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How Stable Are Students' Entrepreneurial Intentions in the COVID-19 Pandemic Context?

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Abstract: The purposed longitudinal study analyzes the evolution of students' Entrepreneurial Intentions (EI) and its antecedents over the COVID-19 pandemic period and explores the inter-individual differences and the intra-individual changes. Our main contribution consists of proposing two-panel estimations techniques: first, a Latent Change Score model (LCS) approach to analyze the stability of our constructs, and second, a Generalized Least Squares (GLS) Random-Effect estimation of a complex network of relationships that we have identified within the Theory of Planned Behavior (TPB) framework. Our empirical results show that students' EI enrolled in an entrepreneurship education (EE) program increased during the COVID-19 pandemic. Individuals with initial higher scores for EI have changed less than those with lower initial scores, and a gender difference exists in the initial level of EI and its antecedents. Our results also document the moderation effects of entrepreneurial self-efficacy and the importance of inspiration and resources in building students' EI and provide valuable policy recommendations for universities regarding the design of EE programs to contribute to the economic recovery in the post-pandemic era.

Keywords: entrepreneurial intention (EI); entrepreneurship education (EE); COVID-19; longitudinal data; panel estimation techniques

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1. Introduction

The COVID-19 pandemic has caused considerable disruptions to economies worldwide [1]. The surge in freight rates and labor market shortages negatively affect the global supply chains [2]. While COVID-19 has determined a change in the climate for business, it has also caused severe social dislocation. Different lockdown degrees, travel and large events bans and implementation of protocols to prevent the dissemination of the virus have negatively affected every aspect of our life.

However, these disruptions have also provided new opportunities as the transformations we face are paving the way for the emergence of new business models, providing entrepreneurs with new business opportunities [3]. According to Global Entrepreneurship Monitor (GEM) [4] (p. 29), 'since entrepreneurship is a key driver of economic development, and a vital source of new jobs and incomes, policymakers will increasingly look towards entrepreneurship as a key component of the solution to repairing national economies in the post-pandemic era'. As a result, scholars (e.g., [5]) are increasingly considering entrepreneurship as a key component of the recovery solution to the COVID-19 pandemic. Furthermore, efforts to achieve sustainable development goals through entrepreneurship can effectively alleviate the damage caused by COVID-19 [6].

Studying the effects of the COVID-19 pandemic on students' intentions to start a new business is a recent development in existing entrepreneurial intention (EI) literature [7–13]. Although the intention to become an entrepreneur has been extensively studied in EI

literature, there is not enough evidence on how EI has changed considering the new conjectures imposed by the COVID-19 Pandemic [14].

Universities are expected to implement entrepreneurship education (EE) programs to drive economic recovery after the COVID-19 pandemic [15], highlighting the importance of EE. This issue is significant for Romania, where the pre-pandemic economic growth has been replaced by a post-pandemic precipitated economic decline [3]. According to Romanian Trade Register Office (RTRO) statistics, in Romania, during the first eleven months of 2021, more than 59.000 firms were closed (which represents a 28.66% increase compared to the same period of the precedent year) [16]. The economic downturn in Romania primarily affects young people (15–24 years old), for whom finding employment is increasingly difficult. The proportion of young people at risk of poverty within the European Union (EU) is the highest in Romania (35%) compared to a 25.1% EU average and only 11% in Czechia [17]. Eurofound [17] also shows that young people are more likely to work on less secure temporary contracts and low wages, which put them at a higher risk of job loss and social exclusion. Additionally, according to the same study, Romania has the third-highest proportion of school dropouts, after Malta and Spain [17].

Romanian young people are aware that the COVID-19 crisis resulted in a dramatic reduction in the number of early-stage businesses, and, according to Ruiz-Rosa et al. [7] their EI is expected to decrease. On the other hand, the COVID-19 pandemic shifted the entrepreneurial paradigm and created survival entrepreneurship, as Lungu et al. [18] revealed; therefore, an increase in EI is also possible.

The aim of this research is to contribute to the literature on EI, filling the gap concerning how EI has changed during the COVID-19 pandemic and providing empirically-based suggestions for improved EE programs. Investigating EI and its antecedents appears very relevant and strengthens the literature on EI in terms of studies carried out in abnormal times that impact society and the economy at their core. From a methodological standpoint, this study aims to advocate the necessity of employing empirical estimations specific to longitudinal studies.

Our main contribution to the literature in the field of EI consists of proposing two-panel estimations techniques in our analysis of students' EI. Using a sample of 313 students from non-economic programs enrolled in a cross-campus entrepreneurship program between 2019 and 2021 at the University of Oradea, Romania, we have first analyzed the stability of EI and its antecedents by employing a Latent Change Score (LCS) model, which offers valuable insights into inter-individual differences and intra-individual changes over the considered period. Compared to a traditional *t*-test analysis, an LCS estimation employs latent constructs, overcoming the measurement bias caused by models using observed variables instead [19]. An LCS approach to analyzing the stability of our constructs also allowed us to investigate whether gender-related differences exist in our case. Second, the present study proposes a Generalized Least Squares (GLS) Random-Effects estimation of a complex network of relationships that we have defined within the Theory of Planned Behavior (TPB) framework. A GLS Random-Effects model allows us to analyze the moderation effects of entrepreneurial self-efficacy (ESE) and of the benefits of entrepreneurship education in estimating students' EI. Most importantly, our paper compares the outcomes from two different moments, one at the beginning and the other at the end of the COVID-19 pandemic period, enabling us to investigate whether the context has influenced the EI.

The paper is structured as follows: Section 2 overviews the existing estimations of EI in the field and the importance of entrepreneurship education in developing students' EI; Section 3 considers the research framework and hypotheses; Sections 4 and 5 present the method, data, and the results of our empirical estimation. Section 6 discusses the results, and Section 7 concludes and presents the paper's contribution and clues for further research.

2. Literature Review

In its quest to enhance understanding of what drives individuals to start a new business, entrepreneurship research is increasingly focusing on EI [20]. EI is defined as a 'conscious awareness and conviction by an individual that they intend to initiate a new business venture and plan to do so in the future' [21] (p. 3). Intentions in entrepreneurship research also tackle the intention to become self-employed and acquire a business [22]. Lortie and Castogiovanni [23] add to EI aspects such as opportunity recognition, innovation, or forming ties. In the current literature, EI is assumed to encompass motivational factors that influence entrepreneurial behavior [20,24,25]. Chronologically, EI literature is grounded in the theory of entrepreneurial event [26,27], the social cognitive theory [28], the theory of implementing entrepreneurial ideas [29], and the theory of planned behavior (TPB) [30].

2.1. Prevalence of TPB in EI Estimations

EI estimation models based solely on personality traits and demographics have been typically less robust and with less predictive power [31]. Moreover, Krueger, Reilly, and Carsrud [32] pointed out that behavior and intentions are often weakly predicted by exogenous factors. In contrast with estimations based on exogenous factors, the TPB assumes that the proximal antecedents of behavioral intentions are the individual's attitudes, subjective norms, and perceived behavioral control. Individuals who have favorable attitudes to entrepreneurship, experience social and cultural pressure and possess the capacity to perform an entrepreneurial behavior tend to continue to fulfill their EI. Attitude toward entrepreneurship (EA) refers to the experience or appraisal of the individual towards this proposed action. Subjective norms (SN) depend upon perceived social pressure to engage or not in entrepreneurship. Perceived behavioral control (PBC) is the respondent's perception of the chance to perform in entrepreneurship.

Although it was not explicitly developed for EI, the TPB has provided the most used theoretical framework for EI's estimations [33]. The prevalence of TPB in EI estimations is mainly attributable to its robustness across different implementations [20] (p. 88). Also, according to the same research, TPB is considered a complete, parsimonious, and sufficient model of EI' [20] (p. 107). In sum, using the TPB offers an opportunity to increase the model's explanatory power.

Over time TPB framework has been augmented [20] (p. 20). For example, various antecedents of attitudes, social norms, and perceived behavioral control have been proposed. Moderating and mediating effects have been considered to provide value-adding insights for mechanisms leading to EI formation [34].

Whereas much empirical research confirms the usefulness of TPB in predicting EI, scholars have also pointed out several caveats associated with it. A severe criticism of the TPB is provided by Sniehotta, Presseau and Araújo-Soares [35]. They argue that TPB has a static explanatory nature, focuses on rational reasoning, excluding unconscious influences on behavior, and relies on false assumptions such as the belief that the relationships between external factors and intentions or behavior are mediated by the traditional antecedents of intentions. Ajzen [36] has responded to all these points, dismissing them, concluding that Sniehotta, Presseau, and Araújo-Soares [35] (p. 6) 'have failed to make a case for retiring the TPB model'.

Nevertheless, several issues with TPB are also supported by other researchers in the field. For instance, empirical evidence documents a significant gap between the predictive power of TPB estimations of EI versus estimations of behavior. Thus, TPB models account for 40–50% of EI variance and 19–38% of the variance in behavior [20] (p. 110). In this respect, Sheeran [37] considers that EI materializes only in 53% of the cases. The gap between intentions and behavior can be attributable to a lack of action plans for implementing intentions [38,39]. While we agree that action plans for implementing intentions are needed, we note that Brännback and Carsrud [20] have already mentioned that planning constitutes another layer that mediates the relationship between EI and behavior and, consequently, in itself, does not invalidate the framework provided by the TPB.

Another debated issue in the EI literature refers to the TPB's static nature [35]. More recently, Donaldson, Liñán, and Alegre [25] mentioned that the static nature of TPB is attributable to a cross-sectional approach to estimating EI. Yet, as Ajzen [36] shows, the misconception concerning the static nature of TPB is attributable to an oversimplification of the theory, with empirical estimations in the field failing to account for the feedback loops provided by the model. Moreover, Ajzen [36,40] adequately raises the issue of stability of the intentions, showing that if temporal continuity of intentions does not hold, it will weaken the relationship between intentions and behavior.

Consequently, addressing the issues of stability of the intentions and the context in which the entire process unfolds is paramount to ensuring a throughout understanding of the mechanisms leading to the formation of EI and the subsequent materialization of intentions.

2.2. Econometric Strategies in EI Estimations

EI literature recommends collecting panel datasets [41]. When using panel data, we consider that the estimation strategy should tackle the issues specific to longitudinal datasets. Studies employing ordinary least squares estimations or even non-linear dichotomous/polytomous logistic estimations do not take full advantage of the panel structure of the data (e.g., Popescu et al. [42]).

Although scarce, longitudinal analyses are present in EI literature. Sheeran, Norman, and Orbell [43] were among the first in the field of EI to measure the temporal stability of latent variables based on the within-participants Pearson correlation between scale items at different time points. This approach was subsequently used by other longitudinal studies, for example, by Liñán, Rodriguez-Cohard, and Rueda-Cantuche [44]; Zhao, Seibert, and Hills [45]; and Hsu et al. [46].

When data are collected at two-time points, a simple comparison technique of the means involves using a *t*-test or a paired *t*-test [47]. Similar results are possible by employing a generalized linear model (GLM) repeated measures procedure, a more complex econometric approach [48]. A GLM repeated measures procedure has been used in the field of EI by Field [49] and Souitaris, Zerbinati, and Al-Laham [50]. Shinnar et al. [51] prefer to employ an equivalence test (equivalence test between the means at different time points).

However, these techniques cannot control for problems specific to longitudinal datasets, such as the issue of time-invariant unobserved factors or the serial correlation problem [47,48].

Several panel analysis techniques allow researchers to accommodate different assumptions specific to panel data. Fixed Effects/Within model partials out the unobserved individual heterogeneity by regressing time demeaned data, whereas the First Differences model removes it by regressing first differences. When individual-specific effects are independent of the regressors, a Random Effect transformation is needed to solve the issue of the non-spherical error variance caused by the composite error term [52]. The Random Effect transformation is a feasible generalized least square (fGLS) technique. It uses a quasi–time demeaned model, where time demeaned variables are weighted with an estimated coefficient corresponding to the degree of serial correlation induced by the composite error term [52]. To the best of our knowledge, neither the GLS Fixed-Effects nor the GLS Random-Effects models have been employed in existing EI estimation.

Whereas panel GLS estimations have been present in empirical research for 30 years (although not in EI estimations, to the best of our knowledge), only recent advances in statistical software have facilitated the implementation of techniques based on structural equation modeling (SEM) able to analyze the change and stability over time [53].

Cross-lagged models can be used to estimate causal or reverse causal relationships, with or without moderation and auto-regressive effects [54]. Estimating the between-units difference in a cross-lagged model is possible with a random intercept addition to the model [55]. Arshi, Danamaraju, and Nandi [54] used a cross-lagged panel model to examine

perceived entrepreneurial stress by estimating causal and reverse causal relationships, with or without moderation and auto-regressive effects.

Joensuu, Viljamaa, and Varamäki [56,57] have implemented a latent growth curve (LGC) model within the framework of TPB to analyze the change in EI on a multi-wave panel dataset. LGC accounts for within and between variances and requires a minimum of three waves of data.

Latent difference score models (LDS) represent a third SEM-based modeling approach that can be used to study the stability over time of latent constructs. An LDS model defines a latent construct that directly expresses changes over time, allowing the researchers to analyze whether there was a statistically significant change over time, what is the extent to which the change is dependent on the initial state, or what are the individual differences in change over time. Kievit et al. [58] use the LDS in the context of analyzing complex lifespan behavioral and neurological developments. Klopack and Wickrama [53] also use the LDS modeling approach for assessing life course behavioral processes.

LDS has also been implemented in entrepreneurship research to explain the application of volitional and motivational intentions towards entrepreneurship behavior. To the best of our knowledge, the LDS has not yet been implemented in modeling EI. For this reason, an important contribution of our present research is proposing an LDS approach to assess the stability of intentions within the theoretical framework of the TPB model.

2.3. Entrepreneurship Education and Its Influence on EI

In the light of the Bae et al. [59] review of empirical studies in the field, it is conceivable that there is a relationship between entrepreneurship education (EE) and EI. The authors have highlighted additional information about the relationship between EE and EI. According to the above-mentioned study, EE is influencing EI to a higher degree than business education in general. Most empirical studies found a positive impact of EE on EI [50,60–63]. These studies showed that EE builds competencies and encourages the search and exploitation of business opportunities. Moreover, EE is helping students unlock their potential and develop a sense of personal fulfillment [34].

There are also empirical estimations that document the negative impact of EE on EI. For example, Oosterbeek, Van Praag, and Ijsselstein [64] argue that EE better informs students on the risks involved in entrepreneurship and thereby discourages EI. Hoogendoorn, van der Zwan, and Thurik [65] focused on the social benefits of EE, showing that EE serves collective interests by addressing unmet socially challenging issues. In this respect, EE builds confidence in youth, overcoming learning difficulties, lack of motivation, lack of integration among individuals, and the risk of exclusion from the labor market [66]. Consequently, many entrepreneurship programs were elaborated by universities, increasing the attractiveness of educational offerings targeting students from social categories "at-risk" in the labor market and under-represented in entrepreneurship [34].

COVID-19 posed unprecedented challenges to universities as they were forced to almost mandatory online learning. As a result, psychological pressure on students has appeared, as proved by several empirical studies (e.g., Cao et al. [67]). Understanding how the COVID-19 context affects the development of students' EI remains largely an open question, with mixed empirical results. While there are studies that showed that the uncertainty created by the pandemic increased students' perceived level of personal entrepreneurial risk [12], other studies found that new opportunities for entrepreneurs were created by the pandemic [18]. The results are mixed regarding the relationship between EE and EI during the pandemic period. For example, Ruiz-Rosa, Gutiérrez-Taño, and García-Rodríguez [7] found that social EI of Spanish students decreased during the COVID-19 crisis. Zhang and Huang [9] concluded that college students had retained some EI during the pandemic. Gomes et al. [8] showed that attitudes towards behavior and perceived behavioral control positively impacted EI during the pandemic, and the subjective norms negatively affected EI. Insofar as the relationship between EE and EI is concerned, on

a positive note, Lopes et al. [13] found that in the COVID-19 pandemic circumstances, Portuguese students are more attracted to being entrepreneurs than employed by others.

Looking at teaching strategies in the time of the COVID-19 pandemic, Orlow et al. [68] highlighted a paradigm shift from "who you teach" to "how you teach". Advocating for the effectiveness of small groups of students, collaborative learning, and teamwork in the pandemic context, Gaworsky et al. [69] also have underlined the advantages of qualitative research in identifying pertinent research questions and useful insights which can better inform policy makers involved in designing entrepreneurship programs. In short, we can say that the COVID-19 pandemic has added an extra layer to the complexity of the EE-EI estimations. With empirical results obtained so far taking us even further away from a consensus concerning the relationship between EE and EI, we consider that understanding how context, temporality, and uncertainty induced by the COVID-19 epidemic is still an open question. In our quest to better understand the relationship between EE and EI, our strategy is to adequately identify the estimation strategies to tackle the issues specific to longitudinal estimations.

3. Research Framework and Hypothesis Development

In developing our research framework, we start from our previous study on EI [34], which has proposed a complex chain of relationships linking the benefits of EE and entrepreneurship self-efficacy (ESE) to the traditional antecedents of EI. In the study mentioned above, we acknowledged that TPB is considered a complete, parsimonious, and sufficient model of EI', offering an opportunity to increase the model's explanatory power [20] (p. 107). Based on the study of Zhao et al. [45], Wilson, Kickul, and Marlino [70], and Newman et al. [71], we proposed ESE as an additional antecedent of EI. Following Souitaris, Zerbinati, and Al-Laham [50] we identified entrepreneurship knowledge (EK) and the program-derived entrepreneurial inspiration and incubation resources (IR) as the benefits of EE. While existing empirical results concerning the EE-EI relationship range from a positive relationship [50,60–63] to insignificant effects [72] or even negative effects [64], our previous research has documented a positive contribution of EE to students' EI. Adding genre as an exogenous control is motivated by previous work in the field [45,51,73–75], which has documented a significant relationship between gender and EI. Finally, we rely on the work of Devece, Peris-Ortiz, and Rueda-Armengot [76] to unfold the influence of the general COVID-19 environment on EI.

In our previous study on EI [34], we have employed an SEM estimation to account for the complexity of the relationships between EI and its antecedents, especially the indirect effects of ESE, EK, and IR on EI. However, to accommodate better the panel structure of our data, we now propose using a traditional panel technique for our estimation. From all the available panel estimations, we opted for a Random-Effects GLS regression which proved to accommodate better our dataset's characteristics (as shown by a Hausman test). Employing a Random-Effects GLS estimation allows controlling for time-invariant variables such as gender. As Dodescu et al. [34] have documented, ESE, EK, and IR do not pass their effect directly to EI. Consequently, we propose adding interaction terms between ESE and EA, PBC and SN, and between the benefits of EE and the traditional antecedents of EI in our Random-Effects GLS estimation. Adding the interaction terms allows us to understand better how EE's benefits influence EI formation and whether ESE moderates the relationship between EI and its traditional antecedents.

Thus, our proposed GLS Random-effects estimation is:

$$EI_{it} = \beta_0 + \beta_1 (X'_{it}) + v_t + \alpha_i + u_{it} \quad (1)$$

where i = 1, 2, . . . , 313 is the index corresponding to individuals involved in analysis and t = 1–2 is the index for time–we have data for years 2020 and 2021.

X_{it} is a vector containing the exogenous variables used in the analysis. Besides the traditional antecedents of EI (EA, PBC and SN), X_{it} also includes the benefits of EE program

(EK and IR) and ESE. Interaction terms as previously mentioned are also included in the X_{it} term of Equation (1).

V_t in Equation (1) corresponds to the time-dependent variables. In our case, the V_t in Equation (1) consists of a dichotomous variable (Year2) which accounts for the environment corresponding to our second time period of the analysis.

α_i is the time-invariant component included in the analysis. In our case α_i corresponds to Genre, the binary variable used to account for gender differences in entrepreneurial intentions. The dependent variable is EI_{it}. The idiosyncratic error is u_{it} whereas the β_0 is the intercept and β_1 corresponds to the estimated coefficients of the exogenous variables.

In order to assess the temporal stability of EI and its antecedents, we propose using an LDS approach. An LDS model is basically the equivalent of a re-formulated longitudinal confirmatory factor analysis (CFA) model. For two time points (t_1 and t_2), an LDS model is implementing a simple structural model with two latent variables, according to a structural equation [19] (Equation (2)).

$$\tau_2 = \tau_1 + (\tau_2\text{-}\tau_1) = \tau_1 + \Delta\tau \quad (2)$$

In Equation (2), τ_1 corresponds to the initial scores and τ_2 to the latent score at time t_2. $\Delta\tau$ is the latent change score, which, as shown in Equation (3) is the difference between τ_2 and τ_1. The corresponding measurement model is presented in Equation (3).

$$v_{it} = \alpha_i + b_i \times \tau_i + \varepsilon_{it} \quad (3)$$

In Equation (3), the index "i" indicates the item or indicator variable. In our case, we use "n" items to measure our latent constructs τ_1 and τ_2, as shown in Figure 1. Index "t" corresponds to time points (t_1 and t_2 in our case). α_i is the intercept, assumed to be time-invariant for strong measurement equivalence across time. b_i is the factor loading, also assumed time-invariant. τ_i is the latent factor at time point "t". ε_{it} is the variable and time-specific measurement error.

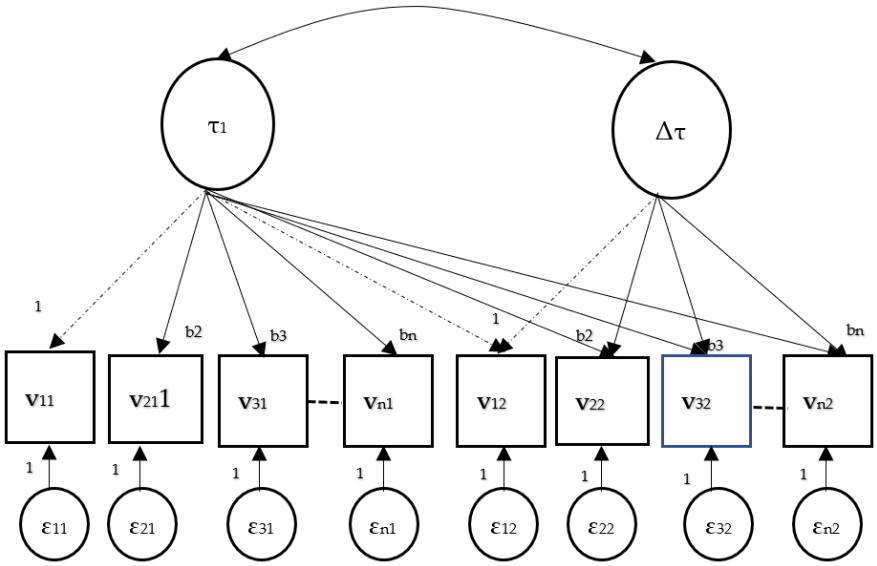

Figure 1. LCS model.

Combining Equations (2) and (3) allows us to define an LCS model presented in Figure 1, which can be implemented in statistical software.

Figure 1 shows that the latent construct for the initial period (τ1) loads on the indicator variables (v_{i1}, $i = \overline{1,n}$). The latent change factor (Δτ) loads both on the indicator variables used to measure τ1 and on the indicator variables used to measure τ_2 (vi_2, $i = \overline{1,n}$). Figure 1 also shows that we have required time-invariant loadings for measure-

ment invariance across time. The loadings bi ($i = \overline{1,n}$) and their error components (ε_{it}, $i = \overline{1,n}, t = \{1,2\}$) in Figure 1 correspond to factor loadings and measurement errors in Equation (3). Additionally, intercepts were also constrained in order to ensure the measurement invariance of our constructs across time.

Using a structural model based on a latent chance score variable to assess inter-individual differences and intra-individual changes is superior to simply taking the observed variables and computing differences directly because the latter approach transfers the measurement error to the observed differences. A latent score difference instead avoids this problem since we already have accounted for the measurement error in the indicator variables used to define our $\tau 1$ and $\Delta\tau$ latent constructs [19]. In operationalizing the LDS model, we opted for the estimation strategy displayed in Figure 1.

Our proposed estimation strategy based on the LDS model allows us to follow Liñán, Rodriguez-Cohard, and Rueda-Cantuche [44], Joensuu et al. [56,57] to investigate the stability of EI and its antecedents (i.e., EA, SN, and PBC). Santos et al. [77] show that during the COVID-19 pandemic students have become more attracted to becoming entrepreneurs. Lungu et al. [18] also document an increase in entrepreneurial intentions, as the COVID-19 pandemic resulted in new opportunities for entrepreneurs. Consequently, we formulate the research hypotheses H1:

Hypothesis H1. *Entrepreneurial intentions (EI) have increased over the investigated period.*

Extensive empirical evidence documents the usefulness of the theory of planned behavior in predicting entrepreneurial intentions [20,33]. In the light of empirical studies documenting an increase in entrepreneurial intentions during the COVID-19 crisis Santos et al. [77], corroborated with empirical studies that show positive and statistically significant relationships between the change in entrepreneurial intentions and changes in their antecedents [57], we formulate H2.

Hypothesis H2. *Entrepreneurial attitudes (EA), perceived behavioral control (PBC) and subjective norms (SN) have increased over the investigated period.*

Our Random-effects GLS regression allows us to follow Yunita et al. [78] and Krichen and Chaabouni [12] in order to investigate the impact of the COVID-19 crisis on students' entrepreneurial intentions. Based on the work by Lungu et al. [18], which underlines that the COVID-19 pandemic resulted in new opportunities for entrepreneurs, we formulate the third hypothesis of our research:

Hypothesis H3. *The COVID-19 pandemic environment has positively affected the students' entrepreneurial intentions (EI) over the investigated period.*

EI literature acknowledges that entrepreneurial self-efficacy (ESE) is a key determinant of entrepreneurial intentions (EI) [71]. The theory of planned behavior shows that exogenous variables do not affect intentions directly [20,34]. Indeed, in our previous research [34] we have shown that the benefits of ESE are not being directly transmitted to EI. In their turn, Kuen-Hung, Hui-Chen, and Chen-Yi [79] extend the link between entrepreneurial self-efficacy and intention, proposing a moderation model. More specifically, they show that the impact of attitudes toward entrepreneurship (EA), perceived behavioral control (PBC) and subjective norms (SN) on intentions (EI) increases with entrepreneurial self-efficacy (ESE). Following [79] we propose our fourth research hypothesis:

Hypothesis H4. *The link between entrepreneurial intentions (EI) and its traditional antecedents (entrepreneurial attitudes, perceived behavioral control, and subjective norms) is positively influenced by entrepreneurial self-efficacy (ESE).*

Relying on our previous study [34] and also on other empirical studies, which document that entrepreneurship education is contributing to the development of students' entrepreneurial intentions [50], our GLS Random-Effects modeling strategy allows us to investigate whether the benefits of entrepreneurship education moderate the relationship between entrepreneurial intentions and their traditional antecedents. A moderation model

of the impact of entrepreneurial education on entrepreneurial intentions (EI) is proposed by Shahab et al. [80]. In the above-mentioned study, authors show that with entrepreneurship education individuals can successfully develop entrepreneurial attitudes (EA) to nurture their entrepreneurial intentions (EI). Furthermore, as Lee et al. [81] infer, entrepreneurship education can engender perceived behavioral control (PBC) since benefitting from entrepreneurship knowledge helps build confidence in individuals' abilities to start a new business. It is also likely that people from close environments would increasingly approve of an entrepreneurial decision once entrepreneurship programs supply students with the required knowledge and resources. Based on all these arguments we formulate our fifth research hypothesis:

Hypothesis H5. *The link between entrepreneurial intentions (EI) and its traditional antecedents (entrepreneurial attitudes, perceived behavioral control, and subjective norms) is positively influenced by Entrepreneurial Knowledge (EK), and Inspiration and Resources (IR).*

The EI literature which investigates the gender differences in the levels of EI and its antecedents has documented the existence of a gender gap in entrepreneurship, with women being less successful entrepreneurs than men [45,73–75,82,83]. However, as Shinnar et al. [82] point out, entrepreneurship education which is targeting women is likely to lead to more gender balance among nascent entrepreneurs. Since the starting point of the present study is a program at the University of Oradea addressing inclusiveness by promoting entrepreneurship of students from social categories at risk in the labor market, including women, based on Shinnar et al. [82] we formulate our sixth research hypothesis:

Hypothesis H6. *There are no gender-related differences in the students' EI over the investigated period.*

4. Data and Method

4.1. Data

Data were attained in two waves (t1 and t2), utilizing a questionnaire distributed among undergraduate students enrolled in a two-year cross-campus entrepreneurship program. The original study collected data via an online questionnaire in the spring of 2020 (t1). A total of 313 students completed the questionnaire in full. Participants in the original study were contacted in June 2021 at the end of the program for a follow-up study (t2). Our strategy for collecting data relied once again on an online questionnaire. However, having encountered a low response rate, we have reapplied the questionnaire in July 2021, using a classic 'paper-pencil' approach to collecting the data. We have received 323 responses, but 10 were excluded from the analysis because the respondents were not listed in our first wave of data collection. Non-response bias is not an issue since we have received matched responses from students enrolled in both original and the follow-up study.

Our longitudinal analysis uses a dataset with 100 male students and 213 female students from non-economics programs (engineering sciences and constructions, 30.35%; social sciences and law, 20.49%; medicine and pharmacy, 22.33%; environmental sciences, 14.37% and mathematics-informatics, 12.46%). 68% of the subjects included in our study were women. 65% of the subjects come from rural areas. The students from non-economic programs have the advantage that their EI is not contaminated by prior exposure to business classes [34]. Additionally, an important percentage of them are STEM individuals (i.e., students that learn to use their knowledge of science, technology, engineering, or math to try to solve economic problems) with higher chances to start high growth technology-based businesses [50] or green-based business [10].

4.2. Measurement Model

The survey questionnaire was configured based on validated and reliable measurement scales found in the EI literature. Our previous research [34] presented the effort invested in reviewing the literature to identify measurement scales employed in different studies. In sum, we based our measurement scale for EI and Subjective norms on Liñán

and Chen's [33] and Lorz's [84]. A scale proposed by Liñán and Chen [33] and Lorz [84] was adapted to our context to measure subjective norms and perceived behavioral control. Measuring ESE was based on Chen, Greene, and Crick [85] and for the benefits of EE, we have turned to the scale proposed by Souitaris, Zerbinati, and Al-Laham [50]. All the items used in our measurement model and their source are presented in Appendix A.1.

Control variables describe exogenous influences on the dependent variable. Demographics, such as gender or family background or other control variables like previous work experience, are often used to "control" the possible effect on the dependent variable. Our research questionnaire collected data on variables such as gender, the field of study, work experience, and environment of origin (urban/rural). The effect on EI of gender, previous work experience, and environment of origin have been investigated in the original study [34].

4.3. Method

Previous research has presented that we have rigorously tested the adequacy of measurement scales by reviewing existing literature [34]. The results indicated that the scales used in our analysis measure all aspects of the underlying concepts, and all the items are conceptually/theoretically linked to the construct. In evaluating the measurement model for our constructs, we assessed the convergent reliability, internal consistency, and discriminant validity of the reflective constructs employed in the analysis.

We have conducted a standard method bias test using Harman's single factor method test for standard method variance. With all indicator variables included in a CFA analysis, one factor explains only 14.3% of the variance, and the factors with Eigenvalues greater than 1 explain 59.96% of the total variance. While the possibility of bias attributable to the standard method cannot be entirely neglected [56], the results of Harman's test indicated that standard method variance bias does not affect our subsequent analysis.

Our LCS analysis was performed in R, based on Lavaan. Estimation of the GLS Random-Effects model was also carried out in R. A baseline model without interaction terms was first estimated. Subsequently, we added to the baseline model the interaction terms and estimated the corresponding models. We chose to estimate separate models for each interaction involved in our analysis in order to allow a correct inference about the moderation effects.

We used seven latent variables in our analysis: Entrepreneurial Attitude (EA), Perceived Behavioral Control (PBC), Subjective Norms (SN), Entrepreneurial Intentions (EI), Entrepreneurial Self-Efficacy (ESE), Entrepreneurial Knowledge (EK), and Inspiration and Resources (IR). In building the IR construct, we have combined two benefits of EE, namely program-derived Entrepreneurial Inspiration and Incubation Resources. For each construct, we have measured the initial scores (at time t1), the scores at time t2, and the latent difference scores. Consequently, EA1, PBC1, SN1, ESE1, EK1, and IR1 are the initial scores of our latent construct. With "Δ," we represented the latent difference scores for our constructs, and EA2, PBC2, SN2, ESE2, EK2, and IR2 are the scores of our constructs at time t2.

In evaluating the measurement model and its items, we considered the statistical significance of outer weight and VIF statistics to assess multicollinearity. For determining the reflective constructs, we considered the indicator reliability, internal consistency, convergent reliability, and discriminant validity of the constructs utilized in the analysis.

Taking the recommendation of McArdle et al. [19], we test the stability of our constructs by using an LDS model. To estimate the relationship between EI and its determinants, we employ a GLS Random effect estimation using STATA. Following recommendations from previous research in the field [30,32,39,44,56,57,86], we aggregated scales by generating factor scores which were subsequently employed as inputs in the GLS Random Effects estimation. Our choice for a Random-Effects model was based on a Hausman Test (H0–random effects are independent of explanatory variables). The results of the Hausman test (chi2 = 17.20, Prob > chi2 = 0.372) indicate that we cannot reject the null hypothesis and, consequently, we have opted for a Random Effects model instead of a Fixed-Effects one.

5. Results

Descriptive statistics of the latent constructs at both time points (t1, t2) are presented in Table 1 and correlations in Appendix A.2.

Table 1. Descriptive statistics.

Variable	Mean	s.d.	Median	Min	Max	Range
	t1	t1	t1	t1	t1	t1
	(t2)	(t2)	(t2)	(t2)	(t2)	(t2)
EK	3.05	0.65	3.00	1.50	5	3.50
	(3.94)	(0.70)	(4)	(2.20)	(5)	(2.80)
IR	3.24	0.83	3.25	1.25	5	3.75
	(4.2)	(0.70)	(4.33)	(1.44)	(5)	(3.56)
EA	3.94	0.64	4.00	1.00	5	4.00
	(4.11)	(0.68)	(4.00)	(1.80)	(5)	(3.20)
SN	11.50	5.27	11.33	1.00	25	24.00
	(15.66)	(4.50)	(16.00)	(3.00)	(25.00)	(22.00)
PBC	2.33	1.08	2.00	1.00	5	4.00
	(3.60)	(0.72)	(3.50)	(1.50)	(5)	(3.50)
ESE	3.59	0.65	3.50	1.33	5	3.67
	(3.85)	(0.64)	(3.95)	(2)	(5)	(3)
EI	2.67	1.15	2.50	1.00	5	4.00
	(3.63)	(0.75)	(3.62)	(1.50)	(5)	(3.50)

Since most correlations were significant, data were tested for multicollinearity. The variance inflationary factor values were below the 0.2 threshold recommended by Tehseen et al. [87] and thus we have confirmed that data were not affected by the multicollinearity issue.

5.1. Measurement Model Analysis

In our analysis of the measurement model, we included all factors in the analysis. Measurement model indicated good fit (t1: cfi = 0.934, RMSEA = 0.046, SRMR = 0.058, t2: cfi = 0.903, RMSEA = 0.051, SRMR = 0.063). Factor loadings at both time points are presented in Annex 3. All the loadings are above the 0.5 threshold recommended by Hulland [88] and are highly statistically significant. Values of Cronbach's alpha are above the 0.7 threshold in all cases [89]. All values of Average Variance Extracted (AVE) are greater than the threshold level of 0.5 suggested by Bagozzi and Yi [90], indicating convergent reliability.

5.2. Structural Model Analysis

Estimated intercepts for the latent change factor are presented in Table 2.

Table 2. Estimated Intercepts for our latent scores.

	Estimate	S.E.	z-Value
EI1	2.590 ***	0.118	22.028
ΔEI	0.859 ***	0.139	0.646
EA1	3.806 ***	0.065	58.650
ΔEA	0.097 *	0.088	1.108
PBC	2.335 ***	0.103	22.718
ΔPBC	1.022 ***	0.123	8.334
ESE1	3.436 ***	0.064	53.562
ΔESE	0.219 **	0.092	2.393
EK1	3.103 ***	0.076	40.954
ΔEK	0.836 ***	0.101	8.267
IR1	2.842 ***	0.106	26.682
ΔIR	1.416 ***	0.125	11.287
SN1	4.334 ***	0.104	41.574
ΔSN	0.511 ***	0.124	4.138

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

As Table 2 shows, all the estimated intercepts for the latent change variables are positive and statistically significant, showing that, on average, they have changed over the investigated period.

Covariances produced by our structural model are shown in Table 3.

Table 3. Estimated covariances.

Covariance	Std. Estimate	S.E.
EI1~~EK1	0.313 ***	0.045
EI1~~IR1	0.247 ***	0.061
EI1~~EA1	0.676 ***	0.047
EI1~~SN1	0.081 ***	0.032
EI1~~PBC1	0.634 ***	0.085
EI1~~ESE1	0.426 ***	0.044
ΔEI~~EK2	0.322 ***	0.028
ΔEI~~IR2	0.154 **	0.028
ΔEI~~EA2	0.732 ***	0.037
ΔEI~~SN2	0.243 ***	0.024
ΔEI~~PBC2	0.654 ***	0.040
ΔEI~~ESE2	0.649 ***	0.035
EI1~~ΔEI	−1.097 ***	0.13
EA1~~ΔEA	−0.256 ***	0.038
PBC1~~ΔPBC	−0.669***	0.097
SN1~~ΔSN	−0.533 ***	0.083
ESE1~~ΔESE	−0.32 ***	0.043
EK1~~ΔEK	−0.312 ***	0.042
IR1~~ΔIR	−0.868 ***	0.098
Genre~~EI_1	0.155 **	0.039
Genre~~ΔEI	−0.026	0.110
Genre~~EA_1	0.149	0.029
Genre~~ΔEA	−0.016	0.077
Genre~~PBC_1	0.172 **	0.045
Genre~~ΔPBC	0.054	0.116
Genre~~SN_1	0.349 **	0.037
Genre~~ΔSN	0.065 *	0.037

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

All covariances are statistically significant. Estimated variances are presented in Table 4.

Table 4. Estimated variances.

Latent Construct	Estimate	S.E.	z-Value
EI1	1.217 ***	0.109	1.154
EA1	0.32 ***	0.03	10.774
SN1	0.728 ***	0.085	8.597
PBC1	0.812 ***	0.083	9.749
ESE1	0.318 ***	0.031	10.231
EK1	0.471 ***	0.045	10.575
IR1	0.991 ***	0.09	10.964
ΔEI	1.765 ***	0.156	11.334
ΔEA	0.681 ***	0.062	10.958
ΔPBC	1.242 ***	0.121	10.236
ΔEK	0.898 ***	0.082	10.927
ΔSN	0.893 ***	0.107	8.348
ΔESE	0.742 ***	0.068	10.988
ΔIR	1.385 ***	0.126	10.965

Note: *** $p < 0.01$.

As Table 4 shows, all estimated variances of our latent constructs are statistically significant. The estimated variances for the latent change score are higher than the variances of the initial latent constructs.

5.3. Results of the GLS Random-Effect Estimation

As shown in Table 5, model 1 is the baseline model, without interaction terms. Subsequently, we added interactions to the baseline model and estimated Model 2–Model 10. Thus, each interaction was added to the baseline model and estimated separately in order to allow a correct inference about the moderation effect. Table 5 displays the estimated coefficients and, in parentheses, the robust standard errors. R-statistical software was employed in our GLS Random-Effects estimations. All models were correctly specified (p-value is 0.000). The overall adjusted R-squared is presented in Table 5.

Table 5. Results of the GLS Random-Effect Estimations.

	Dependent Variable: EI									
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
EA	0.594 *** (0.057)	0.544 *** (0.052)	0.590 *** (0.057)	0.594 *** (0.057)	0.503 *** (0.180)	0.597 *** (0.057)	0.589 *** (0.056)	0.782 *** (0.207)	0.608 *** (0.057)	0.580 *** (0.055)
PBC	0.303 *** (0.046)	0.297 *** (0.046)	0.717 *** (0.165)	0.303 *** (0.046)	0.302 *** (0.046)	0.546 *** (0.117)	0.297 *** (0.045)	0.306 *** (0.046)	0.670 *** (0.122)	0.302 *** (0.046)
SN	0.019 *** (0.007)	0.020 *** (0.007)	0.017** (0.007)	0.024 (0.028)	0.019 *** (0.007)	0.018 *** (0.007)	0.097 *** (0.027)	0.018 *** (0.007)	0.019 *** (0.007)	0.112 *** (0.026)
ESE	0.171 (0.064)	0.351 (0.176)	0.499 (0.140)	0.191 (0.108)	0.169 (0.064)	0.180 (0.064)	0.156 (0.062)	0.178 (0.064)	0.194 (0.064)	0.165 (0.062)
EK	0.035 (0.052)	0.037 (0.052)	0.033 (0.053)	0.035 (0.052)	0.090 (0.098)	0.096 (0.114)	0.092 (0.111)	0.034 (0.052)	0.025 (0.052)	0.018 (0.052)
IR	0.018 (0.046)	0.009 (0.046)	0.027 (0.046)	0.019 (0.046)	0.018 (0.046)	0.017 (0.046)	0.023 (0.045)	0.127 (0.092)	0.148 (0.095)	0.142 (0.097)
Genre	−0.170 *** (−0.059)	−0.163 *** (−0.060)	−0.179 *** (−0.059)	−0.171 *** (−0.0590)	−0.167 *** (−0.060)	−0.183 *** (−0.059)	−0.181 *** (−0.059)	−0.176 *** (−0.059)	−0.186 *** (−0.058)	−0.170 *** (−0.058)
Year2	0.364 *** (0.084)	0.372 *** (0.084)	0.348 *** (0.084)	0.364 *** (0.084)	0.365 *** (0.084)	0.350 *** (0.084)	0.367 *** (0.082)	0.362 *** (0.084)	0.371 *** (0.083)	0.371 *** (0.083)
Interaction	–	EA:ESE	PBC:ESE	SN:ESE	EA:EK	PBC:EK	SN:EK	EA:IR	PBC:IR	SN:IR
		0.128 ** (0.043)	0.109 *** (0.040)	0.001 (0.007)	0.027 (0.048)	0.052 (042)	0.023 *** (0.006)	0.073 ** (0.032)	0.102 *** (0.030)	0.024 *** 0.006
Adjusted R2	0.595	0.599	0.600	0.595	0.595	0.597	0.601	0.596	0.601	0.605

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

As the baseline model (Model 1) reveals, entrepreneurial attitude (EA), perceived behavioral control (PBC), and subjective norms (SN) have a positive and statistically significant impact on entrepreneurial intentions (EI). Furthermore, as shown by Model 2–Model 10, adding the interaction term does not change the sign or the statistical significance of the estimated coefficients corresponding to the traditional antecedents of entrepreneurial intentions (EI). The estimated coefficients for entrepreneurial self-efficacy (ESE) and for the benefits of entrepreneurship education (EK, IR) are not significant, regardless of the specification. Genre and the dummy estimate for the second year are highly statistically significant. The interaction terms are not all statistically significant.

6. Discussion

6.1. Support for the Research Hypothesis

The results inserted in Table 2 document the existence of an average change over the considered period (t1–t2). Also, statistically significant variances for the latent change score underline the existence of inter-individual differences in how much people change over time (Table 3). A change in EI and its antecedents (EA, SN, and PBC) over the investigated period supports H1 and H2 of the present study.

Our GLS estimation includes a year dummy for our second wave of data. This dummy variable captures the characteristics of the environment in which students have formed their EI. Table 5 shows that the estimated coefficient for Year2 is positive and statistically significant in all cases, offering support for our third research hypothesis (H3). As shown in Table 6, statistically significant interaction terms show that ESE moderates the relationship between EI and two traditional antecedents of EI: EA and PBC. On the contrary, EK moderates the relationship between EI and SN. Insofar as IR are concerned, moderation is present for all traditional antecedents of EI. Thus, since the data do not support a moderation effect of ESE on the relationship between EI and SN, our support for H4 is partial. Similarly, interactions between EK*PBC and EK*EA are not statistically significant. Thereby we conclude that support for H5 is also mixed.

Table 6. Summarizes the results of our research hypothesis.

Research Hypothesis	Results
H1: Entrepreneurial intentions (EI) have increased over the investigated period	Supported
H2: Entrepreneurial attitudes (EA), perceived behavioral control (PBC) and subjective norms (SN) have increased over the investigated period	Supported
H3: The COVID-19 pandemic environment has positively affected the students' EI over the investigated period	Supported
H4: The link between entrepreneurial intentions (EI) and its traditional antecedents (entrepreneurial attitudes, perceived behavioral control, and subjective norms) is positively influenced by entrepreneurial self-efficacy (ESE).	Mixed results. Partially supported
H5: The link between entrepreneurial intentions (EI) and its traditional antecedents (entrepreneurial attitudes, perceived behavioral control, and subjective norms) is positively influenced by Entrepreneurial Knowledge (EK), and Inspiration and Resources (IR).	Mixed results. Partially supported
H6: There are no gender-related differences in the students' EI over the investigated period	Mixed results. Partially supported

Covariances between Genre and initial scores document initial differences between individuals concerning their EI, PBC, and SN. However, the covariance between Genre and EA1 is not significant. Further on, differences between men and women in the way they have changed exist only for their SN. Additionally, our GLS Random-effects estimation shows a negative and statistically significant relationship between Genre and EI, regardless of the specification. Since the Genre variable is a dichotomous variable (F = "1", M = "0"), the negative coefficient means that EI intentions are lower for women than for men. So, basically, our analysis offers mixed results in support of our sixth research hypothesis (H6).

6.2. Entrepreneurial Intentions Increased during the COVID-19 Pandemic Period

Investigating the stability of our constructs, we found several useful insights. Estimated intercepts (Table 2) document that, on average, EI and its antecedents have increased during the pandemic. Also, the Year2 dummy variable, which controls for the characteristics of the environment in the GLS Random-Effects estimation, is positive and statistically significant, showing that EI has increased during the COVID-19 pandemic period.

These findings are consistent with Santos et al. [77], which also shows that during the COVID-19 pandemic, students have become more attracted to becoming entrepreneurs. Our results further corroborate with Lungu et al. [18], which have underlined that the COVID-19 pandemic brings to the frontline a wide range of economic activities and opportunities for entrepreneurs–for instance, economic activities that take place on digital platforms and apps ("gig economy"). Our opinion is that the increase in students' EI is also attributable

to the negative impact of the COVID-19 pandemic on the economy. As shown previously, many people have already lost their jobs while others accept nonstandard work models, such as working extra shifts or longer hours, temporary work contracts, reduced wages, etc. Under these circumstances, entrepreneurship or self-employment in the "gig economy" that enables flexible work arrangements has become an increasingly attractive employment alternative, offsetting the adverse conditions in the labor market.

6.3. Inter-Individual Differences and Intra-Individual Changes

As an additional characteristic of the increase in EI and its antecedents, we found that covariances between the initial scores of our latent constructs and the corresponding latent change scores are negative and statistically significant (Table 4). This indicates that individuals with initial higher scores for EI, EA, PBC, PBC, EK, and IR have changed less than those with lower initial scores. Furthermore, covariances (Table 3) show the existence of a gender difference in the initial level of EI and its antecedents, with lower levels of EI, PBC, and SN for women. However, we have not found evidence for a gender differential concerning our latent change constructs measuring EI, EA, and PBC. Changes are different between men and women only insofar as SN is concerned (Genre~~ΔSN = 065*).

The inter-individual differences and intra-individual EI changes can be linked with personality attributes (e.g., creativity, risk-propensity). Thus, as Cater et al. [11] found, under challenging circumstances such as the COVID-19 pandemic, individuals with a higher risk propensity and creativity are more likely to increase their EI than those with less risk propensity and creativity. The estimated variances (Table 4) document the inter-individual differences and intra-individual differences in change, bringing, therefore, additional information that is not available when using t-test analysis.

6.4. Support for the TPB Framework

The LCS model estimates the covariances between the initial levels of our latent constructs and EI. As Table 3 shows, they are all positive and statistically significant, indicating that individuals with initially higher levels of EA, PBC, and SN also had initial higher levels of EI, as expected within the framework of the TPB. Similarly, greater latent changes in EA, PBC, SN, ESE, EK, and IR are associated with greater changes in EI (Table 3). Results of the GLS Random Effects estimations show that the estimates corresponding to EA, PBC, and SN are positive and statistically significant. Moreover, the effects of ESE, EK, and IR do not directly affect the EI, indicating support for the framework of TPB in estimating the relationship between EI and its traditional antecedents.

6.5. Moderation Effects

Including interaction terms allowed us to test for moderation effects in our estimation. We have found that ESE moderates the relationship between EI with EA and PBC. This finding is in accordance with previous empirical studies [45,71].

While EK is successfully moderating the relationship between SN and EI, resources and inspiration provided by the EE programs are also efficient in increasing the impact of EA and PBC on EI, which is consistent with recommendations for a practical approach to EE programs literature [56,70,76,91–93]. On the positive side, the EE program at the University of Oradea has successfully provided the inspiration and the resources that have enhanced the relationship of EI with all its traditional antecedents. In this respect, we believe that the positive impact of IR on students' EI is also attributable to successfully designing at the University of Oradea an EE program that blends a taught component and interaction with the business environment as Souitaris, Zerbinati, and Al-Laham [50] has recommended. For example, we have developed a business planning competition, which has offered students the opportunity to interact closely with the representatives of the local entrepreneurial ecosystem who offered support for start-ups, incubation opportunities, and access to finance opportunities for winners. Additionally, adding career and life skills development coaching to customized curricula focusing on entrepreneurial skills

development has also contributed to the positive relationship between IR and students' EI. Notably, the EE program at the University of Oradea has successfully captured the accelerated digitization induced by the COVID-19 pandemic. Facilitating students' access to information, IR made available to students has successfully increased the impact on EI of its traditional antecedents.

7. Concluding Remarks and Future Research

Our longitudinal study has analyzed the evolution of students' EI and its antecedents over the COVID-19 pandemic period, exploring the inter-individual differences and the intra-individual changes. The present research proposes EI estimation techniques that accommodate the assumptions needed for longitudinal analysis and allows assessing the complex role of EE and its benefits on the formation of students' EI.

The study was undertaken using a sample of 313 Romanian students enrolled in an EE program between 2019-and 2021 at the University of Oradea. Our analysis relies on the framework of Ajzen's TPB, and longitudinal data were collected in two waves, in 2020 and 2021. The empirical longitudinal analysis is based on the LCS model, which has not been used in EI research previously. Our LCS estimation surmounts the disadvantage of a simple t-test technique by relying entirely on a latent variable for estimation. Constraining factor loadings and intercepts to be time-invariant allows us to estimate the latent means for the initial latent construct and the latent change factor. Using a GLS Random-Effects model allowed us to investigate the moderation in our estimation of students' EI.

Our empirical results show that students' EI enrolled in the EE program has increased during the COVID-19 pandemic times. Second, individuals with initial higher scores for EI, EA, PBC, PBC, EK, and IR have changed less than those with lower initial scores, and there is a gender difference in the initial level of EI and its antecedents, with lower levels of EI, PBC, and SN for women. Finally, our results show that the framework of TPB is efficient in evaluating both the stability of our constructs and the complex relationships that govern the formation of EI.

This paper contributes to the literature on EI, providing empirically-based suggestions for improving EE programs. Results suggest that EI development through higher EE programs in the COVID-19 context is not a simple matter but rather a complicated process. We recommend universities encourage potential entrepreneurs by implementing innovative action-based methods in their EE programs, propelling them as active opportunities searchers. Working in multidisciplinary groups, involving students in real activities, and encouraging inspiration from local entrepreneurial ecosystems by working in close collaboration with non-academic stakeholders (especially private companies and business support structures) can also offer guidance and practical support to students seeking an entrepreneurship career. Additionally, in designing EE programs, universities should strive to reduce the gender differential in the EI formation to widen the access to and dissemination of entrepreneurship-related knowledge to under-represented categories in entrepreneurship.

As a limitation of the present research, we acknowledge that Romanian students' EI may differ from those of the general population from Romania or from those of other countries. Additionally, our methodological approach to research employed a quantitative procedure. We acknowledge that adding a qualitative dimension to our research would better allow us to measure the participants' perceptions regarding entrepreneurship and experiences related to their participation in the entrepreneurship program. As recommended by Gaworski et al. [69], including qualitative items in the research questionnaire would subsequently allow identifying relevant research problems. Most importantly, qualitative items would better allow the researcher to distinguish criteria used by students in evaluating the benefits of entrepreneurship programs [69].

In this respect, we intend to collect the third wave of data one year after EE program graduation, adding a qualitative component to the research. This would allow us to address

the "strategic window" issue first mentioned by Harvey and Evans [94], which is specific to estimations of EI based on students' datasets.

Our subsequent research will further test the TPB by analyzing the link between intentions and behavior. Additionally, collecting data for a third-time point will allow us to use a growth curve model, which is the other panel technique for latent constructs that can be applied in the context of EI. To assess the complex relationships between EI and its antecedents, we intend to use a technique that is efficient and robust to heteroscedasticity and autocorrelation.

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Appendix A

Appendix A.1

The study's main variables along with their sources and their theoretically designated factors.

Variable	Sources
Attitude towards Entrepreneurship (EA), with 5 items: 1. Being an entrepreneur implies more advantages than disadvantages to me; 2. A career as entrepreneur is attractive for me; 3. If I had the opportunity and resources, I would like to start a business; 4. Being an entrepreneur would entail great satisfactions for me; 5. Among various options, I would rather be an entrepreneur	Liñán & Chen (2009)
Subjective Norms (SN), with 2 multiple answers items: 1. people from the close environment that should approve a potential entrepreneurship decision (close family, close friends, close friends from faculty); 2. people from close environments which opinions are important (close family, close friends, close friends from faculty)	adopted from Liñán & Chen (2009); Lorz (2011) and adapted to our context
Perceived Behavioral Control (PBC), with 6 items: 1. To start a firm and keep it working would be easy for me; 2. I am prepared to start a viable firm; 3. I can control the creation process of a new firm; 4. I know the necessary practical details to start a firm, 5. I know how to develop an entrepreneurial project, 6. If I tried to start a firm, I would have a high probability of succeeding	Liñán & Chen (2009)
Entrepreneurial Intention (EI), with 8 items: 1. I am ready to do anything to be an entrepreneur; 2. My professional goal is becoming an entrepreneur, 3. I will make every effort to start and run my own firm, 4. I am determined to create a firm in the future, 5. I have very seriously thought of starting a firm, 6. I have got the intention to start a firm in the next 2 years, 7. I have got the intention to start a firm in the next 2 to 5 years. 8. I have got the intention to start a firm some day	Liñán & Chen (2009), for items 1–5 Lorz (2011), for items 6–8

Variable	Sources
Entrepreneurial Self-efficacy (ESE), with 5 multiple items: Marketing (1. Set and meet market share goals; 2. Set and meet sales goals; 3. Set and attain profit goals; 4. Establish position in product market; 5. Conduct market analysis; 6. Expand business); Innovation (1. New venturing and new ideas; 2. New products and services; 3. New markets and geographic territories; 4. New methods of production, marketing and management); Management (1. Reduce risk and uncertainty; 2. Strategic planning and develop system; 3. Manage time by setting goals; 4. Establish and achieve goals and objectives; 5. Define organizational roles, responsibilities, and policies); Risk-taking (1. Take calculated risks; 2. Make decisions under uncertainty and risk; 3. Take responsibility for ideas and decisions; 4. Work under pressure and conflict); Financial control (1. Perform financial analysis; 2. Develop financial system and internal controls; 3. Control cost).	Chen, Greene, and Crick (1998)
Entrepreneurial Knowledge (EK), with 5 items: To what extent did the entrepreneurship program (1) increase your understanding of the attitudes, values and motivation of entrepreneurs (i.e., why do entrepreneurs act?); (2) increase your understanding of the actions someone has to take in order to start a business (i.e., what needs to be done?); (3) enhance your practical management skills in order to start a business (i.e., how do I start the venture?); (4) enhance your ability to develop networks (i.e., who do I need to know)?; (5) enhance your ability to identify an opportunity (i.e., when do I need to act?)	Souitaris, Zerbinati, and Al-Laham (2007)
Inspiration and Resources construct (IR), with 2 multiple answers items: 1. event/situation experienced, or person met during the entrepreneurship education program that changed drastically individual's "heart and mind" to intend to become an entrepreneur; 2. entrepreneurship learning resources and the extent to which one individual has benefited from	Self-constructed in spirit with Souitaris, Zerbinati, and Al-Laham (2007); Lorz (2011)

Appendix A.2

Correlations latent constructs.

	EI1	Ea1	PBC1	SN1	ESE1	EK1	IR1	ΔEI	ΔEA	ΔPBC	ΔSN	ΔESE	ΔEK	ΔIR
EI1	1	0.742 **	0.534 **	0.352 **	0.490 **	0.380 **	0.262 **	−0.015	0.010	−0.154 **	−0.041	−0.069	−0.053	−0.138 *
EA1	0.742 **	1	0.490 **	0.376 **	0.617 **	0.526 **	0.294 **	0.033	0.018	−0.051	0.031	0.010	0.037	0.007
PBC1	0.534 **	0.490 **	1	0.273 **	0.598 **	0.479 **	0.290 **	−0.005	−0.060	0.110	−0.060	−0.016	−0.028	0.006
SN1	0.352 **	0.376 **	0.273 **	1	0.475 **	0.266 **	0.107	−0.083	−0.027	−0.070	0.164 **	−0.022	0.031	0.117 *
ESE1	0.490 **	0.617 **	0.598 **	0.475 **	1	0.741 **	0.366 **	−0.065	0.010	−0.019	0.185 **	−0.019	0.037	0.066
EK1	0.380 **	0.526 **	0.479 **	0.266 **	0.741 **	1	0.428 **	−0.046	0.007	0.031	0.011	−0.005	0.022	−0.011
IR1	0.262 **	0.294 **	0.290 **	0.107	0.366 **	0.428 **	1	−0.114 *	−0.074	−0.035	−0.044	−0.063	0.046	0.043
ΔEI	−0.015	0.033	−0.005	−0.083	−0.065	−0.046	−0.114 *	1	0.778 **	0.654 **	0.134 *	0.687 **	0.328 **	0.151 **
ΔEA	0.010	0.018	−0.060	−0.027	0.010	0.007	−0.074	0.778 **	1	0.661 **	0.275 **	0.609 **	0.419 **	0.289 **
ΔPBC	−0.154 **	−0.051	0.110	−0.070	−0.019	0.031	−0.035	0.654 **	0.661 **	1	0.134 *	0.688 **	0.300 **	0.163 **
ΔSN	−0.041	0.031	−0.060	0.164 **	0.185 **	0.011	−0.044	0.134 *	0.275 **	0.134 *	1	0.160 **	0.382 **	0.403 **
ΔESE	−0.069	0.010	−0.016	−0.022	−0.019	−0.005	−0.063	0.687 **	0.609 **	0.688 **	0.160 **	1	0.390 **	0.233 **
ΔEK	−0.053	0.037	−0.028	0.031	0.037	0.022	0.046	0.328 **	0.419 **	0.300 **	0.382 **	0.390 **	1	0.583 **
ΔIR	−0.138 *	0.007	0.006	0.117 *	0.066	−0.011	0.043	0.151 **	0.289 **	0.163 **	0.403 **	0.233 **	0.583 **	1

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

Appendix A.3

Estimated loadings, Cronbach Alpha, AVE and CR.

		Loadings		Cronbach's Alpha		AVE		CR	
		t1	t2	t1	t2	t1	t2	t1	t2
EI	v1	0.704 ***	0.784 ***	0.900	0.920	0.562	0.677	0.899	0.935
	v2	0.730 ***	0.872 ***						
	v3	0.817 ***	0.882 ***						
	v4	0.847 ***	0.939 ***						
	v5	0.832 ***	0.904 ***						
	v6	0.659 ***	0.735 ***						
	v7	0.628 ***	0.589 ***						
EA	v1	0.571 ***	0.694 ***	0.860	0.870	0.571	0.640	0.867	0.899
	v2	0.788 ***	0.811 ***						
	v3	0.738 ***	0.797 ***						
	v4	0.836 ***	0.862 ***						
	v5	0.814 ***	0.827 ***						
PBC	v1	0.636 ***	0.796 ***	0.790	0.880	0.514	0.683	0.840	0.914
	v2	0.673 ***	0.907 ***						
	v3	0.719 ***	0.882 ***						
	v4	0.498 ***	0.672 ***						
	v5	0.745 ***	0.853 ***						
SN	v1	0.673 ***	0.658 ***	0.720	0.740	0.565	0.541	0.789	0.779
	v2	0.813 ***	0.728 ***						
	v3	0.522 ***	0.519 ***						
ESE	v1	0.733 ***	0.783 ***	0.830	0.920	0.549	0.752	0.829	0.923
	v2	0.735 ***	0.923 ***						
	v3	0.792 ***	0.908 ***						
	v4	0.700 ***	0.847 ***						
EK	v1	0.739 ***	0.856 ***	0.890	0.880	0.611	0.719	0.887	0.927
	v2	0.817 ***	0.765 ***						
	v3	0.810 ***	0.840 ***						
	v4	0.783 ***	0.903 ***						
	v5	0.756 ***	0.869 ***						
IR	v1	0.800 ***	0.862 ***	0.890	0.880	0.700	0.725	0.874	0.888
	v2	0.948	0.819 ***						
	v3	0.75	0.873 ***						

Note: *** $p < 0.01$.

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