation Model (PLS-SEM). To achieve the aim of the study, there were six hypotheses to be tested (Figure 1):

H1: SDOH factors significantly impact IMRs in all three countries.

H2: HRS factors significantly impact IMRs in all three countries.

H3: ENV factors significantly impact IMRs in all GCC countries.

H4: ENV factors significantly impact SDOH factors in all three countries.

H5: ENV factors significantly impact HRS factors in all three countries.

H6: SDOH factors significantly impact HRS factors in all three countries.

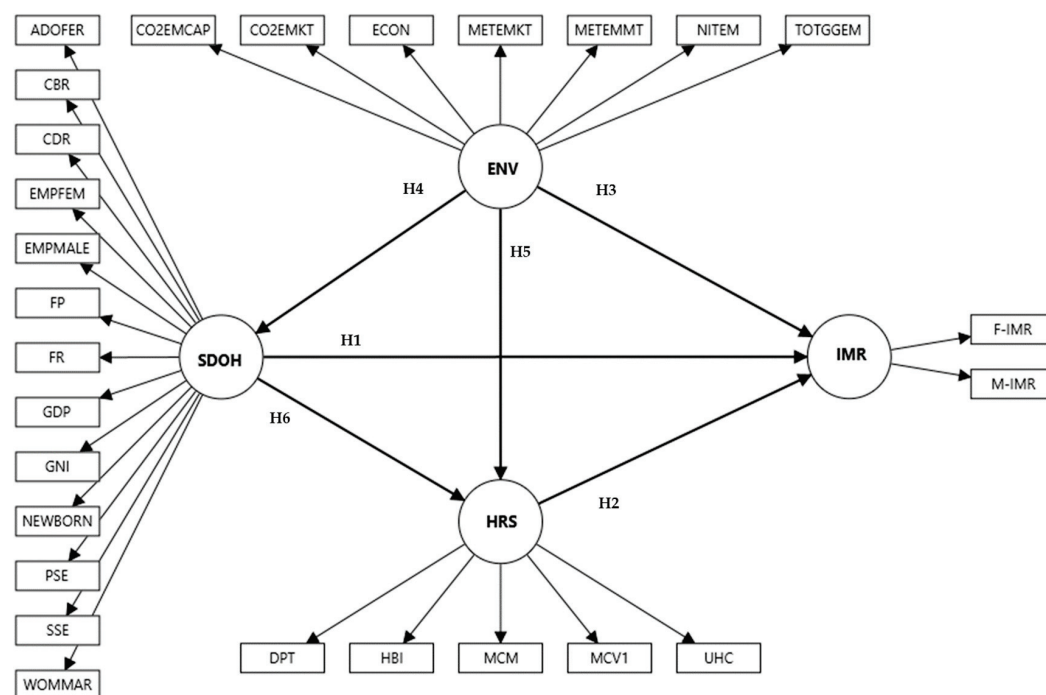


Figure 1. The conceptual model of the impact of SDOH, HRS, and ENV factors on IMR in Bahrain, Kuwait, and Qatar (1990–2022). LV: latent variable; MV: manifest variable; SDOH: sociodemographic on health; ENV: environmental; HRS: health resources; IMR: infant mortality rate; F-IMR: infant mortality rate for females; M-IMR: infant mortality rate for males; UHC: universal health coverage service coverage index; MCV1: newborns vaccinated with MCV1; MCM: method needs for family planning with modern contraception methods; HBI: newborns vaccinated with BCG; DPT: DPT immunization; WOMMAR: percentage of women married; SSE: secondary school education; PSE: primary school education; NEWBORN: gender of a newborn; GNI: gross national income per capita; GDP: GDP per capita; FP: food production index; FR: total fertility rate; EMPFEM: employment to population ratio (females); EMPMALE: employment to population ratio (males); CDR: death rates; CBR: birth rates; ADOFER: adolescent fertility rates; CO2EMKT: CO₂ emissions from oil refineries; CO2EMCAP: CO₂ emissions per capita; ECON: electricity consumption; METEMKT: methane emissions (kt of CO₂ equivalent); METEMMT: methane emissions in the energy sector; NITEM: fuel efficiency rate; and TOTGGEM: total greenhouse gas emissions.

2. Materials and Methods

2.1. Research Design and Data Sources

This study used a retrospective time-series design to investigate the impact of SDOH, HRS, and ENV factors on IMR in Bahrain, Qatar, and Kuwait using secondary data from 1990 to 2022. This approach has been used because the study mainly focuses on the measurable relationships between the key variables and IMR. This research focuses on developing models for each country to identify how these determinants can affect IMR. This model can help us understand how each determinant can contribute to IMR variations and provides country-specific models. The data for the independent and dependent variables are sourced from international organizations and country-level health databases to ensure accuracy, consistency, and comparability. Each country's data were collected in the same timeframe, from 1990 to 2022, for consistent comparison. The data (see Table 1) used for this study are from World Bank (2025), World Health Organization (2024), UNICEF (2024), The Global Economy (2024), Statista (2023), Macrotrends (2024), GlobalData (2023), and SESRIC (2023).

Table 1. List of Latent and Manifest Variables in the Conceptual Model.

LV	MV (Unit)	Abbreviation
IMR *	Infant Mortality Rate, total female infant death per 1000 live births (year)	F-IMR
	Infant Mortality Rate, total male infant death per 1000 live births (year)	M-IMR
SDOH ^	Adolescent fertility rate in a certain year	ADOFER
	Birth rate in a certain year	CBR
	Death rate in a certain year	CDR
	Employment to population ratio (females) in a certain year	EMPFEM
	Employment to population ratio (males) in a certain year	EMPMAL
	Percentage of women married in a certain year	WOMMAR
	Food Production Index in a certain year	FP
	Total fertility rate in a certain year	FR
	GDP per capita (Local Currency Unit)	GDP
	Gross national income per capita in a certain year	GNI
	Gender of the newborn in a certain year	NEWBORN
	Primary School Enrolment in a certain year	PSE
	Secondary School Enrolment in a certain year	SSE
ENV ~	CO ₂ emission or oil refineries	CO2EMKT
	CO ₂ emission per capita	CO2EMCAP
	Electricity Consumption in a certain year	ECON
	Methane emissions in the energy sector (thousand metric tons of CO ₂ equivalent)	METEMMT
	Methane emissions (kt of CO ₂ equivalent)	METEMKT
	Nitrous oxide emissions (thousand metric tons of CO ₂ equivalent)	NITEM
HRS #	Total greenhouse gas emissions (kt of CO ₂ equivalent)	TOTGGEM
	DPT immunization	DPT
	Newborns are vaccinated with BCG.	HBI
	Method needs for family planning with modern contraception methods	MCM
	Newborns vaccinated with MCV1 in a certain year	MCV1
	Universal health coverage (UHC) service coverage index in a given year.	UHC

LV: latent variable. MV: manifest variable. SDOH: sociodemographic on health; ENV: environmental factors; HRS: health resources; IMR: infant mortality rate; *: sources from World Health Organization (2024), GlobalData (2023), UNICEF (2024), and Macrotrends (2024); ^: sources from World Bank (2025), The Global Economy (2024), SESRIC (2023), and UNICEF (2024); ~: sources from The Global Economy (2024), Statista (2023), and SESRIC (2023); and #: sources from World Health Organization (2024) and UNICEF (2024).

2.2. Dependent and Independent Variables

The dependent variable for this study is the IMR, a critical measure of public health. The IMR included the total number of female (F-IMR) and male (M-IMR) infant deaths per 1000 live births within a year. The independent variables have three key categories: SDOH,

HRS, and ENV factors. These variables represent a range of socioeconomic, healthcare, and environmental indicators that influence IMR. SDOH are indicated by adolescent fertility rate (ADOFER), birth rate (CBR), death rate in certain year (CDR), employment to population ratio for females (EMPFEM) and males (EMPMAL), percentage of women married in a certain year (WOMMAR), food production index (FP), total fertility rate (FR), gross domestic product (GDP) per capita (GDP), gross national income per capita (GNI), primary school enrolment (PSE), and secondary (SSE) school enrolment. The health resources (HRS) include DPT immunization (DPT), newborns vaccinated with BCG (HBI), family planning with modern contraception (MCM), universal healthcare (UHC) service coverage index (UHC), and newborns vaccinated with MCV1 (MCV1). Environmental (ENV) factors included CO₂ emissions (CO2EMK), CO₂ emissions per capita (CO2EMCAP), electricity consumption (ECON), methane emissions (METEMMT) in the energy sector, methane emissions (METRMKT), nitrous oxide emissions (NITEM), and total greenhouse gas emissions (TOTGGEM) (See Table 1).

2.3. Statistical Analysis

2.3.1. Analytical Methods

This study employs previous studies that used the PLS-SEM method to assess the complexities between the latent and manifest variables in GCC countries (Eltayib et al., 2023a; Wirayuda et al., 2023). Their predictive nature and ability to establish complex direct and indirect relationships among the variables in small sample sizes make them suitable for this research. Sarstedt et al. (2020) stated that this method uses composite-based modeling that focuses on and predicts outcomes. This research used PLS-SEM to analyze the predictive relationship between SDOH, HRS, and ENV factors in IMRs. Some debates exist about using PLS-SEM in psychological and social sciences (Sarstedt et al., 2020). Although Rönkkö et al. (2016) suggested discontinuing this approach, Rigdon (2016) argued that these misconceptions about applying PLS-SEM overshadow their advantages. PLS-SEM can handle complex and exploratory data using formative models, making it the correct choice for the study. This study mainly tries to explain the variants in IMRs (Kaufmann & Gaeckler, 2015). When using independent variables like SDOH, HRS, and ENV factors, PLS-SEM is mainly designed to accommodate more dependent and independent variables. This model aligns with the needs of the study as the study interrelates the influences of different factors' impact on IMRs (Eltayib et al., 2023b). This will give modeling flexibility and effectively produce path coefficients (Dijkstra & Henseler, 2015; Shmueli et al., 2016).

2.3.2. Analytical Procedures

The PLS-SEM analysis was conducted using SmartPLS 4.0 (Ringle et al., 2024) software. Various steps are involved in this procedure. First, according to the proposed conceptual model, the modeling specifications involving the model pathway are defined (Gkontelos et al., 2023; Sarstedt et al., 2020). Independent variables like SDOH, HRS, and ENV factors will be specified as latent structures. The dependent variables will be IMRs. Next, path coefficients will be generated, mainly showing the relationship between the independent and dependent variables. The coefficients will help assess their statistical significance (Memon et al., 2021). Various information about factors affecting IMRs in Bahrain, Qatar, and Kuwait will be given in this process. Some key metrics like R^2 , Q^2 , and the SRMR were used for model validation. This model validation is needed to evaluate the quality of the model (Hair et al., 2019). The final step will be applied using the bootstrapping method. In this method, the standard errors and confidence intervals are analyzed to improve the reliability of the loading of each LV on IMRs (Hair et al., 2019). It helps to

address the primary objective of this study. Separate models are made for each country, and a comparative analysis is conducted to check how these factors will interact with each other in terms of their impact on IMRs, which helps address this study's second objective.

2.3.3. Sample and Ethical Considerations

The required samples (number of years) for each country are based on the proposed conceptual model with a set of multiple regressions, including 6 hypotheses. If this study expected a 0.55 effect size, we required at least 32 samples per country (total is 96) to achieve a 5% type I error with 80% power, based on G*Power v3.1 software (Faul et al., 2007). Each country's data were collected from open sources covering the period from 1990 to 2022 (33 years) (World Bank, 2025; World Health Organization, 2024; UNICEF, 2024; The Global Economy, 2024; Statista, 2023; Macrotrends, 2024; GlobalData, 2023; SESRIC, 2023). This retrospective time-series study uses secondary data with minimal ethical considerations regarding privacy and protection. Ethical approval exemption was obtained from the ethics research committee of the Sultan Qaboos University (MERC#2666). However, care will be taken to ensure the accuracy and consistency of the data across the three countries.

2.4. Analysis

Based on the prior systematic review (Eltayib et al., 2023a) and a study in Oman (Eltayib et al., 2023b), the conceptual model is presented in Figure 1. A comprehensive overview of the manifest variables (MVs) and latent variables (LVs) is provided in Table 1. The model incorporates MVs that represent their corresponding LVs. According to the systematic review in GCC countries (Eltayib et al., 2023a), all items significantly impact IMRs. The structural or inner model examines the relationships between the specified LVs, as shown in Figure 1. Additionally, indirect and total effects are automatically available through SmartPLS 4.0 (Ringle et al., 2024). Negative loading MVs in the PLS algorithm are adjusted following PLS-SEM guidelines. The model's robustness was evaluated using multiple reliability and validity measures. Each MV was confirmed to have statistically significant loadings at the 5% level. Internal consistency reliability for LVs was assessed through Cronbach's alpha (CA), composite reliability (CR), and Rhô-A, all requiring a minimum threshold of 0.7 (Sarstedt et al., 2020). Convergent validity was verified using the average variance extracted (AVE), with a cut-off of 0.50 (Rönkkö et al., 2016). Discriminant validity between two LVs is confirmed when the upper bound of the confidence interval (CI) for the HTMT criterion is below 1 (Hair et al., 2019). Predictive capability is indicated by R^2 and Q^2 , with an $R^2 > 0.25$ recommended and a $Q^2 > 0.35$ considered strong (Sarstedt et al., 2020). The f^2 also gauges the significance of direct effects, with values >0.35 indicating strong significance (Faul et al., 2007; Sarstedt et al., 2020). Path coefficients were estimated through bootstrapping with 10,000 subsamples, and coefficients greater than an absolute 0.20 were deemed significant (Sarstedt et al., 2020).

3. Results

3.1. The Bahrain Model

The final model that best represents the determinants of IMRs in Bahrain is given in Figure 2. Overall, the IMR was reflected by both male and female IMRs (each having a loading of more than 0.7 and significant at $p < 0.001$). For the ENV factors determinant, it was reflected by six MVs in the final model (CO2EMKT, ECON, METEMMT, METEMKT, NITEM, and TOTGEM), all boasting factor loadings >0.7 and significant at $p < 0.001$. Next, the SDOH LV was reflected by six MVs out of the original proposed seven MVs: EMPFEM, FP, GDP, GNI, NEWBORN, and PSE. Lastly, the HRS LV was reflected by five MVs, all similar to the ones in the hypothetical model: DPT, HBI, MCM, MCV1, and UHC. To be included in the final model,

all of these MVs had factor loading values of more than 0.7 and were significant at $p < 0.05$. For a more detailed overview of the LVs, MVs, and their loadings, refer to Table 2.

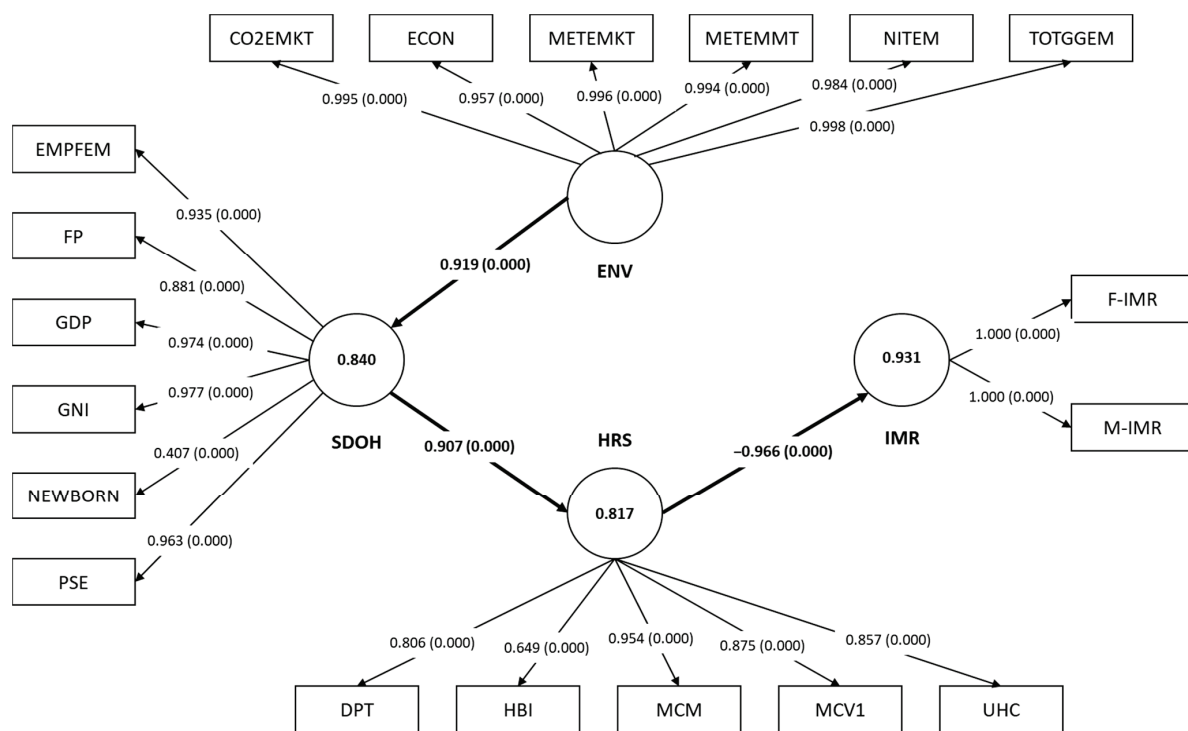


Figure 2. The final model of the impact of SDOH, HRS, and ENV factors on IMRs in Bahrain, (1990–2022). SDOH: sociodemographic on health; ENV: environmental; HRS: health resources; IMR: infant mortality rate; F-IMR: infant mortality rate for females; M-IMR: infant mortality rate for males; UHC: universal health coverage service coverage index; MCV1: newborns vaccinated with MCV1; MCM: method needs for family planning with modern contraception methods; HBI: newborns vaccinated with BCG; DPT: DPT immunization; PSE: primary school education; NEWBORN: gender of a newborn; GNI: gross national income per capita; GDP: GDP per capita; FP: food production index; EMPFEM: employment to population ratio (females); CO2EMKT: CO₂ emissions from oil refineries; ECON: electricity consumption; METEMKT: methane emissions (kt of CO₂ equivalent); METEMMT: methane emissions in the energy sector; NITEM: fuel efficiency rate; and TOTGGEM: total greenhouse gas emissions. The circular shapes represent the LVs, while the rectangular shapes represent the MVs. The numbers in the arrows between the LVs and MVs represent the factor loading of each MV, while the numbers between the brackets reflect the loadings' p -values. The numbers inside the LV circle indicate the R^2 value. The numbers in between the arrows of the pathways between the LVs represent the model's beta coefficients and their p -values are given between the brackets. All the values inside the diagram above are significant at $p < 0.05$.

After ensuring that Bahrain's final model contained suitable MVs, the reliability, validity, and predictability of each LV had to be evaluated. As such, for the reliability, CA, CR, and Rhô-A measures were utilized. A more in-depth summary of these values is given in Table 3. In Bahrain, the final model was reliable as all reliability measures were above the minimum threshold of 0.7. For the HRS LV, it had a CA of 0.890, a CR of 0.919, and a Rhô-A of 0.927. Similarly, the SDOH (CA = 0.932, CR = 0.951, and Rhô-A = 0.974), ENV factors' determinants (CA = 0.995, CR = 0.996, and Rhô-A = 0.995) and IMR LV (CA = 1.000, CR = 1.000, and Rhô-A = 1.000) showed appropriate reliability measures. In addition, the final model showed a good convergent validity with an AVE value of 0.696 for the HRS, 0.775 for the SDOH, 0.974 for the ENV factors determinant, and 1.000 for the IMR LV. As for the discriminant validity, the HTMT criterion for each relationship in the final model fell below 1.0, thus establishing discriminant

validity. Lastly, the model's predictability was evaluated via its R^2 and Q^2 values. The final model showed that it can explain about 82.3% of the variance in the HRS determinant, 84.5% of the variance in the SDOH LV, and 93.3% of the variance in IMRs. Regarding the Q^2 values, the final model showed good predictability with Q^2 values ranging from 0.541 for HRS, 0.837 for SDOH, and 0.764 for IMR (Table 3).

Table 2. List of Latent and Manifest Variables with their Respective Loadings by Country.

LV	MV (Unit)	Abbreviation	Loading		
			Bahrain	Kuwait	Qatar
IMR	Infant Mortality Rate, total infant female death (years)	F-IMR	1.000 *	0.991 *	1.000 *
	Infant Mortality Rate, total infant male death (years)	M-IMR	1.000 *	0.991 *	1.000 *
SDOH	Employment to population ratio (females) in a certain year	EMPFEM	0.935 *	0.927 *	-
	Food Production Index in a certain year	FP	0.881 *	0.826 *	0.762 *
	GDP per capita (Local Currency Unit)	GDP	0.974 *	0.858 *	0.907 *
	Gross national income per capita in a certain year	GNI	0.977 *	0.856 *	0.923 *
	Gender of a newborn in a certain year	NEWBORN	0.407 *	0.627 *	-
	Primary School Enrolment in a certain year	PSE	0.963 *	0.690 *	-
	Secondary School Enrolment in a certain year	SSE	-	0.760 *	0.894 *
ENV	CO ₂ emission or oil refineries	CO2EMKT	0.995 *	0.987 *	0.997 *
	Electricity Consumption in a certain year	ECON	0.957 *	0.941 *	0.952 *
	Methane emissions in the energy sector (thousand metric tons of CO ₂ equivalent)	METEMMT	0.994 *	0.941 *	0.990 *
	Methane emissions (kt of CO ₂ equivalent)	METEMKT	0.996 *	0.958 *	0.992 *
	Nitrous oxide emissions (thousand metric tons of CO ₂ equivalent)	NITEM	0.984 *	0.977 *	0.984 *
	Total greenhouse gas emissions (kt of CO ₂ equivalent)	TOTGEM	0.998 *	0.993 *	0.998 *
HRS	DPT immunization	DPT	0.806 *	0.723 *	0.833 *
	newborns vaccinated with BCG	HBI	0.649 *	0.814 *	0.867 *
	Method needs for family planning with modern contraception methods	MCM	0.954 *	0.853 *	0.933 *
	newborns vaccinated with MCV1 in a certain year	MCV1	0.875 *	0.808 *	0.915 *
	Universal health coverage (UHC) service coverage index in a given year.	UHC	0.857 *	0.799 *	0.781 *

*: Significant at $p < 0.05$. LV: latent variable. MV: manifest variable. SDOH: sociodemographic on health; ENV: environmental factors; HRS: health resources; and IMR: infant mortality rate.

Table 3. Reliability, Validity, and Predictability of the Latent Variables by Country.

LV	Country	CA	CR	Rho-A	AVE	Q ²	R ²	HTMT (95% CI)		
								HRS	IMR	SDOH
HRS	Bahrain	0.890	0.919	0.927	0.696	0.541	0.823	-	1.004 (0.975, 1.025)	0.926 (0.878, 0.985)
	Kuwait	0.870	0.899	0.895	0.641	0.731	0.752	-	0.944 (0.789, 0.999)	0.922 (0.818, 1.067)
	Qatar	0.918	0.938	0.935	0.753	0.669	0.775	-	0.966 (0.897, 1.003)	0.943 (0.869, 0.999)
SDOH	Bahrain	0.932	0.951	0.974	0.775	0.837	0.845	-	-	-
	Kuwait	0.902	0.924	0.913	0.637	0.822	0.837	-	-	-
	Qatar	0.895	0.928	0.904	0.764	0.889	0.895	-	-	-
ENV	Bahrain	0.995	0.996	0.995	0.974	-	-	0.916 (0.865, 0.969)	0.889 (0.844, 0.927)	0.942 (0.849, 1.015)
	Kuwait	0.986	0.988	0.986	0.934	-	-	0.908 (0.745, 0.996)	0.947 (0.886, 0.996)	0.960 (0.834, 1.016)
	Qatar	0.994	0.995	0.994	0.971	-	-	0.843 (0.709, 0.932)	0.858 (0.783, 0.929)	0.997 (0.931, 1.047)
IMR	Bahrain	1.000	1.000	1.000	1.000	0.764	0.933	-	-	0.883 (0.847, 0.930)
	Kuwait	0.982	0.991	0.983	0.982	0.828	0.883	-	-	0.932 (0.829, 0.986)
	Qatar	1.000	1.000	1.000	1.000	0.709	0.886	-	-	0.969 (0.924, 1.013)

CA: Cronbach's alpha (>0.7); Rhô -A: rhô-alpha (>0.7); CR: composite reliability (>0.7); AVE: average variance extraction (>0.50); R²: >0.25 recommended; Q²: 0.35 (strong); SDOH: sociodemographic on health; ENV: environmental factors; HRS: health resources; IMR: infant mortality rate; LV: latent variables; and HTMT: hetero-trait and mono-trait ratio (95% CI < 1.0). All estimates are significant at $p < 0.05$ and 95% CI, 95% confined interval.

Finally, the Bahrain's final model relationships and pathways had to be evaluated. A thorough summary of the values is given in Table 4. From the initial proposed six hypotheses, only three hypotheses were validated in the final model (H2, H4, and H6). The second hypothesis is present in the final model, as HRS directly, significantly, and negatively affect IMRs ($\beta = -0.966$, CI: -0.987 to -0.949 , and $p < 0.001$) (Figure 2). The fourth hypothesis states that the ENV factors determinant in Bahrain exerts a significant direct effect on the SDOH, with a beta coefficient of 0.919 (CI: 0.829–0.993) and a p value of <0.001 . The last hypothesis to be validated by the final model is the sixth one, which states that the SDOH LV influences the HRS determinant directly ($\beta = 0.907$, CI: 0.873–0.941, and $p < 0.001$). All of these three relationships showed strong significance, with f^2 values ranging from 4.654 to 13.912, far surpassing the 0.35 threshold.

Table 4. Effect Size, Direct Effect, Indirect Effect, and Total Effect of the Latent Variables by Country.

Hypothesis (Relationship)	Country	Direct Effect (95% CI)	Indirect Effect (95% CI)	Total Effect (95% CI)	f^2
H1: SDOH $\rightarrow$ IMR	Bahrain	-	-0.876 (-0.912, -0.850)	-0.876 (-0.912, -0.850)	-
H2: HRS $\rightarrow$ IMR		-0.966 (-0.987, -0.949)	-	-0.966 (-0.987, -0.949)	13.912
H3: ENV $\rightarrow$ IMR		-	-0.805 (-0.889, -0.720)	-0.805 (-0.889, -0.720)	-
H4: ENV $\rightarrow$ SDOH		0.919 (0.829, 0.993)	-	0.919 (0.829, 0.993)	5.442
H5: ENV $\rightarrow$ HRS		-	0.834 (0.742, 0.921)	0.834 (0.742, 0.921)	-
H6: SDOH $\rightarrow$ HRS		0.907 (0.873, 0.941)	-	0.907 (0.873, 0.941)	4.654
H1: SDOH $\rightarrow$ IMR	Kuwait	-	-0.815 (-0.893, -0.791)	-0.815 (-0.893, -0.791)	-
H2: HRS $\rightarrow$ IMR		-0.939 (-0.979, -0.909)	-	-0.939 (-0.979, -0.909)	7.518
H3: ENV $\rightarrow$ IMR		-	-0.745 (-0.845, -0.693)	-0.745 (-0.845, -0.693)	-
H4: ENV $\rightarrow$ SDOH		0.915 (0.855, 0.971)	-	0.915 (0.855, 0.971)	5.132
H5: ENV $\rightarrow$ HRS		-	0.794 (0.731, 0.901)	0.794 (0.731, 0.901)	-
H6: SDOH $\rightarrow$ HRS		0.867 (0.831, 0.944)	-	0.867 (0.831, 0.944)	3.038
H1: SDOH $\rightarrow$ IMR	Qatar	-	-0.828 (-0.898, -0.788)	-0.828 (-0.898, -0.788)	-
H2: HRS $\rightarrow$ IMR		-0.941 (-0.976, -0.910)	-	-0.941 (-0.976, -0.910)	7.749
H3: ENV $\rightarrow$ IMR		-	-0.784 (-0.857, -0.721)	-0.784 (-0.857, -0.721)	-
H4: ENV $\rightarrow$ SDOH		0.946 (0.887, 0.989)	-	0.946 (0.887, 0.989)	8.527
H5: ENV $\rightarrow$ HRS		-	0.833 (0.777, 0.897)	0.833 (0.777, 0.897)	-
H6: SDOH $\rightarrow$ HRS		0.880 (0.847, 0.932)	-	0.880 (0.847, 0.932)	3.440

LV: latent variable; SDOH: sociodemographic on health; ENV: environmental factors; HRS: health resources; IMR: infant mortality rate; and f^2 : effect size 0.35 (strong). All effects are significant at $p < 0.05$ and 95% CI, 95% confident interval.

Out of all the three determinants, only the HRS exerted a direct effect on IMRs, while the ENV factors and SDOH determinant only influenced IMRs indirectly, with a total significant effect of -0.805 and -0.876 , respectively (Table 4).

3.2. The Kuwait Model

In Kuwait, the final model showed that the IMR LV was best reflected by both male and female IMRs, with factor loadings equal to 0.991 for both MVs and significant at $p < 0.05$. Generally, all of the proposed MVs were found to have sufficient factor loadings and significantly reflect the HRS, SDOH and ENV factors' determinants in Kuwait's final model (Table 2). For a graphical representation of the final model for Kuwait, refer to Figure 3.

The final model also showed appropriate reliability measures. HRS metrics were CA = 0.870, CR = 0.899, and Rhô-A = 0.895. Moreover, the SDOH had a CA of 0.902, a CR of 0.924, and a Rhô-A of 0.913, while the ENV factors displayed a CA value of 0.986, a CR value of 0.988, and a Rhô-A value of 0.986. The IMR LV also showed appropriate reliability measures (CA = 0.982, CR = 0.991, and Rhô-A = 0.983) (Table 3). Further, both convergent and discriminant validity were appropriately established in the final model via the AVE and HTMT measures, respectively. The AVE values for all the LVs surpassed the 0.5 threshold (for HRS = 0.641, for SDOH = 0.637, for ENV = 0.934, and for IMR = 0.982).

The upper limit of the CI for the HTMT criterion is below one for all LVs, thus ensuring discriminant validity for the final model. Kuwait's model also showed that it could account for 88.3% of the variation in IMRs, 75.2% of the variation in the HRS, and 83.7% of the variation in the SDOH. Its Q^2 values surpassed 0.35, thus reflecting the strong predictability of the final model (Table 3).

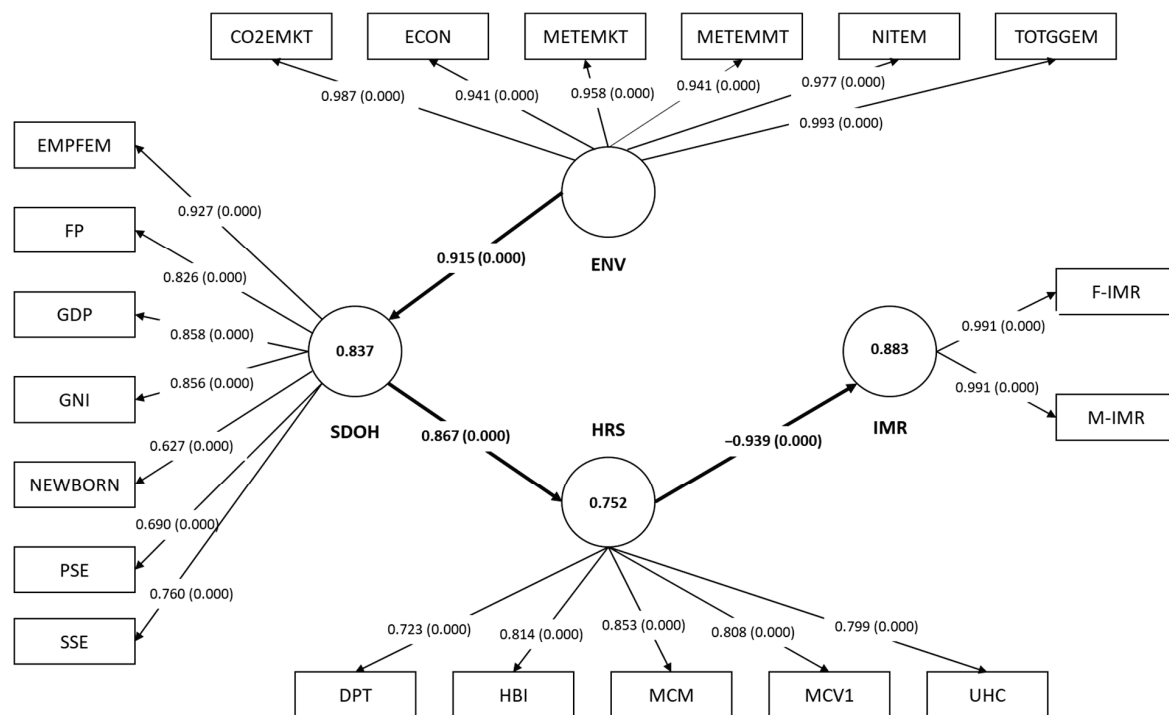


Figure 3. The final model of the impact of SDOH, HRS, and ENV factors on IMRs in Kuwait (1990–2022). SDOH: sociodemographic on health; ENV: environmental; HRS: health resources; IMR: infant mortality rate; F-IMR: infant mortality rate for females; M-IMR: infant mortality rate for males; UHC: universal health coverage service coverage index; MCV1: newborns vaccinated with MCV1; MCM: method needs for family planning with modern contraception methods; HBI: newborns vaccinated with BCG; DPT: DPT immunization; SSE: secondary school enrolment; PSE: primary school education; NEWBORN: gender of a newborn; GNI: gross national income per capita; GDP: GDP per capita; FP: food production index; EMPFEM: employment to population ratio (females); CO2EMKT: CO₂ emissions from oil refineries; ECON: electricity consumption; METEMKT: methane emissions (kt of CO₂ equivalent); METEMMT: methane emissions in the energy sector; NITEM: fuel efficiency rate; and TOTGGEM: total greenhouse gas emissions. The circular shapes represent the LVs, while the rectangular shapes represent the MVs. The numbers in the arrows between the LVs and MVs represent the factor loading of each MV, while the numbers between the brackets reflect the loadings' p -values. The numbers inside the LV circle indicate the R^2 value. The numbers in between the arrows of the pathways between the LVs represent the model's beta coefficients and their p -values are given between the brackets. All the values inside the diagram above are significant at $p < 0.05$.

Regarding the validation of the proposed hypotheses, Kuwait's final model pathways echoed that of Bahrain's, as only three hypotheses (H2, H4, and H6) were significant out of the original six hypotheses. The final model reveals that only the HRS exerted a direct effect on IMRs (H2), with a beta coefficient of -0.939 ($p < 0.001$). In addition, the ENV factors' determinant influenced the SDOH (H4) directly and positively ($\beta = 0.915$, CI: 0.855–0.971, and $p < 0.001$). The SDOH determinant also exerted a positive direct effect on the HRS (H6: $\beta = 0.867$, CI: 0.831–0.944, and $p < 0.001$). Further, the f^2 values for these relationships ranged from 3.038 for H6, 5.132 for H4, to 7.518 for H2 (Table 4), indicating

strong relationships between the above-mentioned determinants. Regarding the IMR LV, also echoing Bahrain's model, the SDOH and ENV factors only influenced IMRs indirectly, with a negative total effect of -0.815 ($p < 0.001$), and -0.745 ($p < 0.001$), respectively.

3.3. The Qatar Model

A summary illustration of the Qatar final model is provided in Figure 4. Firstly, regarding which MVs were found to best reflect each LV, IMRs, the HRS, and the ENV factors were best reflected by all of their original proposed MVs (two MVs for the IMRs: F-IMR and M-IMR, five MVs for the HRS: DPT, HBI, MCM, MCV1, and UHC, and six MVs for ENV factors: CO2EMKT, ECON, METEMKT, METEMMT, NITEM, and TOTGGEM). The SDOH determinant was best reflected by only four of its original proposed MVs: FP, GDP, GNI, and SSE (Table 2).

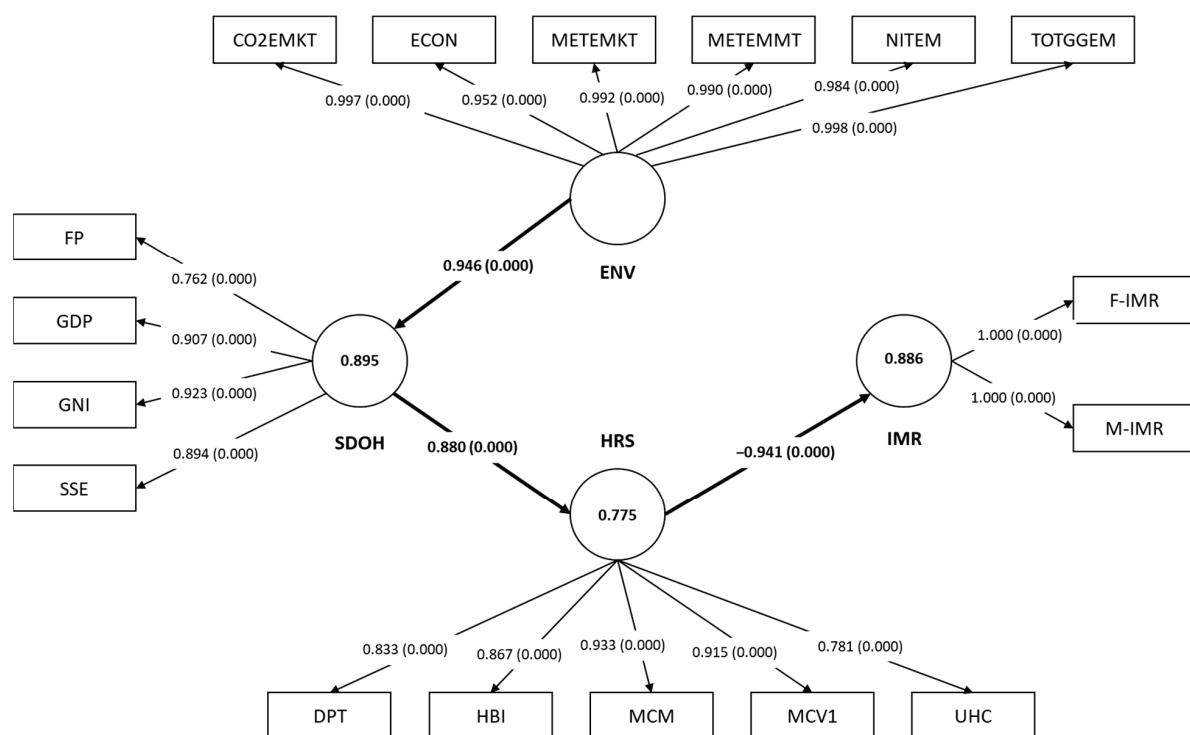


Figure 4. The final model of the impact of SDOH, HRS, and ENV factors on IMRs in Qatar (1990–2022). SDOH: sociodemographic on health; ENV: environmental; HRS: health resources; IMR: infant mortality rates; F-IMR: infant mortality rate for females; M-IMR: infant mortality rate for males; UHC: universal health coverage service coverage index; MCV1: newborns vaccinated with MCV1; MCM: method needs for family planning with modern contraception methods; HBI: newborns vaccinated with BCG; DPT: DPT immunization; SSE: secondary school enrolment; GNI: gross national income per capita; GDP: GDP per capita; FP: food production index; CO2EMKT: CO₂ emissions from oil refineries; ECON: electricity consumption; METEMKT: methane emissions (kt of CO₂ equivalent); METEMMT: methane emissions in the energy sector; NITEM: fuel efficiency rate; and TOTGGEM: total greenhouse gas emissions. The circular shapes represent the LVs, while the rectangular shapes represent the MVs. The numbers in the arrows between the LVs and MVs represent the factor loading of each MV, while the numbers between the brackets reflect the loadings' p -values. The numbers inside the LV circle indicate the R^2 value. The numbers in between the arrows of the pathways between the LVs represent the model's beta coefficients and their p -values are given between the brackets. All the values inside the diagram above are significant at $p < 0.05$.

Qatar's final model displayed good reliability metrics, with the HRS determinant having a CA of 0.918, CR of 0.938, and Rhô-A of 0.935. Similarly, the remaining LVs also

showed food reliability values (For SDOH: CA = 0.895, CR = 0.928, and Rhô-A = 0.904. For ENV: CA = 0.994, CR = 0.995, and Rhô-A = 0.994.). For the IMRs, all three metrics displayed values of 1 (Table 3). Furthermore, both convergent and discriminant validity was well established in the final model, with all four LVs displaying AVE values surpassing the 0.5 threshold, and an HTMT criterion falling below 1 for each relationship (Table 3). Moreover, the R^2 values showed that a good amount of the variability in each LV was explained by the final model (For IMR = 0.886, for HRS = 0.775, and for SDOH = 0.895.). Lastly, the Q2 metrics point towards the final model having good predictability (For IMR = 0.709, for HRS = 0.669, and for SDOH = 0.889.).

Concerning the significant pathways, only three hypotheses (H2, H4, and H6) were validated in the final model. H2: the HRS exerted a direct, but negative effect on the IMRs ($\beta = -0.941$, CI: -0.976 to -0.910 , and $p < 0.001$). H4: the ENV factors' determinant influenced the SDOH directly ($\beta = 0.946$, CI: 0.887 – 0.989 , and $p < 0.001$), and H6: the SDOH exerted a direct impact on the HRS determinant ($\beta = 0.880$, CI: 0.847 – 0.932 , and $p < 0.001$). All of these pathways were strongly significant relationships as they displayed f^2 values above 0.35 (Table 4). Lastly, Qatar's final model showed that while the HRS affected the IMRs directly, the remaining LVs, -SDOH and -ENV, only influenced the IMRs indirectly. For SDOH the total effect was net negative ($\beta = -0.828$, $p < 0.001$), and for ENV it was also a negative net effect ($\beta = -0.784$, $p < 0.001$).

4. Discussion

Through a retrospective time-series study, this study has examined the influence of SDOH, HRS, and ENV factors on IMRs in Bahrain, Qatar, and Kuwait. The result shows that in all three countries there is a significant direct relationship between HRS and IMRs and an indirect impact between ENV factors and SDOH factors on IMRs.

SDOH encompass factors such as socioeconomic status, education, employment, and fertility rates, all of which play an important role in determining the health outcomes of a population (Braveman & Gottlieb, 2014). This study's findings suggest that female employment rates can influence infant mortality. This is consistent with the findings of other studies in the GCC region (Eltayib et al., 2023a, 2023b). One explanation is that mothers who cannot take sufficient time off may face challenges in providing direct care, breastfeeding, or attending regular healthcare appointments for their infants, which are critical for reducing infant mortality (Siah & Lee, 2015). The results from this study show that the female employment rate significantly affects the IMR (ElMassah & Hassanein, 2023). In Kuwait and Bahrain, higher female employment rates have been linked with lower IMRs (Schwartz et al., 2023). The reason is that women working in employment promotes better healthcare decision-making during pregnancy and allows them to access healthcare and family planning services (Salam & Al-Khraif, 2020). This directly reduces the risks of malnutrition, infections, and other preventable causes of infant deaths. Our models showed that the FP index has significantly impacted IMRs in all three countries. A previous study has shown that ensuring a steady food supply through a high FP index is crucial for lowering IMRs in the GCC countries (Al-Saidi & Saliba, 2019). Similarly, Al-Saidi and Saliba (2019) reported that the FPI reflects food availability within a country and is directly linked to nutritional outcomes, affecting IMRs in all three countries. A study analyzing the GDP per capita of 193 countries revealed a strong negative relationship with IMRs, indicating that economic growth facilitates better healthcare outcomes and social safety nets for families (Schwartz et al., 2023). Our findings align with the FP index and show that GDP and GNI significantly impact IMRs in all three countries. To ensure a stable food supply in these countries, they must be high-income nations, so a strong economy can

enable these countries to allocate significant resources to healthcare, maternal and child health services, and the provision of essential nutrients for infants, all of which contribute to lower IMRs (Salam & Al-Khraif, 2020). This study found that primary and secondary education enrolment are factors impacting IMRs. One reason is that these countries with high educational access have contributed to lower IMRs by increasing awareness of proper prenatal and neonatal care. Educated families are more likely to seek timely medical assistance, understand the importance of immunizations, and maintain hygienic practices that prevent infant disease (ElMassah & Hassanein, 2023; Eltayib et al., 2023b).

The availability of HRS, like immunization coverage, family planning services, and universal health coverage, also plays an important role in reducing infant mortality in these three countries (Katoue et al., 2022). Vaccinations like DPT and MCV1 (measles) are important as they show healthcare access in a country (Salam & Al-Khraif, 2020). In low-income countries, such as those in sub-Saharan Africa, financial constraints often mean that immunization services are not free for all infants, and that requiring fees contributes to higher IMRs (Simmons et al., 2021). In contrast, Bahrain provides free DPT immunization coverage for all infants, which reached 99% in 2022, resulting in a reduction in the IMR to 8.3 deaths per 1000 live births. Similarly, Qatar and Kuwait have increased immunization rates to 98%, leading to a reduction in the IMR of up to 67%. IMRs are also influenced by the implementation of UHC programs in many countries. Previous studies (Preker et al., 2021; Sharma et al., 2023) have reviewed UHC programs across various nations and concluded that UHC is an achievable goal, primarily attainable by high-income countries, often through core government funding. Kuwait and Qatar have established comprehensive healthcare programs that include maternal and child healthcare services (Katoue et al., 2022), contributing to safer pregnancies and births (Sharma et al., 2023). The index of such services in Kuwait was 89 in 2022. Some modern family planning methods have helped women in Saudi Arabia to have a gap between pregnancies (Alenezi & Haridi, 2021). This helps them reduce the risk of pregnancies, reducing the IMR. Modern contraception has increased by 30 percent in 2022 (Mahfouz et al., 2023). This has been related to the overall decrease in high-risk pregnancies and half of the reduction in infant mortalities. Perhaps these three target countries can learn from Saudi Arabia by implementing these methods to reduce the IMR in the future.

Research shows that even air pollution exposure below these standards can increase neonatal mortality risks in countries like India, China, and other Southeast Asian countries. For example, a study in Southern Asia highlighted that over 75% of neonatal deaths occur in regions with hazardous air pollution levels (Anwar et al., 2021). In a few Araba countries like Iran, a 10-year study reported that environmental factors like air pollution, greenhouse gas emissions, and access to clean energy are other determinants of infant mortality (Nazarpour et al., 2023). Oil producers like the GCC countries will face various challenges related to air pollution. This will affect public health, mainly in infants (Khan et al., 2022). Increased carbon dioxide emissions will cause respiratory problems in infants, possibly leading to death (Anwar et al., 2021). In Kuwait, CO₂ emissions have increased by up to 35 metric tons per capita in 2022. This can be related to the slightly increased IMR of 9.2 compared to other countries (AlRukaibi & AlSalem, 2022). Qatar is also a significant emitter of CO₂, but they have implemented cleaner energy policies that have helped reduce the impact on the mortality rate. Greenhouse gases like methane and nitrous oxide can be related to premature birth and infant respiratory diseases.

Bahrain, Kuwait, and Qatar have implemented policies that help them reduce greenhouse gas emissions (AlRukaibi & AlSalem, 2022; Shannak & Contestabile, 2022). This helped them increase fuel efficiency and reduce the flaring during oil production. A 15%

reduction has been observed in Kuwait for greenhouse gas production, and there was an 8% decrease in the IMR simultaneously (AlRukaibi & AlSalem, 2022). In addition, Qatar has also invested in solar energy, which can help reduce pollution (Shannak & Contestabile, 2022) and may have resulted in a reduction in the IMR to 62% in 2022. The conversion towards cleaner energy sources has been important in decreasing the IMR in other GCC countries.

Overall, this study's findings have provided valuable information regarding how these factors interact and influence IMRs across different contexts, revealing details that can guide policy and improve public health outcomes in the GCC region. For example, developing policy interventions can be tailored to address the SDOH, HRS, and ENV factors contributing to reducing the IMR, such as maternal education, income level, and air pollution. In addition, such an understanding of the IMR determinants can help in improving health system financing efficiency through improved dynamic allocation of medical resources across different demographic groups (e.g., low, middle, and high income). Further, in order to aid in achieving their national visions by the year 2030, Bahrain and Kuwait need to further tailor their national strategies by addressing factors such as female employment, more comprehensive childhood vaccinations, and stricter environmental policies. For Qatar, focusing more on factors such as education, immunization coverage, as well as on cleaner energy sources will prove beneficial towards further reducing their IMRs and improving the overall health of their population. In addition, this study's findings further elucidate the point that adopting a multi-sectoral approach that integrates health, education, economic, and environmental sectors as well as legislative and organizational policies is the most efficient pathway to further reduce the chances of infant deaths. Moreover, this multi-faceted approach will aid exponentially in achieving their already existing initiatives' targets.

This study has several strengths. For instance, it is the first of its kind that took into account the comparison of the factors that may affect IMRs in the GCC countries. In addition, this study is the largest study of its kind in terms of the length of the period covered (33 years). Furthermore, the use of structural equation modeling gives a distinct and more in-depth insight into the intricacies of how several factors interact with each other to affect IMRs. Despite these strengths, some limitations in this study are also acknowledged. For example, population size and density variations across countries introduce intra-group heterogeneity and complicating cross-country comparisons in population-based research. Although the studied countries share geographic and economic similarities, they differ significantly in terms of population size, gender proportion, financial structure, cultural practices, and health policies. These differences may limit the generalizability of findings and pooled results require cautious interpretation, highlighting the need for country-specific analyses to understand better the factors influencing IMRs. Additionally, determinants of IMRs may vary between females and males across the studied countries, warranting further research on this issue. While using panel data and PLS-SEM offers valuable insights into complex relationships, it does not establish cause-and-effect links. Moreover, unmeasured confounders, such as lifestyle behaviors and legislative changes, may affect IMRs but were not captured due to data limitations. The dataset, spanning 33 years annually per country, may also increase the risk of type II errors and reduce statistical power.

5. Conclusions

This study showed that SDOH, HRS, and ENV factors influenced IMRs in three GCC countries. While SDOH, like high female employment and educational rate in

primary and secondary schools, stable GDP, GNI, and FPI contribute to better healthcare access and outcomes that reduce IMRs, the HRS mainly cover immunization coverage and UHC, directly affecting IMRs by enhancing infant health services. Environmental factors like pollution present ongoing challenges, though clean energy initiatives have proven beneficial. GCC countries have made substantial progress in reducing IMRs, but continued focus on improving these determinants will be crucial for further reductions. The study highlights the need for multi-faceted public health strategies addressing socioeconomic, healthcare, and environmental challenges. Targeted policies improving socioeconomic conditions, expanding healthcare access, and reducing environmental degradation can help Bahrain, Qatar, and Kuwait reduce IMRs and enhance public health outcomes. Future research should focus on country-specific determinants of IMRs, offering deeper insights into unique cultural, economic, and environmental factors. Such tailored approaches could lead to more effective, localized interventions, strengthening public health in each country.

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Article

'Some Days Are Not a Good Day to Be a Mum': Exploring Lived Experiences of Guilt and Shame in the Early Postpartum Period

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Abstract: The first 16 weeks postpartum are particularly challenging for a new mother and are associated with an elevated risk of experiencing psychological distress. Guilt and shame have been identified as significant predictors of other forms of psychological distress, such as anxiety and depression. However, guilt and shame are poorly distinguished in pre-existing literature. The current study used inductive thematic analysis to explore lived experiences of guilt and shame in the early postpartum period. Semi-structured interviews were conducted with 20 women who had given birth in the past 16 weeks and who were residing in the UK at the time of the investigation. All those interviewed had internalised unrealistic mothering ideals. Physical constraints on one's parenting abilities, due to birth recovery, exacerbated postpartum guilt and shame. Other sources of guilt and shame included body dissatisfaction and making comparisons against other mothers and media depictions of motherhood. Participants were hesitant to confide in others about parenting challenges due to fears of judgement, which perpetuated the shame-concealment cycle. Future research should prioritise the development of interventions designed to target a harsh parenting inner critic, and the re-framing of cognitive biases, to nurture more realistic and self-compassionate beliefs about motherhood. For practice, current findings mirror previous calls for intimate partners to be actively included in routine appointments, to provide healthcare practitioners with specialist training in postpartum mental health, and to educate mothers on responsible social media use.

Keywords: guilt; shame; morality; postpartum; parenting; body image; embarrassment; stigma; mental health; intensive mothering theory

1. Introduction

The first 16 weeks postpartum are particularly challenging for a new mother, representing a steep learning curve for acquiring parenting skills and managing newfound responsibilities [1]. Coupled with hormonal changes in the early postpartum [2], the risk of experiencing emotional distress is particularly elevated in the first 16 weeks after giving birth [3]. Despite idealised portrayals on social media [4], new motherhood also encompasses feelings of overwhelm, irritability, and parental burnout [5]. Prevalence of postpartum anxiety and depressive disorders in the early postpartum stand at 11.1% and 6.1%, respectively [6,7]. Postpartum psychological distress negatively impacts mother-infant bonding and child development outcomes [8] and is associated with poorer maternal quality of life [9]. Deteriorated quality of life also has adverse economic consequences in terms of NHS treatment costs and indirect workplace costs due to periods of absence [10]. It is, therefore, of utmost importance to identify and address factors that lead to the onset and maintenance of psychological distress during this critical period.

Recent literature evidence guilt and shame as significant predictors of postpartum depression and anxiety symptoms [11–13]. Guilt is defined as feelings of remorse concerning a moral transgression, while shame involves the internalisation of said guilt to the self as a global entity [14]. Unlike guilt, which is behaviourally tied, shame is a self-directed moral

emotion [15]. In a parenting context, guilt stems from feeling defensive or selfish about one's perceived shortcomings, while shame manifests when perceived parental failings are judged harshly by others [16]. This results in self-blame, self-abandonment, aggression, insecurity, and help-seeking avoidance [17,18].

New mothers are subject to the mothering myth: a cultural tool that perpetuates unrealistic expectations to be a constant nurturing presence for one's infant [19,20]. This contributes to feelings of guilt and shame when new mothers inevitably fall short of such unattainable standards [21]. Common sources of parenting guilt and shame include spending time away from one's child(ren) [22], infant feeding challenges [23], concern for infant welfare [24], declined relationship satisfaction [25], concerns about body image [26], and physical complaints, e.g., fatigue [27]. Sleep quality is poorest in the first three months postpartum, which can further exacerbate emotional and psychological issues [28]. Poor sleep quality can also adversely affect mother–infant bonding [29]. Certainly, the early postpartum appears to be a critical period for psychological adjustment to new motherhood and for the onset of psychological distress.

Despite their omnipotence, however, guilt and shame are often conflated in parenting research [23], which renders conceptual differentiation difficult [30,31]. This is problematic because guilt and shame are characterised by distinct antecedents, attributes, and consequences [16]. For example, shame indirectly (and more strongly) predicts depression and anxiety symptoms through feelings of dejection from one's social and healthcare professional network, while guilt indirectly predicts depression and anxiety through the infant feeding method [13]. Guilt and shame are considered as transdiagnostic phenomena, both contributing to the onset and maintenance of various forms of psychological distress [11]. Gaining a deeper understanding of these emotions is therefore important for adopting a preventative approach to maternal mental health care. By better understanding lived experiences of sub-clinical emotions such as guilt and shame, it may be possible to enhance postpartum psychological wellbeing, overall quality of life, and prevent the onset of life-disruptive forms of distress, such as postpartum anxiety and depression. To the principal investigator's knowledge, no previous research has explicitly focused on exploring the lived experiences of parenting-specific guilt and shame in the first 16 weeks postpartum. The current study aimed to address this research gap using semi-structured interviewing, analysed using inductive thematic analysis.

2. Materials and Methods

The current study is reported in line with Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines [32] and Standards for Reporting Qualitative Research (SRQR) guidelines [33].

2.1. Ethics Statement

Ethical approval was granted on 11 October 2022 by the University of Liverpool Research Ethics Committee (Project ID: IPHS/11347).

2.2. Reflexivity Statement

LJ had 10 years of experience in conducting sensitive qualitative research with perinatal populations at the time of the investigation, which fed into the training provided to student investigators ahead of commencing recruitment. LJ's experience also aided with bracketing pre-conceived expectations, which enabled data analysis to be systematic and data-driven. At the time of investigation, LJ had the following credentials: BSc (Hons) Psychology, PhD, and Fellow of the Higher Education Academy. All members of the research team were cis female. Also, at the time of investigation, EO, JH, and RG were MSc Psychology students, while AH was a second-year BSc Psychology student. EO and JH both completed their BSc (Hons) Psychology degree, and RG completed an undergraduate degree in Counselling. All student investigators were full-time students at the University of Liverpool at the time of the investigation.

For all student investigators, the current study was their first experience with interviewing perinatal populations. EO and RG's backgrounds in Cognitive Behavioural Therapy mentoring and in counselling, respectively, facilitated rapport-building, empathic active listening, protection of participant confidentiality, and the upholding of professional boundaries. The position of JH as a childless researcher was viewed as a particular advantage in maintaining a stance of objectivity. AH found that the close relationships held with new mothers in her personal life allowed for a deeper understanding of motherhood to be achieved. The potential for bias was lessened as assumptions were bracketed through memo writing and extensive reflective notes during analysis. Additionally, the interview schedule was constructed with careful consideration to ensure that questions were open and non-leading.

2.3. Design and Procedure

A cross-sectional qualitative design was used, and individual semi-structured interviews were conducted via telephone or video conference calling software, e.g., Zoom. Semi-structured interviews allowed researchers to address the pre-defined research aim, while offering flexibility for participants to share unanticipated, salient experiences. An interview schedule was developed, which was divided into three distinct sections: demographic information (specifically, maternal age, infant age (in weeks), highest level of education, occupational status, marital status, and ethnicity); defining postnatal guilt and shame for their stage of new motherhood; and discussing personal experiences of guilt and shame at their stage of new motherhood (see Appendix A for interview schedule). The interview schedule was not piloted prior to commencing study interviews. However, the interview schedule did not require revision during the process of interviewing as both questions and prompts were found to appropriately facilitate conversations with participants. Indeed, all interview schedule questions and prompts had a logical chronology, and comprehensively explored experiential guilt and shame in the early postpartum period.

2.4. Data Collection and Analysis

Eligible participants were 18 years of age or older, English-fluent, UK residents, with a healthy infant (defined as >34 weeks' gestation, weight >2500 g at birth, no clinical abnormalities, which would otherwise contradict breastfeeding ability, e.g., Human Immunodeficiency Virus [HIV] positive status), aged 4–8 or 12–16 weeks, and no current or historic diagnosis of a mental health condition. These criteria were excluded to avoid potential confounders, e.g., [34]. All participants gave informed electronic and audio-recorded consent and were verbally and electronically debriefed within 24 h of the interview taking place. Interview duration ranged from 25 to 55 min (MTime = 36 min) [EO, JH, RG, and AH].

2.5. Participant Characteristics

Purposive sampling was employed [35] to recruit 20 women who were 4–8 weeks or 12–16 weeks postpartum. This methodological decision replicated recent postpartum literature [36] and was deemed appropriate for achieving data saturation [37]. Recruitment was targeted to improve sample heterogeneity. Specifically, due to a large proportion of breastfeeding women recruited in early interviews, formula and combination feeding parenting groups on social media platforms were approached later in recruitment. Study advertisements were placed on social media platforms, e.g., Instagram, X, Facebook, and by word-of-mouth. Recruitment spanned November 2022 to March 2024. Eligible women self-selected to participate by clicking on an active survey link contained within study advertisements. The active survey link re-directed the mother to a Qualtrics survey, where contact details were invited. After 48 h of expressing interest, a student investigator made initial contact to confirm eligibility and arranged a time and date for interviewing [EO, JH, RG, and AH]. As such, there was no known relationship between the research participant and the research team prior to volunteering to take part in the current study.

After consenting to participate and agreeing on a date for interviewing, the participant's email address was confirmed on the initial contact call, and an electronic information sheet and consent form were sent for the mother to read and sign prior to the interview date. All front-facing participant documentation clearly stated the study purpose, aims, and data storage, management, and usage policies. Participant front-facing documentation can be made available on reasonable request to the principal investigator [LJ]. Details regarding the student investigator's characteristics were not disclosed to the participant during the current study in recognition of the participant as the knowledgeable expert and focus of the investigation. Participants were verbally reminded of the study's aims and purpose prior to the interview commencing. All participants gave audio-recorded consent at the time of the interview, as recognition of consent as a continuous process.

2.6. Data Analysis

To address the study aims, the analysis focused on exploring the lived experiences of parenting-specific guilt and shame in the first 16 weeks postpartum. Analysis of participant's self-reported definitions of guilt and shame was beyond the scope of the study's research aim. Interviews were conducted by student investigators at one timepoint [EO, JH, RG, and AH]. Each interview was only attended by a research participant and a delivering student investigator to provide a private and relaxed environment for the participant to share their lived experiences. Interviews were audio-recorded using a Dictaphone. During interviews, field notes were taken so that the student investigators could bracket any emerging pre-conceptions about potentially salient interview points and could ask follow-up questions about the participant's lived experiences. After all interview schedule questions had been asked, participants were given the opportunity to talk about anything else that was important to them and their lived experience of postpartum guilt and shame. Two weeks after the interview concluded (this period was determined to allow the participant the sufficient opportunity to withdraw from the current study post-interview, if they desired), audio recordings were transcribed (verbatim) using NVivo 12 and Microsoft Word [EO, JH, RG, and AH]. Interview transcripts were not returned to participants for comment and/or correction.

The current study adopted a social constructivist epistemology [38]. Social constructivism believes that psychological phenomena, one's identity, and meaning-making are inherently tied to one's sociocultural context [38]. This epistemological approach well aligned with the study's research aim, which sought to better understand the lived experiences of guilt and shame in the first 16 weeks postpartum, for a UK sample of women. This approach recognises the importance of context in conceptualising, defining, and discussing complex emotions such as guilt and shame [39].

An idealist ontology was also an adopted lens for the current study [40]. Idealism recognises that the mind plays a central role in the construction of reality and that psychological phenomena constitute reality in and of itself [40]. Adopting an idealist lens allowed the research team to adopt an inductive approach to analysis because individual participant accounts can be considered as multiple truths. From this, a coherent narrative can be constructed to represent the collective truth of the final sample. These respective approaches methodologically underpinned the decision to analyse interview transcripts using inductive thematic analysis [38,39]. Analysis was supported by NVivo 12 software.

Analysis followed six systematic stages: data familiarisation; generation of initial codes; identification of themes; review and revision of thematic structure; defining final themes; and report writing [LJ]. Data saturation was achieved after analysing seven transcripts, though recruitment continued until the target sample size had been reached. Final themes were named based on the principal investigator's interpretation of participant experiences [LJ]. Theme names were determined as best representing the essence of identified themes, which were verified by the rigorous and systematic approach to analysis [41,42]. Additionally, an iterative approach was taken whereby earlier stages of analysis were revisited after themes had been named to ensure that conceptualisations were grounded

in the accounts of participants, as opposed to the researcher's pre-conceived ideas and expectations. Finally, the analysis was consultative, meaning that final themes and theme names were agreed upon by all members of the research team as best representing the lived experiences of the study sample [EO, JH, RG, and AH]. The appropriateness of theme names is supported by an abundance of relevant participant quotations and rich conceptual interpretation and description. Research participants were not consulted during data analysis.

3. Results

The current study aimed to explore the lived experiences of parenting-specific guilt and shame in the first 16 weeks postpartum. A total of 20 women participated, of 23 who were approached (8% attrition), which is typical of perinatal recruitment [43]. Reasons for dropout included hospitalisation of an infant (one participant) and failure to respond to three contact attempts (one participant). The remaining individual was deemed ineligible at initial contact, due to infant age exceeding 16 weeks. The ineligible mother was verbally and electronically debriefed. During this process, participants were made aware that they could request a short 2-page summary and/or a copy of any final written reports from the current study by emailing the principal investigator [LJ].

Maternal age ranged from 25 to 35 (MAge = 30.71). Most women were married (57.14%), primipara (71.43%), and undergraduate educated or above (65%). Nearly two-thirds of those interviewed were in an [associate] professional occupation (60%), and the remaining were from caring, leisure, and other service occupations (20%); sales and customer service occupations (5%); unemployed (5%); administrative and secretarial occupations (5%); and managers, directors, and senior officials (5%). Participants self-identified as White British (35%), White European (15%), British Pakistani (10%), White Mixed Caribbean (5%), British Indian Asian (5%), Bangladeshi (5%), and Asian British Bangladeshi (5%). Infant age ranged from 4 to 16 weeks (Mean age = 9.6). There was an exact 50:50 split between mothers interviewed whose infant was between 4 and 8 weeks old, and whose infant was between 12 and 16 weeks old. There was also an exact 50:50 split in infant sex (M–F); see Table 1 for participant demographic characteristics.

Thematic analysis identified three major themes, each with two sub-themes: 'No man's land—no longer a woman, not feeling like a mum' (sub-themes: 'Mum gets left by the wayside' and 'Under the magnifying glass'), 'Comparison is the thief of joy' (sub-themes: 'Body failure' and 'Feigning 'fine'), and 'Protecting against the unrelenting storm' (sub-themes: 'Pouring from an overflowing cup', and 'The polarising role of social media in motherhood'). The final thematic summary can be found in Table 2.

Table 1. Participant demographic characteristics.

Participant Pseudonym	Age	Infant Age/Weeks	Parity	Infant Sex	Highest Level Education	Occupation	Marital Status	Ethnicity	Relevant Contextual Factors
Eleanor	35	4	Primiparous	Male	Level 3	Caring, leisure, and other service occupations	Living with partner, Single	White British	
Lola	29	6	Primiparous	Male	Level 2	Sales and customer service occupations	Single, Living with partner	White European	
Clarabella	31	8	Primiparous	Female	Level 7	Professional	Married	N/A *	
Ronnette	29	15	Multiparous	Male	Level 2	Associate professional	Civil partnership	White British	
Heather	33	6	Primiparous	Male	N/A *	Professional	Married	White Mixed Caribbean	Traumatic birth experience, Preeclampsia diagnosis.
Lucille	25	16	Primiparous	Female	Level 3	Unemployed	Single	White European	BMI above 25 during pregnancy, Difficult C-section recovery.
Cecilia	33	12	Primiparous	Male	Level 7	Professional	Living with partner, Single	White British	
Gloria	35	6	Primiparous	Female	Level 6	Professional	Married	White European	
Ophelia	30	8	Primiparous	Female	Level 7	Professional	Cohabiting, Engaged	White British	
Henrietta	32	12	Multiparous	Female	Level 2	Managers, directors, and senior officials	Married	N/A *	
Elsie	30	15	Primiparous	Male	Level 6	Professional	Married	British Indian Asian	
Siobhan	34	12	Multiparous	Female	Level 7	Professional	Married	N/A *	
Éponine	34	9	Primiparous	Female	Level 7	Professional	Single	N/A *	
Daisy	29	12	Multiparous	Female	Level 6	Professional	Married	British Pakistani	
Betty	29	6	Primiparous	Female	Level 7	Caring, leisure, and other service occupations	Married	Bangladeshi	Traumatic birth experience, C-section complications
Galinda	28	7	Multiparous	Male	Level 6	Caring, leisure, and other service occupations	Married	White British	
Jane	23	15	Multiparous	Male	Level 3	Administrative and secretarial occupations	Single	White British	
Veronica	36	12	Multiparous	Male	Level 7	Professional	Married	British Pakistani	
Josie	37	16	Primiparous	Female	Level 7	Caring, leisure, and other service occupations	Married	Asian British, Bangladeshi	Cow's milk protein allergy
Ashley	30	6	Primiparous	Male	Level 6	Professional	Single, Cohabiting	White British	

* Please note: Due to inconsistencies in the demographic questions asked during interviews [EO, JH, RG and AH], the flagged cells are unpopulated due to this information not being routinely collected.

Table 2. Thematic analysis: final structure summary.

Major Theme	Sub-Theme
No man's land—no longer a woman, not feeling like a mum	Mum gets left by the wayside Under the magnifying glass
Comparison is the thief of joy	Body failure Feigning 'fine'
Protecting against the unrelenting storm	Pouring from an overflowing cup The polarising role of social media in motherhood

3.1. Theme One: No Man's Land—No Longer a Woman, Not Feeling Like a Mum

Mothers felt guilty for neglecting self-care but equally felt guilty when prioritising themselves. The latter was due to beliefs held that the mother was neglecting her parenting duties in putting herself first, embodying the mothering myth. Participants also struggled with feeling deprioritised by their healthcare and social support networks, which at times led to resentment being held towards one's infant. Romantic relationship strain and ruminating about potential infant harm, consequential of parental (in)action, also triggered guilt and shame. Reframing one's actions as being in the infant's best interest, on the other hand, protects against these feelings.

3.1.1. Sub-Theme One: Mum Gets Left by the Wayside

New mothers were consumed by guilt for wanting to engage in self-care. This was interpreted as deviating from the motherhood myth of needing to prioritise one's infant at all costs:

I'm just constantly worried about like a variety of things and if I meet up with my friends for coffee- that's not an experience for the baby so should I always be going somewhere that baby's gonna get benefit from. (Galinda)

This left participants in a precarious position because neglecting one's needs also resulted in guilt:

You feel guilty in yourself in terms of not giving yourself enough time. Enough self-care. . . I'm always putting my health to one side to sort of look after the children and it does get on top of you. (Daisy)

Feeling deprioritised was also evoked externally. Many participants felt that their mental health was marginalised during routine postpartum appointments and by their social support network:

I think mental health gets a bit of a tick box [from midwives and health visitors], like you kind of get asked like, '...and how are you doing in terms of anxiety'... If I had been having a harder time with it, I don't think the way that I've been asked about how my mental health is would have necessarily encouraged me to share that information. (Ashley)

I saw everyone just shower him [baby] with so much love but forgotten me, and I was like. 'Well, he's only here because I'm here', so I had those initial [guilty] feelings. . . (Elsie)

Unrelenting parenting responsibilities inflamed guilt and shame. At times, this caused resentment to be held towards one's infant:

. . .not like being able to keep the house as tidy or, you know, give your children enough time, give your husband enough time. . .not being able to like, you know, look after yourself. That could bring about shame as well, right? Your anger- frustration that you can just split yourself into pieces and be able to do it all. (Veronica)

To be honest, sometimes I can be a little resentful towards [baby] because he does take up so much of my time and needs so much. . .that's what I think about feeling guilty. (Eleanor)

Guilt was also consequential in relationship strain among those interviewed:

[I question] why is he [husband]- wasn't washing something up, or, you know, just just the silly little things. . .and I feel bad for doing that. (Josie)

3.1.2. Sub-Theme Two: Under the Magnifying Glass

New mums were vulnerable to self-blame for their infant's development and health status. This sometimes caused dissociation from the maternal identity:

I do feel a bit ashamed when I do go out and see other children of similar age because I'm thinking is it my fault again, you know what I mean? Is it because I'm not a good enough mum? I haven't pushed her, you know what I mean. . . like I haven't given her enough time and sat with her. . . (Daisy)

Questioning one's parenting (in)actions was intrinsically tied with empathic concern for infant wellbeing, perceived inadequacy, and rumination about one's suitability as a mother. Infant feeding was a dominant manifestation of these ruminations:

You feel as though you're neglecting the child, because you're like, 'Hang on a minute, if I haven't fed her for three hours, if I haven't changed this. . .er, am I not good enough for her? Would she be better off with someone else?', sort of thing, 'Should I be a mother?'. (Betty)

I know everyone is different. . .but you know we do have quite strong wishes like I don't want to pop into McDonalds when he's a toddler, I just really want him on the best food we can give him and that starts with breastfeeding for me. (Lola)

However, reframing one's actions as being in their infant's best interest protected the 'good mother' identity:

I felt bad giving her formula but on the side of it I could see how much more content she was from having a good full feed and that's what made me kind of overcome the guilt. (Eponine)

Feeling unable to make one's baby happy also caused distress and concern about one's suitability as a mother:

If they're [baby is] upset and you don't know what they want, and you feel ashamed cause you're like 'what do they want?' (Jane)

Feeling negatively judged for one's parenting not only resulted in feeling the need to defend one's actions but also led to the avoidance of situations that could potentially elicit these emotions:

I do get a bit defensive like someone has kind of criticised me for not having enough wear on the baby on the bus the other day and I think I said, 'Well, we are from [country], she is fine. We are from a very cold climate' erm so I guess I felt a little bit of shame. (Clarabella)

Women who go to those [breastfeeding] groups are exclusively breastfeeding whereas I'm at the minute 99% bottle feeding and trying to move to breastfeeding. So that's the reason I don't feel comfortable really going there, and yeah, I do feel like I would be judged for bottle feeding even when I'm desperate to breastfeed. (Lola)

3.2. Theme Two: Comparison Is the Thief of Joy

Restrictions on movement when recovering from birth and struggling with changes to one's postpartum appearance both triggered guilt and shame. Psychologically, mothers felt inadequate and ungrateful if they held negative emotions about new motherhood or if they faced parenting challenges. Making comparisons with the developmental milestones of other infants was also a source of guilt and shame. Most participants felt unable to confide in others due to fears about being judged as not coping with motherhood. This was uniquely tied to shame and avoidance behaviour.

3.2.1. Sub-Theme One: Body Failure

Mothers experienced guilt when they were unable to carry out household and child-care tasks due to physical restraints. Participants were plagued by beliefs that they 'should' have been able to undertake normative tasks and often felt like a burden to their loved ones:

I went to stay at my mums for 2 weeks [after being discharged from hospital] because of how poorly I was so I could have help with the first born. . .but the very next day I woke up and I felt guilty of like everyone sort of having to run around and, you know, look after my kids. . . (Daisy)

Caesarean section recovery was prominent in the accounts of women who were experiencing guilt. This also instilled shame and hopelessness when participants believed themselves to be abandoning their child or shunting their maternal responsibilities:

I'd look at him [baby] and I couldn't bend, and I couldn't do anything, and obviously looking at him [husband] and showering him [baby] with so much love. . .that triggered me a lot. (Elsie)

My close friend she's just had her 4th and. . . she's just not able to like pick him [baby] up as much because she's had a caesarean. . . she feels really ashamed that she's not really like there for her child. Not being able to pick him up. . .especially when he's like crying out for her. . . (Veronica)

Another cause for distress included postpartum body image adjustments:

I used to be a size 8 or a 10 and became a 16 to 18 [during pregnancy] and I just felt like I ballooned out. I had a small torso and just feeling so huge really affected me. He was 8 pound 4 and quite a long baby and I just think back and wonder how he fit inside of me. But seeing my body change like that, was shocking for me. (Eleanor)

This, in part, stemmed from internalised societal expectations to quickly 'bounce back' to one's pre-pregnancy weight and level of fitness after giving birth:

They say you bounce back, or some people bounce back, but that wasn't the case for me. After I gave birth, I still had a belly where I looked like I was pregnant, and I was quite ashamed of myself like why have I not bounced back? And I still put so much pressure on myself. (Elsie)

This was worsened by insensitive comments received by others regarding one's size:

Even if people are being quite nice, I think it's just not a nice feeling that you think it's okay to just talk about my body openly. I kind of feel very insecure. (Siobhan)

3.2.2. Sub-Theme Two: Feigning 'Fine'

Comparing one's baby with the developmental milestones of other children triggered feelings of failure. This was true for mothers making both upwards and downwards comparisons:

There is shame and guilt sometimes when your baby is doing better than average. . .when people say to you like. 'Oh, your baby has so much hair, they look so much more alert, and 'they are already rolling' or whatever, when their baby is just starting to roll-. I'm like, 'Oh you know, she's- I just give a joke or say I don't know. I downplay it all. (Clarabella)

All participants referred to rose-tinted and unattainable societal depictions of new motherhood. Failing to acknowledge negative experiences triggered guilt and shame, because participants believed themselves to be deviating from accepted narratives:

Society puts such a spin on [parenthood] that it's so perfect and you're so blessed, and you are in a lot of ways. But there is such a spin on it that if you dare feel anything that deviates from that narrative, it's like, 'You knew what you were in for' [when you chose to have a baby]. (Ophelia)

In extreme cases, feelings of overwhelm contributed to depressive symptoms and suicidal thoughts:

*I feel hopeless. Other times I just feel drained and not good enough. I have in the past had a little thought like 'why am I even here'... I just thought f*** it, I've had enough, I can't carry on. (Eleanor)*

Among those interviewed, shame was linked with avoidance of triggering scenarios and self-isolation from one's social network. This perpetuated mental health difficulties because participants felt the need to give the impression that they were coping better than they were, for fear of judgement:

With other problems I would turn to my mum, but... I don't want mum to think, 'Oh she can't manage it, she can't handle it, she needs me to step in' or things like that. So, no, really, I haven't really turned to anybody this time. (Galinda)

Grieving one's pre-pregnancy life was commonplace but was equally closely intertwined with guilt, due to downwards comparisons made with other women. In this respect, women feared that they were being ungrateful:

You grieve for, you know, almost overnight, you've been handed this baby that just wants, you know, just wants all of you and you just want five minutes, and you don't necessarily get that because you're always thinking about the baby, and then you feel terrible... you feel guilty because there's many women out there that can't have babies. (Heather)

3.3. Theme Three: Protecting Against the Unrelenting Storm

Practicing grounding techniques allowed participants to become more self-compassionate. Re-framing parenting expectations to be more manageable, celebrating parenting successes, and protecting time for self-care, all nurtured postpartum wellbeing. Likewise, confiding in those with shared life experiences empowered mothers to persevere through difficulties. Social media was a useful facilitative tool in this support-seeking process, although there was recognition among participants that social media should be used responsibly. Social media could also perpetuate the internalisation of competitive and consumerist-driven parenting beliefs, which exacerbated guilt and shame.

3.3.1. Sub-Theme One: Self-Compassion and Pouring from an Overflowing Cup

Being curious and non-judgemental about intrusive feelings enabled participants to be more self-compassionate:

I'm kind of just deciding what is the truth, like, 'Should I feel guilty? Is there a real like reason to feel that way?' I'm just kind of analysing my behaviour and if there's a real reason to feel guilty. (Gloria)

Slowing down and grounding oneself in the present also dissipated guilt and shame:

If I do look at someone and I think that they are judging me for something or thinking I shouldn't have done that or something, I always just look at my baby, I think for me she is an anchor that brings me totally back down to earth... (Henrietta)

Practicing more realistic parenting standards and protecting time for self-care also alleviated parenting pressures:

Make the child work around you rather than the other way round... it's okay for [baby] to cry. You don't have to tend to him straight away, like, if I'm eating and he's crying, I'll finish off a couple of bites... it's fine for a child to cry, they're meant to cry... look after yourself as well I'd say. (Eleanor)

Sharing one's experiences with other new mothers normalised and validated one's difficulties and alleviated moral distress:

I think my friend, she has kids similar age and she's going through the same sort of thing. And if we are out together, I don't feel as bad as we're um both in the same boat. (Ronnnette)

Making light of one's parental challenges and focusing on achievements diminished the emotional sting and protected against guilt and shame:

I think my husband- cos I think we can try and keep it into perspective, and then maybe even laugh about it, but you know, if baby girl does cry all afternoon, it doesn't mean that we are doing anything wrong. (Clarabella)

3.3.2. Sub-Theme Two: The Polarising Role of Social Media in Motherhood

For some, confiding in those with shared life experiences alleviated guilt and shame:

...I've seen other women and mothers going through the same thing [on Peanut app] ...that's only, I would say the only thing that's helping in the sense that I'm not alone. (Josie)

Social media was outlined as a positive tool for connecting with other mothers and for empowering oneself. Still, recognition was made that social media needed to be used responsibly to be a useful mental health tool:

I'm quite active on social media. So, like on Insta, I vlog my life and what not. So, through that I think those, that has opened doors for me, like, I've had loads of friends from like my school, college, Uni, and they've reached out to me saying like, 'Oh my god. I've had a baby too, like, let's hang out'...through social media I've been able to do that. (Elsie)

I'm not saying that everything that you see on social media is positive, but...you just focus on the posts that you want to pay attention to, don't you? (Eponine)

Although social media played an unequivocally positive role in enhancing social connections and protecting against guilt and shame, it was recognised that social media could also perpetuate competitive attitudes towards mothering, if not navigated carefully:

I think social media and just the kind of amount of information that's out there about how to raise children or babies can put a lot of pressure on new mums, that you should always be doing something with- like if, if at any point in the day you're just kind of sat watching TV or trying to have like a meal, then you're not doing enough kind of thing. (Ashley)

Concerningly, social media was perceived as promoting consumerist ideals, which also triggered guilt and shame:

With the cost of living at the moment as well, and money and maternity pay isn't amazing, it's- I'm constantly feeling guilty that I've not bought him the newest sensory book, or he's not got the best playmat, or he doesn't go to a class every day of the week...I had to buy some things second hand...he's not having the same experience as the children I've seen on Instagram. (Galinda)

Finally, unrealistic social media posting can also trigger perceived inadequacies about one's postpartum body:

...it makes you feel like that mum looked great after having baby, or she looks like she can go and do loads of things, when actually, that's not real. (Eponine)

Failing to meet unattainable parenting standards resulted in shame and avoidance of potentially triggering situations:

It might make you maybe resentful towards others who you think aren't feeling those things or are meeting the expectations that you want to be meeting...not wanting to interact with people who you think aren't feeling those things, so it provably isolates you and perpetuates the feeling. (Ophelia)

Concerns were raised among participants that societal depictions of 'good mothering' were so varied and at times, contradicting, that women were literally unable to tend to everyone's wishes:

Everyone's got advice and if you took it all on board, you'd just be doing everything and doing the opposite of everything, if that makes sense. (Ashley)

4. Discussion

The current study used inductive thematic analysis to explore the lived experiences of parenting-specific guilt and shame in the first 16 weeks postpartum. Participants struggled to navigate the conflict between meeting their parenting responsibilities and needing respite. This is a manifestation of intensive mothering theory [19,20], whereby good mothering is attributed to childrearing, which involves high resource investment and the romanticisation of self-sacrifice. Deviating from intensive mothering ideals drove postpartum emotional distress among those interviewed. To protect the good mother identity, significant re-framing of one's parenting (in)actions is necessary [44]. The same was true in the current study, whereby reframing protected against guilt and shame. Based on this collective evidence, future research should prioritise the development of interventions, which are designed to target a harsh inner critic, for example, self-compassion, positive reframing, or mindfulness-based interventions [45,46].

Rumination [47] and counterfactual thinking [48] cognitively underlie guilt and shame. Reflected in the current study, mentally undoing one's parenting (in)actions was characteristic of postpartum guilt and shame. Unique to shame, this resulted in dissociation from one's maternal identity and avoidance of potentially triggering situations. Both emotions were, however, intrinsically tied to empathic concern for infant wellbeing. Interventions designed to address biased cognitive appraisals, e.g., Cognitive Behavioural Therapy may hold utility for re-framing self-critical thinking around one's parenting practices [49,50].

Feeling deprioritised by one's healthcare team and social support network also exacerbated guilt and shame. The protective effects of well-perceived support from one's intimate partner [51] and healthcare professionals [52] are well documented. Feeling ill-supported in the current study, resulted in resentment being held towards one's infant. This is problematic because infant resentment has been linked with childhood behavioural issues [53]. Current findings therefore mirror previous calls to strengthen the involvement of intimate partners in routine appointments (to give parity of esteem to paternal and maternal mental health screening and support) and to invest in resources and specialist training that will enable healthcare practitioners to deliver this type of necessary holistic support [54].

Physical recovery from childbirth, and particularly from a caesarean section, was a common trigger of guilt and shame. Previous research has identified elevated depression scores among those who had an unplanned caesarean section, when compared with an elective caesarean section [55]. Likewise, quality of life is reportedly higher [56], and physical complaints lower [57] among those who had a vaginal birth when compared with caesarean section delivery. Current findings suggest that restrictions on one's physical ability to fulfil childcare responsibilities and feeling dependent on others during birth-recovery might be pivotal intermediaries between mode of delivery, guilt, shame, and postpartum depressive symptoms. To the first author's knowledge, there have been no previous attempts to quantitatively map these relationships, identifying a new line of research inquiry.

In the current study, participants struggled to navigate internalised societal pressures to bounce back to their pre-pregnancy weight, consistent with previous literature [58]. A staggering 68.8% of women experience body dissatisfaction after childbirth [59], which is persistent following weight loss efforts [60]. Poor body image is significantly associated with depressive, but not anxious, symptomatology in the early postpartum [61]. This is further aggravated by unsolicited comments made by others [62]. Focusing on body functionality and acceptance can combat unrealistic postpartum body image ideals [63]. Current findings reinforce pre-existing literature and mirror recommendations to develop re-framing interventions, with an aim to protect postpartum emotional wellbeing. Educating mental health practitioners on

common postpartum body image concerns is also paramount for addressing body image concerns and for protecting healthy eating practices [64].

Participants noted that depictions of new motherhood were often rose-tinted, which created conflict when negative feelings about motherhood were experienced. This might be explained by ideal–actual discrepancies [65]. Current findings argue that there is a pressing need to construct more realistic narratives of what it is to be a good mother, which allow negative and positive feelings to be held, simultaneously [19]. Those interviewed were hesitant to confide in others about parenting challenges, due to fears of being judged as an incompetent mother. This was uniquely linked with shame and avoidance of potentially triggering situations. National campaigns can effectively address problematic public attitudes, for example, mental health stigmas [66]. Similarly, strengthening the maternal social support network, e.g., through interventions and via inclusion in routine perinatal appointments, has a positive impact on postpartum mental health outcomes [67,68]. Developing multifaceted solutions in this manner may aid in normalising the discussion of postpartum transitional difficulties.

Social media was a useful tool for support-seeking, although there was recognition that it could also perpetuate competitive parenting practices. In the current study, women presented consumerist-driven parenting beliefs [69]. Specifically, participants likened purchasing the most expensive available formula milk with optimal parenting, to morally off-set the decision not to breastfeed [70]. Other participants experienced guilt and shame for purchasing second-hand baby items, being unable to compete with the lifestyles of celebrity parents, making comparisons with the developmental milestones of other infants, and comparing one's postpartum body against those of celebrity parents. The current study sits within the context of the UK cost of living crisis [71], which has had dire consequences for rates of poverty, living standards, and prevalence of mental distress [72]. Current findings suggest that financial strain imposed by this broader societal context may have magnified inequalities regarding postpartum guilt and shame. Although further research is required to corroborate this evidence, providing guidance on mindful technology use during routine perinatal appointments is also recommended. This can be facilitated by signposting mothers to reputable organisations for medical and mental health information, e.g., the Royal College of Obstetrics and Gynaecology (RCOG), and by enhancing maternal self-esteem so to combat impulses to engage in upward comparisons when seeking online parenting support [73]. This may be achieved by encouraging mothers and their support persons to celebrate parenting successes, to re-frame harsh automatic negative thoughts, and to protect time for self-care [74].

Strengths, Limitations, and Future Directions

To the first authors' knowledge, this study was the first to explore lived experiences of postpartum guilt and shame, extending pre-existing infant feeding research [16]. By better understanding the nuances of guilt and shame from the perspective of new mothers, a more accurate measurement of these emotions may be achieved. Conceptualisations of postpartum guilt and shame in the current study can be used as a springboard for comparisons against other perinatal populations, e.g., pregnancy-specific and birth-specific guilt and shame. The final sample was equally distributed in terms of infant sex and age, and the final sample represented diverse ethnicities. This is especially poignant because traditionally, women from non-White backgrounds are underrepresented in perinatal research [23]. The current study, therefore, contributes novel insights to the literature base. However, diversity was not achieved with respect to educational or occupational status or with regard to maternal parity. As such, some caution should still be reserved when interpreting current findings. Demographic questions were inconsistently recorded among student investigators during the process of interviewing, leading to some missing reporting in Table 1. As such, some reservations should be made regarding the transferability of study findings. This may be resolved by ensuring

that one researcher conducts all interviews for consistency, by training junior members of the research team on the importance of standardisation during data collection, and/or by member-checking transcripts after transcription for missing information and troubleshooting issues earlier in the process of recruitment and data collection.

Mode of birth delivery was not routinely captured in the current study. For those who spontaneously recalled their birth experience, this had had a marked effect on their practical parenting capabilities and on their experiences of guilt and shame. In pre-existing literature, caesarean birth significantly predicts posttraumatic stress symptoms [75]. As such, this spontaneous factor may have inadvertently confounded reported experiences. Body Mass Index, too, was not routinely recorded yet was a spontaneously reported. Perinatal women who have overweight or obesity are at elevated risk of depression, anxiety, eating disorders, and bipolar disorder [76]. The current study aligned with previous literature that exposure to thin ideals on social media exacerbated postpartum guilt and shame [77,78]. Future research should consider a dedicated investigation of the relationship between birth experiences, Body Mass Index, and postpartum guilt and shame. In recognition of critical developmental milestones inherent to the first 1001 critical days [79], a longitudinal mixed-methods investigation is recommended to more deeply understand the transitional needs of new mothers in the first two years postpartum.

Interview schedule questions did not cover the quality of the mother's relationship with her romantic partner [80], wider family [81], healthcare team [82], or the potential role of the workplace [83] in her experience of postpartum guilt and shame in the first 16 weeks postpartum. The interview schedule was intentionally designed to be exploratory and broad-scoping. This decision was made to allow participants to focus on topics salient to their personal experiences, without imposing pre-conceived ideas and expectations from the research team, based on a prior understanding of the literature base. However, given the importance of the wider sociocultural context in contributing to maternal guilt and shame [84], capturing these experiential accounts would have further enhanced the richness of data collected from participants. Future research should seek to explore lived experiences of these broader contextual factors and how these contribute to experiential guilt and shame in the first 16 weeks postpartum.

The number of interviews conducted via telephone versus video conference calling software was not routinely collected during the recruitment process. This is problematic because there are respective strengths and limitations to both modes of data collection [85,86]. Telephone interviewing is particularly problematic as disrupted visual cues (inherent to video conference calling interviews) may open data collection to more potential misinterpretation [86]. In the first author's 10 years of experience, however, telephone interviews are particularly favoured among perinatal populations. This may be due to their flexibility and enabled mobility (relative to video conference calling software), allowing them to engage in childcare responsibilities while engaging in the interview process. Further to capturing this information routinely in future research, conducting a methodological study that is dedicated to investigating the relative utility of video conference calling software and telephone interviewing, and is specific to perinatal populations, would be an invaluable contribution to the literature base. Finally, participants were not given the opportunity to comment on their transcript after the interview had taken place. In retrospect, giving the opportunity to member-check transcription would have improved the trustworthiness of the data collected [87]. Future research should ensure ample opportunity for participants to check their transcript prior to analysis, in a reasonable timeframe to ensure that transcription is accurate and reflective of participant accounts.

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Data Availability Statement: Front-facing participant documentation and anonymised interview transcripts can be made available on reasonable request to the corresponding author (leanne.jackson@liverpool.ac.uk). Anonymised interview transcripts are available through the data-sharing repository, Dryad (<https://datadryad.org/stash>) as of 3 December 2024. Raw audio files were destroyed two weeks after each interview took place to protect participant identity and thus are not available for re-use. Participants' contact details are destroyed and thus are not available for re-use.

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Appendix A. Interview Schedule

Thank you for agreeing to talk to me today about your experiences of new motherhood. We are interested in your own personal experience, which may be different from other people—so there are no right or wrong answers, and you will not be judged based on what you say.

We would like to record the conversation with your permission.

We will be able to arrange an opportunity for you to see the transcript.

Should you wish to stop the interview at any time, or take a break, please tell me.

Also, you do not have to answer any question(s) that you do not feel comfortable answering.

Our discussions will remain confidential, and all data will be anonymised (see information sheet).

This interview is split into five sub-sections. Firstly, you will be asked some demographic questions, this is so that we can describe our sample. In section two, you will be asked how you define guilt and shame, and how these feelings are similar and different at this stage of motherhood. If, for you, guilt and shame are the same or too difficult to separate, this is fine as well. There are no right or wrong answers when answering these questions, we are entirely interested in your thoughts, experiences, and opinions. In sections three and four, you will be asked a broad question about the main forms of guilt, and shame, respectively, which are felt at this stage in motherhood. Here we may ask you some follow-up questions, this is not because you have not given us enough information or because you have not responded well enough, but rather it is so that we can make sure that we have covered all bases, to make sure that you have an open platform to talk about all aspects of new motherhood, which are important to you. In section five, you will then be given the opportunity to talk about anything that we may have missed in other sections of this interview.

Do you have any questions?

With your consent, I will now start the audio recorder and take your verbal consent.

[Take audio-recorded, verbal consent]

1. Demographic information

- What is your age?
- How old is your youngest baby (in weeks)?
- What is your highest level of education?
- What is your occupation?
- What is your marital status?
- What is your ethnicity?

2. Definitions

- a. How would you define guilt and shame?
- b. To you, what are the key similarities and differences between guilt and shame?
 - ☐ Feelings?
 - ☐ Thoughts?
 - ☐ Behaviours?
 - ☐ Interactions with others?
 - ☐ Which plays a bigger part in your current stage of motherhood?
 - ☐ Do they feel different? Have different effects? Stay for different amounts of time?

3. Guilt

- a. What are the main forms of guilt that women have at this stage of motherhood?
 - ☐ Day-to-day activities? [routine with baby, e.g., feeding, playing, out and about, in healthcare settings, at night, relationships with others, relationship with yourself]
 - ☐ Feelings? [feelings that trigger, feelings that occur as a result]
 - ☐ Thoughts? [thoughts that trigger, thoughts that occur as a result]
 - ☐ Behaviours? [behaviours that trigger, behaviours that occur as a result]
- b. What do you usually do when you feel guilty?
 - ☐ People you turn to?
 - ☐ Thoughts and/or behaviours that worsen?
 - ☐ Thoughts and/or behaviours that soothe?
- c. For you, how impactful is guilt in your experience of motherhood?
 - ☐ How often do you experience this emotion?
 - ☐ Are there other feelings that are more important? Less important?

4. Shame

- a. What are the main forms of shame that women have at this stage of motherhood?
 - Day-to-day activities? [routine with baby, e.g., feeding, playing, out and about, in healthcare settings, at night, relationships with others, relationship with yourself]
 - ☐ Feelings? [feelings that trigger, feelings that occur as a result]
 - ☐ Thoughts? [thoughts that trigger, thoughts that occur as a result]
 - ☐ Behaviours? [behaviours that trigger, behaviours that occur as a result]
- b. What do you usually do when you feel ashamed?
 - ☐ People you turn to?
 - ☐ Thoughts and/or behaviours that worsen?
 - ☐ Thoughts and/or behaviours that soothe?
- c. For you, how impactful is shame in your experience of motherhood?
 - ☐ How often do you experience this emotion?
 - ☐ Are there other feelings that are more important? Less important?
- d. Anything else
 - ☐ Before we finish up, is there anything else that you would like to talk about, or have I forgotten to ask anything?

Thank you for your time. We will leave you with a list of organisations that you can contact if you need support.

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Article

Parental Burnout—A Model of Risk Factors and Protective Resources Among Mothers of Children with/Without Special Needs

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Abstract: Parents of children With Special Needs and Disabilities (W-SND) who require long-term healthcare are at high risk of Parental Burnout (PB). However, most studies have focused on PB among parents of children Without Special Needs (WO-SN). This study aimed to develop a new model explaining PB of mothers of children W-SND/WO-SN. The main hypothesis was that the nexus of correlations between risk factors of PB (severity of child's disability/challenge, perceived caregiver burden) and protective resources (social support, learned resourcefulness, deep emotion work) will explain the variance of PB of mothers of children W-SND and WO-SN. A questionnaire assessing PB, its risk factors, and protective resources was completed by 352 Israeli mothers of children W-SND (mean age 36.9) or WO-SN (mean age 32.3). The child's disabilities were communicative, physical, intellectual and developmental. The main results are that mothers of children W-SND reported higher PB, higher caregiver burden, and a higher severity of disability. About 50% of PB variance was significantly explained by the nexus of correlations between selected risk and protective factors. Among all mothers, the more social support they received, the higher their learned-resourcefulness. However, learned resourcefulness mediates the correlation between caregiver burden and PB among mothers of children W-SND. Accordingly, it is important to increase awareness among healthcare professionals regarding the risk factors and symptoms of PB, and to develop workshops on protective resources in order to prevent PB and promote mothers' well-being. Further research should be conducted among fathers and parents from diverse cultures.

Keywords: parental burnout; mothers of children with special needs; caregiver burden; social support; emotion work; learned resourcefulness

1. Introduction

Parenting includes raising and nurturing a child for many years, from infancy to adulthood, and requires constant responsibility [1,2]. It is one of the most rewarding experiences in human life and may involve much happiness and pleasure. However, parenting has its challenges, including stressful situations, which can be exhausting. Parenting children With Special Needs and Disabilities (W-SND) demands long-term care over and above routine parenting requirements. This may affect parents' daily functioning due to the physical, emotional, economic, and social pressures [3,4]. Parents need to cope with their child's continual treatments which can be highly stressful and increase the risk of Parental Burnout (PB) [5–8].

To date, most studies have focused on PB among parents of children Without Special Needs (WO-SN) or chronic illnesses, while few studies have conducted among parents (especially mothers) of children W-SND [3,9]. The significance of the current research is its novelty in studying parental burnout among mothers of children with special needs and disabilities; the focus of most studies conducted so far has been mainly among parents of

children with specific chronic diseases, and thus their results do not enable generalization and explanation of the risk factors of PB among mothers of children W-SND.

The main aim of the study was to examine the fitness of a research model describing the contribution of the nexus of correlations between risk factors and protective resources of PB among mothers of children W-SND and WO-SN. The risk factors that the study focused on included the perceived severity of the child's disability and caregiver burden, while protective resources included social support resources [10], learned resourcefulness as a cognitive resource that comprises a repertoire of skills that allow for self-regulation [11], and emotion work (EW) as an emotional resource which allows for the management and adaption of one's emotions to social expectations [12].

The research was based on the Job Demands-Resources Model of Burnout (JD-R) [13], which claims that working conditions (physical, psychological, social, or organizational aspects of the job) include two main categories: (i) job demands that may cause stress and fatigue and positively predict job burnout (e.g., physical environment, task overload), and (ii) job resources that may reduce job demands, contribute to the improvement of functioning and the achievement of work goals, and can negatively predict job burnout (e.g., collegial support, autonomy in decision making). According to the JD-R model, maintaining a balance between job demands and job resources may reduce job burnout [13–16].

According to [17], the JD-R theoretical model [13] can be appropriately applied in the study of parental burnout, as parenting is considered a complex and stressful job with many demands. PB develops due to a chronic imbalance between demands (i.e., risk factors) and protective resources. Thus, the risk for PB is higher when the parent's protective resources are insufficient to cope with the demands of their parental role. However, differences exist between job burnout and PB, i.e., parents cannot quit their role while a worker can quit and be replaced by another, and unlike in regular jobs, boundaries between personal and professional areas are unclear because parenting demands are ongoing [18,19].

1.1. Parental Burnout

PB is a specific syndrome accompanied by chronic exhaustion: physical, mental, emotional, and cognitive, related to and resulting from the roles of the parent [20]. It affects parents worldwide, with an estimated 8% across various cultures, particularly in Western countries [21]. PB includes four dimensions: physical and emotional exhaustion expressed in chronic fatigue; emotional distance from the child which makes it difficult for the parent to care for them beyond their basic needs; saturation from the role of the parent that results in an inability to cope and enjoy being a parent; and parental self-contrast which stems from dissatisfaction with being the parent in the present compared to the past [20,22]. PB develops mainly due to an imbalance between risk factors (ongoing exposure to parenting demands) and protective resources (the type and quantity of coping resources available to the parent). Parents can utilize protective resources against PB, such as high emotional intelligence, self-compassion, positive thinking, appropriate management of leisure time, high parental skills, and environmental and societal support [20,23]. Conversely, parents have a higher risk of PB if they attempt perfectionism in parenting [24] (Kawamoto et al., 2018), are prone to neuroticism, i.e., emotional imbalance [25], have low emotional intelligence, tend to pessimistic thinking, lack child-rearing skills, and lack social and emotional support [20]. As a result of PB, parents may become more vulnerable, emotionally distant from their children, their functioning is merely practical, and their interaction with their children may be limited to instrumental aspects only [26–29].

1.2. Risk Factors for Parental Burnout

The research model focused on the risk factors of perceived caregiver burden and perceived severity of disability.

1.2.1. Perceived Caregiver Burden as a Risk Factor

An informal caregiver's 'burden' may be expressed in an emotional response to caring for a family member. It is perceived as a response to prolonged multidimensional pressures that include physical, psychological, emotional, social, and economic dimensions related to the therapeutic needs of the family member with the disability [25,30]. This prolonged coping has negative consequences for the caregiver and is accompanied by high stress levels related to their subjective perception of the burden that may affect their quality of life [4]. In many cultures, women are traditionally entrusted with childcare, even when working, and thus they are more exposed to additional parental stress, which raises their risk of parental burnout [21,31]. Additionally, during situations of national emergencies (such as a pandemic lockdown or an ongoing war), families' economic situation tends to worsen, placing an extra burden on women to financially support their families in addition to the traditional maternal roles, and thus enhancing the risk of PB [32]. Studies conducted on informal caregivers have shown that the treatment burden tends to negatively affect family relationships, reduce family activities, and harm the parents' marriage [33]. Studies have shown that parents of children with chronic diseases are at higher risk of PB than parents of healthy children, in addition to an increased perceived caregiver burden, mainly due to the prolonged care of the child, the impairment of normative family life management, and neglect of their physical and emotional needs [6,7,25,34]. Studies conducted so far on the relationship between care burden and parental burnout have focused mainly on parents of children with specific chronic diseases, which does not allow generalization and explanation on factors related to PB among parents of children with special needs.

1.2.2. Perceived Caregiver Burden Due to the Perceived Severity of the Disability

Caregiver burden of treatment is strongly affected by the perception of the severity of the disability in terms of the type of disability and the child's level of functioning and independence [35]. Accordingly, disability severity is related to the difficulty involved in fulfilling daily tasks related to the child, which contributes to caregiver burden, and may gradually lead to the development of PB [36].

1.3. Protective Resources for Coping with Parental Burnout

The research model focused on three protective resources: social support, learned resourcefulness, and emotion work.

1.3.1. Social Support—A Social Resource

Social support is an exchange of resources, information, and assistance between at least two people, from official and unofficial sources, to maintain one's well-being [37]. According to Hobfoll's Conservation of Resources Theory [10], people are motivated throughout their life to hold, preserve and protect their personal resources. Social support is perceived as an important resource, as it provides or facilitates the preservation of other valued coping resources. Thus, while coping with ongoing stress, social support enables the preservation of all available resources together with one's personal resources.

Most studies conducted so far on the relationship between social support and burnout have focused on burnout among workers who provide services (e.g., teaching and nursing). In these studies, social support was found to be a significant coping resource that reduces the development of burnout, especially in the dimension of physical and emotional exhaustion [38–40]. However, several studies have examined the relationship between social support and burnout among parents in general and parents of children with disabilities in particular. These studies revealed that social support from family, neighbors, and friends, is a significant protective factor that helps parents cope with PB since it provides help in daily tasks related to caring for the child and gives a sense of partnership in their difficulties. Thus, lack of social support is a risk factor for the development of PB [20,41,42].

1.3.2. Learned Resourcefulness—A Cognitive-Behavioral Resource

Learned resourcefulness is a cognitive-behavioral resource that includes a repertoire of skills with which a person can regulate internal events (e.g., pain, emotions, unwanted thoughts, anxiety, and depression) to achieve better control over the effects these events might have on their behavior [11]. Resourcefulness can be learned, i.e., people can be taught how to acquire self-control skills, regulate unpleasant emotional experiences, plan steps to achieve goals, and learn systematic ways for problem solving.

Previous studies have demonstrated the moderating relationship of a high level of learned resourcefulness between caregiver burden and burnout due to high levels of self-control [43–45].

In most studies, social support and learned resourcefulness are described as two separate resources that help individuals cope with stress, perceived caregiver burden, depression, and loneliness. Both social support and learned resourcefulness have each been found to predict a good quality of life, positive self-esteem, high self-confidence, and adaptive functioning. These allow people to be less worried, depressed, or frustrated [46–48].

1.3.3. Emotion Work—An Emotional Resource

While performing EW, people try to manage and adapt their feelings to the emotions that others expect them to feel in social situations by arousing desirable (positive) emotions or suppressing unwanted (negative) emotions [12,49]. Usually, EW is an unconscious process that may become conscious when the individual senses an emotional gap between their experienced and expected emotions. EW aims to create a real change in an individual's feelings that can be learned. It is carried out using four techniques that can coexist or be performed separately: cognitive, physical, expressive, and superficial [49,50]. Studies examining EW have mostly been conducted among service providers and have found a direct correlation between the ability to perform EW and level of burnout at work [51–53]. Additionally, some studies have investigated EW among health staff (physicians, nurses) [54] and found a negative correlation between the superficial EW technique (surface acting) that enhances the displayed (but not sincerely experienced) emotions and sufficient knowledge to provide patient care safely. As a protective resource that can be learned, deep EW may help cope with PB. In the context of the current study, studies among unofficial caregivers of family members with chronic disabilities found that deep EW helps reduce burnout resulting from a perceived caregiver burden. Conversely, failure to manage their emotions might create stress which increases their caregiver burden [55,56].

1.4. Model of Risk Factors and Protective Resources of Parental-Burnout

Based on the reviewed literature, the research model is presented in Figure 1.

1.5. Research Hypotheses

H1: *The higher the perceived caregiver burden, the mother's level of PB will be found higher.*

H2: *The more the disability (W-SND)/challenge/difficulty (WO-SN) is perceived as severe, the heavier the perceived caregiver burden will be.*

H3: *Learned resourcefulness will moderate the correlation between perceived caregiver burden and PB; among mothers with high levels of learned resourcefulness, the correlation between the perceived caregiver burden and PB will be weaker, and vice versa.*

H4: *The more social support mothers receive, (a) their learned resourcefulness will be found higher and (b) their PB will be found lower.*

H5a: *Caregiver burden will mediate the correlation between deep EW and PB.*

H5b: The nexus of correlations between risk factors and protective resources will explain the variance of PB of mothers of children W-SND and WO-SN.

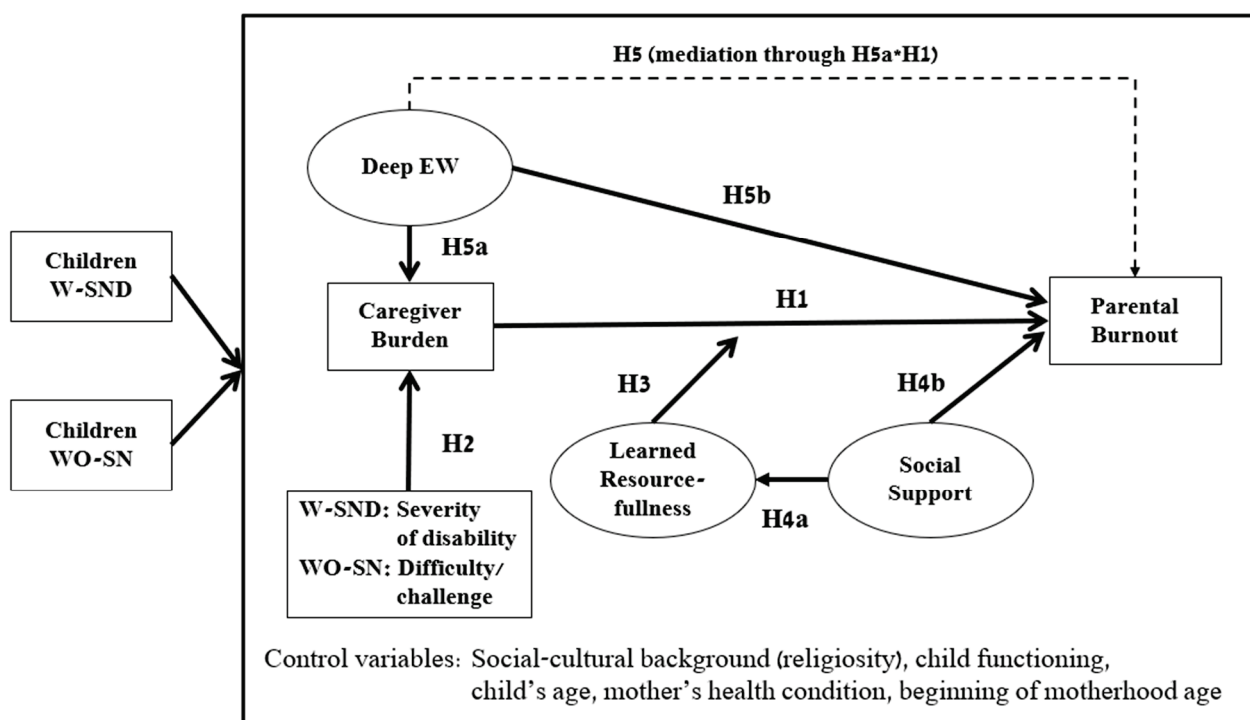


Figure 1. Model of Risk Factors and Protective Resources of Parental Burnout.

2. Methods

2.1. Design

This current research was a quantitative descriptive, cross-sectional study utilizing self-report validated questionnaires. A pilot study was carried out before the final research [9] to test the reliability and validity of the research questionnaires and to adjust them to the research sample (mothers of children with or without special needs).

2.2. Participants

The sample included 352 mothers, 50% ($N = 176$) of whom have a child W-SND treated in one of three child development centers, and 50% ($N = 176$) with a child WO-SN treated in one of three mother-child health centers in Israel (religious and non-religious).

Mothers who expressed consent to participate in the study were included in the study. The mothers were selected through a non-probability convenience sampling procedure. The criteria for inclusion in the research were mothers without physical or cognitive disabilities who were aged 20–55 years. The mothers of children W-SND have only one child W-SND aged 1.5–5 years.

2.3. Procedure

Between 2021 and 2022, nurses and secretaries (who received guidance from the researchers) working in three mother-child health centers and in three child development centers distributed the questionnaires in anonymous sealed envelopes to mothers of children W-SND and WO-SN.

Mothers who agreed to participate were given an oral and written explanation about the study and anonymity was guaranteed. We ensured that the health staff received explanations and directions in order to guarantee minimal bias. There was an 88% response rate for completion of the questionnaires.

2.4. Instruments

2.4.1. Social, Emotional, and Practical Support Questionnaire

The questionnaire measures social, emotional, and practical support received from significant people (nuclear and/or extended family, friends, neighbors, and health professionals (nurses/doctors) (constructed in Hebrew by London [57]). The questionnaire included 12 items, for example, "To what extent do you feel that you receive practical support from friends?". The answers were rated on a scale ranging between 1 (insufficient support) to 5 (sufficient support). The social support score was calculated as the average of the 12 questions. In the present study, this questionnaire demonstrated high internal reliability among all mothers of children W-SND and WO-SN ($\alpha = 0.870$).

2.4.2. Learned Resourcefulness Questionnaire

The questionnaire examines the extent to which the individual applies self-control skills to reduce unwanted effects on their behavior (constructed in Hebrew by Rosenbaum [58]). The original questionnaire was shortened in the pilot study from 36 items and included 17 statements that related directly to parenting [9]. For example, "While an unpleasant thought bothers me, I try to think about pleasant things". The answers were rated on a scale ranging between 1 (very uncharacteristic of me) to 6 (very characteristic of me). The learned resourcefulness score was calculated as the average of the 17 statements. Its internal reliability was high among all mothers of children W-SND and WO-SN in the pilot study ($N = 98$, $\alpha = 0.849$), and in the final study ($N = 352$, $\alpha = 0.878$).

2.4.3. Caregiver Burden of Treatment Questionnaire

The questionnaire measures the caregiver's burden of treatment [59,60]. It includes 12 items, for example, "Due to the time spent with your child, you don't have enough time left for yourself". The items were ranked on a scale ranging from 1 (never, i.e., a low level of caregiver's burden of treatment) to 7 (daily, i.e., a high level of caregiver's burden of treatment). The caregiver's burden of treatment score was the average of the responses to the 12 items. The internal reliability was high in both previous research ($\alpha = 0.830$ [61]; $\alpha = 0.880$ [62]) and in the current study ($\alpha = 0.842$).

2.4.4. Emotion Work Questionnaire

The questionnaire examines the extent to which mothers of children perform EW while caring for their child, based on Hochschild's [12] theory and a research questionnaire on the EW and resilience of nursing and medical staff while treating children from the Palestinian Authority hospitalized in Israel [63]. It was adjusted to the population of mothers of children W-SND and WO-SN as caregivers in the pilot study. The deep EW scale measured three techniques (physical, expressive, cognitive) and included ten items, for example, "I remind myself that my life includes additional activities in order to feel happy". The items were ranked on a scale ranging from 1 (do not agree at all) to 5 (agree to a large extent). The EW score was the average of the responses to the ten items. In previous research ($\alpha = 0.930$ [63]) and in the current study ($\alpha = 0.880$), the reliability was found to be high.

2.4.5. The Parental Burnout Assessment

The Parental Burnout Assessment (PBA) [17] questionnaire includes 23 items. The questionnaire was adjusted to the current research by changing the word "parent" to "mother". The PBA scale includes four PB dimensions: Physical and emotional exhaustion in the parental role, nine items (e.g., "I'm so tired out by my role as a mother that sleeping doesn't seem like enough"); emotional distancing from the child, three items (e.g., "Outside the usual routines (bedtime, meals), I'm no longer able to make an effort for my child(ren)"); saturation from the parental role, five items (e.g., "I feel like I can't cope as a mother"); and contrast with previous parental-self, six items (e.g., "I don't think I'm the good mother that I used to be to my child(ren)"). Mothers were asked to indicate how often they felt

in the past year each feeling on a scale ranging from 1 = never, 2 = a few times a year, 3 = once a month or less, 4 = as few times a month, 5 = once a week, 6 = a few times a week, 7 = every day. The mean PB was the average of the responses to the 23 items. The sum of all the responses to the items was also calculated (range 23–161 [23x1–23x7]). The risk of PB was categorized according to Roskam et al. [17]: 0 = “no PB” (<35), 1 = “low risk” (36–53), 2 = “medium risk” (54–70), 3 = “high risk” (71–88), and 4 = “has PB” (89+). In the current study, the reliability of the questionnaire was high $\alpha = 0.95$.

2.4.6. Caregiver’s Perceived Level of Child’s Disability or Challenge/Difficulty in Raising Their Child

The mothers of children W-SND were requested to define their perception of the severity of their child’s daily functional disability (“How would you define the level of severity of your child’s disability, regarding daily functioning?”), and mothers of children WO-SN were asked whether they found that raising their child is challenging or difficult (“how would you define the level of challenge/difficulty raising your child, regarding daily functioning?”). Their responses were ranked on a five-rank scale, between 1 (very mild) and 5 (very severe).

2.4.7. WeeFim—Functional Independence Measure for Children

The questionnaire assesses the functioning of healthy children from six months to seven years of age and in children with disabilities from six months to 12 years [64]. The WeeFim questionnaire is based on the Functional Independence Measure (FIM) scale for adults and was developed for children by Braun et al. [65]. The questionnaire includes 18 items describing the child’s functional ability in six areas that relate to the performance of the child’s daily activities: self-care, control of urine sphincters, transitions, mobility, communication and social cognition. Thirteen items belong to the motor dimension (e.g., “to what extent is you child able to eat by himself”) and five items to the cognitive dimension (e.g., “to what extent is you child able to express himself”). The items were rated on a Likert scale ranging between 1 (full dependence on another person’s help, lack of independence) to 7 (complete independence in performing the functional task, without the need for the assistance of another person). The final score was calculated as the standardized average of the items. The reliability of the child’s functioning questionnaire in the present study was high ($\alpha = 0.96$).

2.4.8. Background Characteristics

Background characteristics included religiosity, age, age when becoming a mother (mother’s age minus the firstborn child’s age), mother’s health condition in the past month (1 = not good to 5 = very good), child’s age and gender, and number of children. Mothers of children W-SND were asked the nature of their child’s impairment (cognitive developmental, physical, visual, hearing, communicative (autistic-spectrum disorders), chronic disease, or other).

2.5. Data Analyses

The data were processed using SPSS for Windows version 27. The reliability of the questionnaires was examined using Cronbach alpha (α). Descriptive statistics included frequencies, percentages, means, and standard deviations. The inference statistics included a comparison between mothers of children W-SND or WO-SN, using χ^2 tests and independent samples *t*-tests. The effect size of the differences between means among mothers of children W-SND or WO-SN, was calculated by Cohen’s *d* (size effects around 0.20 are considered weak, around 0.50—moderate and above 0.80—strong [66,67]). Confirmatory factor analysis was used to calibrate the research values and confirm the validity of their construct. The hypotheses drawn from the theoretical model were tested using structural equation modeling (SEM) [68] using Mplus software version 8.9.

2.6. Ethical Considerations

The study was approved by the Helsinki committee of “Meuhedet Health Services” Clinics (approval #02290120) and by the ethics committee of Tel-Aviv University (approval #0001222-2). According to the Helsinki Committee approval, informed consent was accepted by the mothers’ agreement to complete the questionnaire.

3. Results

3.1. Sample Characteristics

The average age of the mothers of children W-SND (36.90 ± 5.63) was found to be higher than the mothers of children WO-SN (32.27 ± 5.88) ($t = -7.53, p \leq 0.001$). Mothers of children W-SND became mothers at an older age (26.17 ± 4.97) than mothers of children WO-SN (24.33 ± 4.45) ($t = -3.67, p \leq 0.001$). The average number of children in the family was similar (W-SND— 4.22 ± 2.23) WO-SN (3.97 ± 2.62) ($t = -0.941, p = 0.347$). Mothers of children W-SND reported that their health condition in the past month (3.89 ± 0.68) was not as good as the mothers of children WO-SN (4.40 ± 0.60) ($t = 7.56, p \leq 0.001$). Most of the children were males (71%). The average age of the children W-SND (4.06 ± 0.97) was higher than children WO-SN (3.03 ± 1.09) ($t = -9.35, p \leq 0.001$). The child’s disabilities were communicative (44.9%), physical (30.1%), intellectual developmental (27.8%), sensory vision (6.8%), sensory hearing (5.1%), and mental (2.8%). Some of the children had more than one disability. Most mothers (85.8%) reported that their child’s impairment did not have any known genetic component.

3.2. Parental Burnout of Mothers of Children W-SND/WO-SN

T-tests between groups were computed to test the differences in PB and its dimensions between mothers of children W-SND/WO-SN (Table 1).

Table 1. Distribution of PB dimensions by group (W-SND/WO-SN).

	Overall Parental Burnout	Physical and Emotional Exhaustion in the Parental Role	Emotional Distancing from the Child	Saturation from the Parental Role	Contrast with Previous Parental-Self
Children WO-SN					
Mean	1.48	1.64	1.23	1.19	1.35
SD	0.58	0.71	0.46	0.48	0.56
Children W-SND					
Mean	2.12	2.55	1.64	1.48	1.56
SD	0.95	1.19	0.77	0.73	0.70
t	7.80	8.67	6.09	4.46	3.16
p	0.000	0.000	0.000	0.000	0.010
Effect Size (Cohen’s d)	0.81	0.93	0.65	0.47	0.33

Range: 1–7 (7 = high level of PB).

According to Table 1, the overall level of PB (and its four dimensions) was found to be relatively low, but higher among mothers of children W-SND (2.12 ± 0.95) than among mothers of children WO-SN (1.48 ± 0.58) ($t = -7.80, p \leq 0.001$). Thus, in both groups, a similar pattern was found in all four dimensions of PB, but the largest gap was found in the physical and emotional exhaustion dimension. The highest, yet moderate, level of PB in the physical and emotional exhaustion dimension was reported by mothers of children W-SND (2.55 ± 1.19) as compared to lower levels of PB in the other three dimensions.

A high risk of PB was found among six (3.4%) mothers of children W-SND, as compared to three (1.7%) mothers of children WO-SN. PB was found among seven (4%) mothers of children W-SND, as compared to one mother (0.6%) of children WO-SN. Conversely,

67 (38.1%) mothers of children W-SND had no risk of PB compared to 133 (75.6%) mothers of children WO-SN.

T-tests between groups were computed to test the differences between mothers of children W-SND/WO-SN in the risk factors and the protective resources of PB (Table 2).

Table 2. Risk factors and protective sources for PB by group (W-SND/WO-SN).

	Risk Factors			Protective Resources	
	Perceived Caregiver Burden	Child Functioning	Social Support	Learned Resourcefulness	Deep Emotion Work
Range	1–7	(standardized)	1–5	1–6	1–5
Children WO-SN					
Mean	2.15	−0.01	2.60	4.36	2.39
SD	0.91	0.88	0.91	0.77	0.93
Children W-SND					
Mean	2.77	0.01	2.53	4.14	2.99
SD	1.07	0.91	0.91	0.69	0.72
t	5.79	0.24	0.74	2.77	6.77
p	0.000	0.086	0.470	0.035	0.000
Effect Size (Cohen's d)	0.62	0.02	0.08	0.30	0.72

According to Table 2, mothers of children W-SND perceived a higher caregiver burden than those of children WO-SN (2.77 ± 1.07 vs. 2.15 ± 0.91 ; $t = -5.79$, $p \leq 0.001$). Mothers of children W-SND also reported less learned resourcefulness and performed deeper EW. Both groups of mothers similarly assessed their child's functioning and their social support.

3.2.1. Risk Factors for PB

Perceived caregiver burden of treatment (range 1–7). Mothers of children WO-SN reported a lower caregiver burden of treatment (2.15 ± 0.91) than mothers of children W-SND (2.77 ± 1.07) ($t = -5.79$, $p \leq 0.001$). No significant difference was found in child functioning ($t = -0.24$, $p = 0.086$). In addition, according to the reported background variables, mothers of children W-SND perceived the severity of their child's disability as moderate (2.94 ± 0.92). Additionally, 7.4% of these mothers reported that they perceive their child's disability as not severe, as compared to 22.7% that perceived it as severe. Conversely, 76% of mothers of children WO-SN reported that they do not have any challenges/difficulties in raising their children. A high level (but not the highest) of challenge/difficulty in raising the child was reported by 15.3% of the mothers.

3.2.2. Protective Resources

Social support (range 1–5): mothers of children WO-SN (2.60 ± 0.91) reported a moderate level of social support, but slightly higher than mothers of children W-SND (2.53 ± 0.91) ($t = 0.74$, $p = 0.470$). Learned resourcefulness (range 1–6): mothers of children WO-SN (4.36 ± 0.77) reported a slightly higher level of learned resourcefulness than mothers of children W-SND (4.14 ± 0.69) ($t = 2.77$, $p = 0.035$). Emotion work (range 1–5): mothers of children WO-SN (2.39 ± 0.93) reported a slightly lower level of deep EW than mothers of children W-SND (2.99 ± 0.72) ($t = -6.77$, $p \leq 0.001$).

3.3. Hypothesis Testing

In order to test the research hypothesis according to the theoretical model, SEM analysis was computed. The results are presented in Figure 2 (W-SND) and Figure 3 (WO-SN).

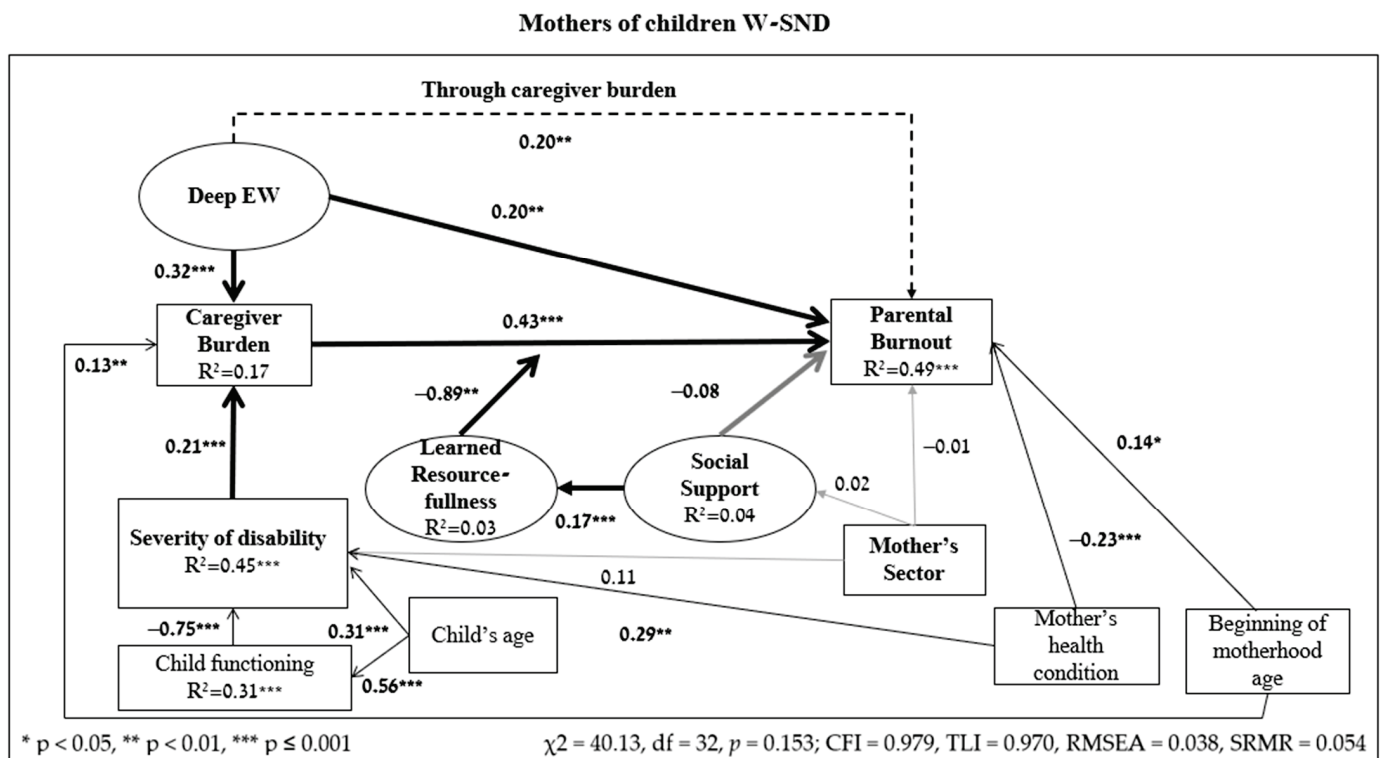


Figure 2. Results of SEM hypothesis testing among mothers of children W-SND (β standardized coefficients) (N = 176).

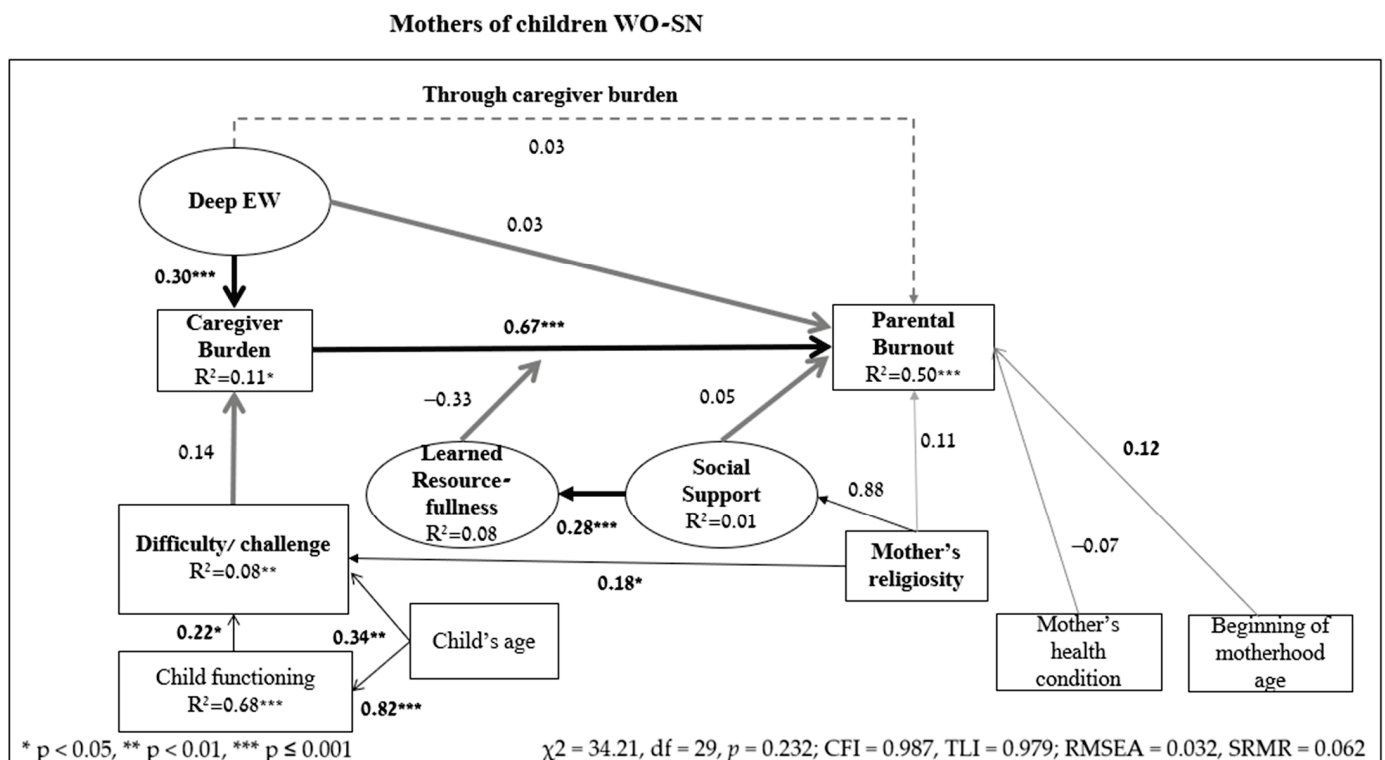


Figure 3. Results of SEM hypothesis testing among mothers of children WO-SN (β standardized coefficients) (N = 176).

No significant effect was found for religiosity on PB. However, religious mothers of children WO-SN reported less challenge/difficulty raising their child ($\beta = 0.18$, $p = 0.014$)

and received more social support ($\beta = 0.88, p \leq 0.001$) than non-religious mothers. No similar effect was found among mothers of children W-SND. Among all mothers, as the age of the child increases, the mothers' perception of the child's functioning level is higher (W-SND— $\beta = 0.56, p \leq 0.001$, WO-SN— $\beta = 0.82, p \leq 0.001$). It was also found that the younger mothers of children W-SND became mothers, their perceived caregiver burden ($\beta = 0.13, p = 0.007$) and PB ($\beta = 0.14, p = 0.013$) were reported higher. No similar effect was found among mothers of children WO-SN. Additionally, the mothers of children W-SND who reported more positively on their own health condition in the past month, perceived their child's disability as less severe ($\beta = 0.29, p \leq 0.001$) and reported lower PB ($\beta = -0.23, p \leq 0.001$). No similar effect was found among mothers of children WO-SN.

According to the results of the model's hypothesis testing, Hypothesis 1 was confirmed: the higher the mothers perceived their caregiver burden, the higher their level of PB (W-SND $\beta = 0.43, p \leq 0.001$; WO-SN $\beta = 0.67, p \leq 0.001$).

Hypothesis 2 stated that the more the disability/challenge/difficulty was perceived as severe, the heavier the perceived caregiver burden. Hypothesis 2 was confirmed among mothers of children W-SND ($\beta = 0.21, p \leq 0.001$) but not among mothers of children WO-SN ($\beta = 0.14, p = 0.059$).

Hypothesis 3 assumed that the correlation between perceived caregiver burden and PB was moderated by learned resourcefulness. Among mothers of children W-SND, the fit indices of the model, including the moderation effect, were found to be non-significant ($\chi^2 = 9.86, df = 5, p = 0.079$; $\chi^2/df = 1.97$; CFI = 0.970, TLI = 0.928; RMSEA = 0.074, SRMR = 0.046), i.e., the empirical data matched the hypothesis model. Hypothesis 3 was confirmed for mothers of children W-SND ($\beta = -0.89, p = 0.008$) such that among those with low levels of learned resourcefulness, the correlation between perceived caregiver burden and PB was stronger; whereas among those with high levels of learned resourcefulness, this correlation was weaker. Among mothers of children WO-SN, the fit indices of the model were found to be insignificant ($\chi^2 = 5.55, df = 4, p = 0.235$; CFI = 0.990, TLI = 0.971; RMSEA = 0.047, SRMR = 0.044); i.e., the empirical data matched the hypothesis model. However, the moderation hypothesis was not confirmed ($\beta = -0.33, p = 0.200$).

Hypothesis 4 tested the direct correlations between social support, learned resourcefulness, and PB. Hypothesis 4a was confirmed among mothers of children W-SND ($\beta = 0.17, p = 0.019$) and WO-SN ($\beta = 0.28, p \leq 0.001$) such that the more social support the mothers received, the higher their learned resourcefulness. According to Hypothesis 4b, the more social support mothers receive, the lower their PB. This hypothesis was not confirmed (W-SND $\beta = -0.08, p = 0.126$; WO-SN $\beta = 0.05, p = 0.449$).

According to Hypothesis 5, the perceived caregiver burden mediated the correlation between EW and PB. This hypothesis was confirmed among mothers of children W-SND (indirect = 0.135, $p \leq 0.001$, 95%CI [0.07, 0.22]) and WO-SN (indirect = 0.199, $p \leq 0.001$, 95%CI [0.11, 0.30]). Additionally, among mothers of children W-SND ($\beta = 0.20, p \leq 0.001$) there was also a direct correlation between EW and PB (and not only indirectly through perceived caregiver burden), i.e., a partial mediation. However, among mothers of children WO-SN, the correlation between EW and PB was only indirect through perceived caregiver burden ($\beta = 0.03, p = 0.551$), i.e., full mediation.

Hypothesis 6 that tested the research model was confirmed, such that the correlations between risk factors and protective resources explained the variance of PB of mothers of children W-SND/WO-SN. It was found that the correlations significantly explained the variance of PB among mothers of children W-SND ($R^2 = 0.49, p \leq 0.001$) and WO-SN ($R^2 = 0.50, p \leq 0.001$). According to Figures 2 and 3, among both groups of mothers, the empirical data matched the hypothesis model (W-SND $\chi^2 = 40.13, df = 32, p = 0.153$; CFI = 0.979, TLI = 0.970; RMSEA = 0.038, SRMR = 0.054; WO-SN $\chi^2 = 34.21, df = 29, p = 0.232$; CFI = 0.987, TLI = 0.979; RMSEA = 0.032, SRMR = 0.062).

Comparing the model fit among each group of mothers revealed that a significant difference was found between the model's fit for mothers of children W-SND ($\chi^2 = 30.00$) and for mothers of children WO-SN ($\chi^2 = 13.19$). Namely, the correlations between pro-

tective resources and PB were found stronger among mothers of children W-SND (social support: $d = -0.17, p = 0.015$; learned resourcefulness: $d = -0.24, p = 0.008$; EW: $d = 0.28, p = 0.002$). This is despite the fact that the burden of treatment (as a risk factor) was found to have a similar effect on PB in both groups ($d = 0.01, p = 0.913$). In addition, similar correlations were found between EW ($d = -0.10, p = 0.220$) and perceived disability/challenge/difficulty ($d = 0.15, p = 0.137$) with caregiver burden, and between social support and learned resourcefulness ($d = 0.18, p = 0.156$).

4. Discussion

The ongoing care of children W-SND with chronic disabilities may impose a unique caregiver burden and affect parents' daily functioning and relationships with their children. The parents' perceived caregiver burden may lead to the development of PB symptoms, mainly due to an imbalance between risk factors for PB and available protective resources. The current study focuses on the phenomenon of PB among mothers of children W-SND.

4.1. The Phenomenon of PB Among Mothers of Children W-SND/WO-SN

It was found that the levels of PB and its dimensions were relatively low, but higher among mothers of children W-SND. The PB dimension of physical and emotional exhaustion in the parental role among mothers of children W-SND was found to have the highest self-reported rating. This finding may indicate the main effect of PB on the mothers of children W-SND. In accordance with these findings, previous studies have shown that parents of children with chronic diseases are at higher risk of PB than parents of healthy children, mainly because they are required to cope with many concurrent pressures including family, economic, emotional, and social demands among others, in addition to their child's ongoing therapeutic requirements [6,7,69]. Moreover, the dimension of physical and emotional exhaustion may be the basis for parental optimal functioning [20] in addition to the other dimensions of PB.

4.2. The Relationship Between Risk Factors and Protective Resources for PB

The relationship between caregiver burden and PB. According to Hypothesis 1, it was found that the higher the mothers perceived their caregiver burden, the higher the PB. This finding can be explained on the basis of the fact that usually mothers are considered the primary caregivers of their children in general, and unofficial caregivers of their children W-SND [8]. The literature also describes the daily time-consuming demands that mothers of children W-SND experience in addition to their other roles and responsibilities which may lead to a high perceived caregiver burden [25,30]. These include finding different treatment options for their child's special needs, locating suitable treatment professionals, finding an appropriate educational framework, scheduling evaluations and meetings with relevant therapists, participating in therapeutic sessions with the child, and continuously monitoring the child's progress [70–72]. Moreover, mothers often have to deal with a complex reality to ensure that the needs of the child with disabilities do not overshadow the needs of her other children and their spouse [8,73]. The perceived caregiver burden is especially true for parents who strive for perfectionism in performing these multiple tasks [24] such that the burden may adversely affect their physical and emotional health [74,75]. To date, in regard to the health system in Israel, there are not enough organizations and programs that offer effective support to these mothers.

Hypothesis 2 was confirmed, such that the higher mothers of children W-SND perceived their child's disability severity, the higher they perceived their caregiver burden. This finding is supported by previous studies which showed that when parents perceive their child's disability as more severe and their functional ability as lower, they report more burden and difficulty in caring for their child's special needs [35,36,76].

In addition to the aforementioned risk factors for PB, the study investigated three protective resources that may reduce PB. It was found that for mothers of children W-SND, the cognitive coping resource of learned resourcefulness moderated the relationship

between their perceived caregiver burden and PB (confirming Hypothesis 3). This means that among mothers with a high level of learned resourcefulness, the relationship between the perceived caregiver burden and PB was weaker, while among mothers with a low level of learned resourcefulness, this relationship was found to be stronger. The implication of this finding is that learned resourcefulness can reduce the effect of perceived caregiver burden on PB. According to the literature, learning how to be resourceful may enable mothers to acquire a better capacity for self-control over their negative emotions, help them effectively regulate and manage stress, cope with challenging circumstances, and make decisions in their own and their families' best interest [11].

It was also found that the more social support mothers receive, their level of learned resourcefulness was found higher (confirming Hypothesis 4a). It is possible that social support provides mothers with the encouragement, motivation, and resources they need to develop ways of coping with difficult situations and challenges, contributing to their ability to develop learned resourcefulness as a protective resource. Similarly, social support, adaptation to daily concerns, and the ability to use positive patterns of thought significantly predicted learned resourcefulness among African American mothers who are considered primary caregivers of their children [77]. However, the lack of social support per se may serve as a risk factor for PB [20,41,42].

Contrary to Hypothesis 4b, it was found that receiving social support was unrelated to the PB level. A possible explanation for this lack of correlation is the nature of the social support, its quality, as well as the timing of when it is provided. All these are crucial for effectively assisting mothers to cope with stressors and challenges, and as a result, may reduce the risk of PB. For example, social support focused on problem solving and practical assistance may be more effective in reducing PB compared to friends' support that usually has good intentions but can only offer general advice that is not necessarily appropriate for the needs and circumstances of mothers of children W-SND [78,79]. It is also possible that mothers do use social support to cope with the symptoms of PB, but do not simultaneously address the causes of the factors that led to the development of their PB. The latter include personality tendencies (tendency to pessimistic thought patterns, parental perfectionism), lack of parental skills for raising children, and low cooperation in parenthood [20]. In such cases, the support of friends and family may provide some temporary relief, but it will not necessarily lead to a reduction in long-term PB [80]. The timing of social support is also important; at times that mothers feel emotionally and consciously overwhelmed, they find it difficult to benefit from the social support offered to them, even though it may help reduce their risk of PB [81].

Another coping resource against PB is deep EW. Our findings indicate that perceived caregiver burden mediates the correlation between deep EW and PB among all mothers (confirming Hypothesis 5). Additionally, among mothers of children W-SND only, a direct correlation between EW and PB was found (i.e., a partial mediation in addition to the indirect effect through perceived caregiver burden). Among mothers of children WO-SN, the correlation between EW and PB was only indirect (i.e., fully mediated through perceived caregiver burden), as hypothesized. The meaning of these findings is that performing deep EW serves as an effective protective resource against PB among mothers of children W-SND because its effect on reducing PB is both direct (disregarding the perceived level of caregiver burden of treatment) and indirect (considering the perceived caregiver burden of treatment). In comparison, among mothers of children WO-SN, deep EW is effective only when the mothers experience a high caregiver burden of treatment. These findings imply that deep EW should be an inherent part of interventions whereby mothers of children W-SND are taught the physical, expressive, and cognitive techniques of deep EW.

The study found that the correlation between deep EW and PB is positive among mothers of children W-SND. This may imply that mothers of children W-SND in particular often perform EW that may lead them to feel overloaded, stressed, and exhausted. This is supported in the literature where it is described that mothers of children W-SND sometimes need to find ways to sensibly manage their emotions and even hide their feelings (e.g.,

stress, sadness, or frustration from their environment); a process that might increase rather than reduce their PB [82,83]. However, it is important to note that although EW can be demanding and challenging in itself and may even lead to an increase in the perceived caregiver burden and risk of PB, deep EW can ultimately serve as a protective resource with the potential for mothers to be able cope with complex parenting for their child W-SND and ultimately may reduce PB.

Finally, the nexus of correlations between the model's risk factors and protective resources significantly explain about half of the variance in PB among mothers of children W-SND/WO-SN, confirming Hypothesis 6. Additionally, this relationship was significantly stronger among mothers of children W-SND. The findings support the importance of combining within one model [13,14] the protective resources for coping with PB, according to the three theories of social [10], cognitive [11], and emotional [12,49,50] resources.

4.3. Limitations of the Study and Recommendations for Further Research

In the current research mothers of children with specific disabilities may have had an unproportional impact on the results. Therefore, we suggest future investigations to sample groups of mothers of children with additional disabilities that experience other types and levels of difficulty. We also recommended to conduct additional studies among a variety of social and cultural backgrounds.

As parents of children W-SND face unique personal, marital and social challenges, further research should examine unique risk factors related to their condition. For example, socioeconomic status (low income or low levels of education may be related to financial stress or limited access to support services), lack of a supportive community and access to available support services, social or policy-related aspects (including financial assistance or counseling when needed).

Regarding learned resourcefulness as a protective resource, we suggest classifying the mothers into four distinct groups (W-SND/WO-SN X high/low levels of learned resourcefulness) and reassessing the research model after establishing the theoretical basis for this distinction and producing additional hypotheses.

It is also recommended to conduct similar research, using the "Model of Risk Factors and Protective Resources of Parental-Burnout" among fathers of children W-SND/WO-SN and among parents as dyads. These findings may contribute to the planning and development of programs for the entire family. For example, such a program could focus on balancing between needs, general tasks, and tasks involved in caring for the child, as well as the contribution of each family member to the required treatment.

5. Summary and Conclusions

This research examined a model of relationships between risk factors for PB and protective resources, that may alleviate burnout and balance the demands from mothers regarding their perceived caregiver burden [13,14,22].

The theoretical innovation of this research model lies in establishing the importance of combining the three theories of social, cognitive, and emotional protective resources, for coping with PB and reducing it in order to promote mothers' well-being.

The first conclusion leads to the need to develop an intervention program for mothers of children W-SND, in which emphasis is placed on balancing their child's needs alongside their personal needs. The goal of such a program is to reduce the risk factors for PB and to provide and strengthen their protective resources, including those investigated in this study (social support, learned resourcefulness, and emotion work). It is also important to identify the level of PB of these mothers using the PB assessment used in this study in addition to family and environmental reports, and paying attention to symptoms of exhaustion, depression, anxiety, and self-neglect. Accordingly, the multidisciplinary health team should be given appropriate tools for identifying mothers' levels of PB.

We also suggest developing awareness in nursing studies and developing educational management practice regarding PB. Nursing students as well as healthcare staff should

be guided to observe certain symptoms of the child resulting from the mother failing to provide essential treatments, signs of neglect and/or abuse, and receive clear instructions for offering these mothers appropriate professional interventions.

In summary, PB is explained by the nexus of correlations between risk factors and protective resources, beyond the effect of the child's functioning, the mother's perception of severity of disability, sense of caregiver burden, and the child's dependency upon her.

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Institutional Review Board Statement: The study was approved by the Helsinki committee of “Meuhedet Health Service” Clinics (approval #02290120) and by the ethics committee of Tel-Aviv University (approval #0001222-2). According to the Helsinki Committee approval, informed consent was accepted by the mothers' agreement to complete the questionnaire.

Informed Consent Statement: Informed consent was obtained from all participants. The act of filling out the questionnaire and sending it constitutes consent to participate in the survey.

Data Availability Statement: The original contributions presented in the study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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