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Review Article

Longitudinal Research Opportunities on Entrepreneurship Education: A Utilization of GUESSS Data

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Abstract
This study fosters global research collaboration by leveraging GUESSS longitudinal data from 2018 and 2021 to generate high-impact academic publications. Utilizing a rigorous seven-stage systematic literature review, ranging from topic definition to findings synthesis, the research establishes a comprehensive empirical model for analysing entrepreneurial dynamics. The analysis reveals that entrepreneurial intentions and behaviours are influenced by a complex interplay of individual, familial, institutional, and national factors. Significant drivers include the structure of entrepreneurship education, perceptions of parental success, university climate, and national cultural dimensions. While current data constraints limit the scope of certain longitudinal analyses, the proposed model provides a robust starting point using available variables. To bridge existing research gaps, the study suggests expanding future GUESSS data collection to include cultural and institutional differences. Ultimately, this work provides a vital foundation for scholars to collaboratively examine the causal relationships between intention and action. By offering a roadmap to navigate multi-level influences on students, the study seeks to advance the global understanding of how diverse environments shape the next generation of entrepreneurs.

Keywords: career choice, entrepreneurship education, entrepreneurial intention, longitudinal data

INTRODUCTION

Entrepreneurship education is an interactive learning process that builds attitudes, skills, and knowledge for recognising, identifying, and realising business opportunities through real-world community-based business activities (Boon et al., 2013; Rodrigues, 2023). The outcomes of entrepreneurship education can be measured by students' improved skills in identifying business opportunities (Cohen et al., 2021; Fisher et al., 2008). Affectively, this improvement is evident in a shift in mindset toward the aspiration to establish a new enterprise or contribute to the growth of an established business (Kyro, 2008; McDonald et al., 2022). Cognitively, the improvement is evidenced by the student's enhanced critical thinking regarding the information and knowledge required to navigate business complexity (Jones & Colwill, 2013a; Talamás-Carvajal et al., 2024). The outcomes of entrepreneurship education can be observed in the number and performance of student-managed start-up ventures, as well as in their economic and societal impacts (Nabi et al., 2017; Zhao et al., 2022).

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Given that entrepreneurship education is a process, its impact cannot be observed in the short term; therefore, it opens opportunities to investigate its long-term effects. Unfortunately, the measurement of entrepreneurship education impact is dominated by subjective short-term measures, such as entrepreneurial attitudes and intentions (Martínez-Gregorio et al., 2021) and they rely on cross-sectional data, which present several limitations regarding causality, temporal change, and generalizability. Cross-sectional designs make it difficult to establish causal relationships between entrepreneurship education and entrepreneurial outcomes. For instance, while studies show that entrepreneurship education positively influences entrepreneurial intentions and self-efficacy, the causal link remains uncertain due to the cross-sectional nature of the data (Suratno et al., 2019). Cross-sectional studies also do not capture temporal change. This limitation is highlighted in research that suggests the need for longitudinal studies to better understand how entrepreneurship education impacts entrepreneurial intentions and behaviours over extended periods (Ahmed et al., 2017). Furthermore, the generalizability of findings from cross-sectional studies is often limited. For example, results from country-specific samples may not be applicable in different cultural contexts, as seen in studies that emphasise the role of national culture in shaping the impact of entrepreneurship education (Oo et al., 2018). Finally, cross-sectional studies focus on antecedents of entrepreneurial intentions rather than actual entrepreneurial behaviours.

This gap calls for more comprehensive evaluations of how entrepreneurship education influences the process of starting new businesses (Kassean et al., 2015). As suggested by prior studies, future research should adopt longitudinal designs to track changes in entrepreneurial intentions and behaviours over time to provide a clearer picture of the long-term impact of entrepreneurship education (Liu et al., 2024). Expanding research to include diverse cultural and institutional contexts can improve the generalizability of the results and provide insights into how entrepreneurship education impacts students globally (Fleck et al., 2020).

This paper introduces the Global University Entrepreneurial Students' Spirit Survey (GUESSS), a multi-year global survey designed to assess the long-term impact of entrepreneurship education on students' entrepreneurial outcomes. GUESSS data have been used to publish articles in leading international academic journals, including the Journal of Business Venturing and Entrepreneurship Theory & Practice (see https://www.guesssurvei.org/). Unfortunately, to the best of my knowledge, only five academic articles (Bergmann et al., 2023; Bogatyreva et al., 2019; Gil-Soto et al., 2024; Hahn et al., 2020; Shirokova et al., 2022) utilise GUESSS data in a longitudinal study.

The inception of GUESSS initiatives took place in 2003 at the University of St. Gallen in Switzerland. Subsequently, on a biennial or triennial basis, GUESSS conducts surveys that encompass a broader spectrum of university collaborators from diverse nations. Within each nation, an appointed national leader is responsible for coordinating all university partners. Surveys are distributed to country leaders for dissemination to university affiliates' representatives, who subsequently distribute them to their student cohorts. By 2023, GUESSS had amassed a dataset comprising 226,000 samples from numerous university partners across 57 nations (https://www.guesssurvey.org/).

The research conducted by GUESSS centres on students' career choice intentions and entrepreneurial endeavours, with a specific focus on the factors that influence entrepreneurial intention and on students' engagement in initiating and managing businesses, encompassing both nascent and active entrepreneurship. These influential factors are examined at the individual, university, family, and national levels. The

individual level includes factors such as attitudes, whereas the university level encompasses entrepreneurial education and the university environment. Family-level factors include parental assistance and intrafamilial relationship quality, whereas national-level factors involve culture.

GUESSS also examines student participation in the succession process within family businesses. GUESSS administers online surveys every 2-3 years to get this information. The survey is centrally coordinated using validated measurement tools. The collected data are useful for comparative studies across countries. GUESSS has identified participants who have contributed to both survey waves, enabling longitudinal analysis of the data. Moreover, GUESSS introduces specific variables in each survey cycle based on the highlighted theme. Each country can propose variables based on its context. Appendix 1 and Appendix 2 present the main and control variables surveyed by GUESSS in 2018 and 2021, respectively.

This article invites entrepreneurship education researchers to join GUESSS, collaborate on data collection, and use GUESSS data for publication, particularly for longitudinal research. We summarised prior longitudinal research on the GUESSS dataset, proposed a model of the impacts of entrepreneurship education, and encouraged entrepreneurship education researchers to test the model longitudinally using GUESSS data.

METHOD

This study adopted a systematic literature review (SLR) procedure (Boland et al., 2017; Booth et al., 2021), previously conducted by Schuhmacher and Thieu (2022), SLR is used to provide a concise summary of previous longitudinal studies on GUESSS results for the following reasons. First, SLRs provide a complete summary of the current literature, ensuring that all relevant studies are included and evaluated. Second, SLR minimizes biases that might arise from the selective inclusion of studies. Third, SLR follows a structured methodology, including systematic literature search, selection and assessment of studies, data extraction, and synthesis of results (Lefaivre & Slobogean, 2013; Shrivastava & Mishra, 2025).

We followed these steps. First, we used the keyword "longitudinal" to find relevant articles. Because GUESSS administrators list only high-quality articles on their website, we reviewed only English-language articles listed in the GUESSS repository (https://www.guesssurvey.org/). Of 87 articles, we identified 40 in English containing the word "longitudinal". Third, we reviewed only articles that used longitudinal data and provided suggestions about the needs of a longitudinal approach for future research. Fourth, we read the abstract, methods, and discussion sections (including future research directions) of the 40 remaining articles. We identified five articles using longitudinal GUESSS data and 21 articles that suggest longitudinal research. Finally, we analysed these 26 articles and put the insights into Table 1 and Table 2.

RESULT

These 26 filtered articles were published over seven years (2016-2023) in 22 distinct academic journals across various fields. There are only five longitudinal studies, indicating the scarcity of longitudinal research using GUESSS data and underscoring the potential of GUESSS for such research. Considering the geographic distribution, the

respondents come from a wide array of countries, ensuring a rich cross-cultural dataset. Notable inclusions are European focus (3 articles) with samples from 8 to 24 countries (Bergmann et al., 2023; Hahn et al., 2020), Latin American focus (2 articles) with samples from 9 to 11 countries (Leiva et al., 2021; Romaní et al., 2022), and global representative (11 articles) with samples from 19 to 34 countries (Braun & Sieger, 2021; Criaco et al., 2017; Gillanders et al., 2021; Karpinskaia et al., 2025; Knatko et al., 2016; Laskovaia et al., 2017; Shirokova et al., 2022; Sieger & Minola, 2017; Smolka et al., 2018; Weiss et al., 2023). The Theory of Planned Behaviour (Ajzen, 1991) is used in eight articles, whereas the Resource-Based View (Barney, 1991) and Effectuation (Sarasvathy, 2001) are each used in two articles. The remaining articles employ various theories and concepts.

Table 1 presents insights from the longitudinal articles. The longitudinal articles were looking for the relationship between entrepreneurial behaviour and entrepreneurial intention (Bogatyreva et al., 2019; Shirokova et al., 2022) and the university's entrepreneurial climate (Bergmann et al., 2023), as well as the antecedents of entrepreneurial intention (Gil-Soto et al., 2024) and entrepreneurial skills (Hahn et al., 2020). These studies specifically investigated the moderating effects of national culture dimensions (Bogatyreva et al., 2019), family entrepreneurial background (Hahn et al., 2020), economic context (Gil-Soto et al., 2024), institutional context (Shirokova et al., 2022), and gender (Bergmann et al., 2023) on that relationship.

Table 1
Longitudinal research based on GUESSS data

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Bogatyreva et al. (2019)	Hofstede's cultural dimensions	GUESSS survey; 1,434 students from multiple countries (2011–2014)	National culture influences the intention–action relationship; individualism strengthens entrepreneurial action.	Self-reported data; student-only sample; limited country representation; small country-level sample.	Examine religion, ethnicity, and sub-national culture; apply alternative cultural frameworks.
Hahn et al. (2020)	Family Embeddedness Theory; Intergenerational Transmission Theory	GUESSS 2013 & 2016; 427 students from 8 European countries	Elective entrepreneurship education (EE) improves entrepreneurial skills; family background moderates EE effectiveness.	Non-representative sample; self-selection bias; limited causal inference.	Investigate EE effects across different student capabilities and family backgrounds.
Gil-Soto et al. (2024)	Rational Expectations Theory; Theory of Planned Behaviour (TPB)	GUESSS; Spanish university students (3,384 in 2013; 4,070 in 2018)	Positive economic conditions reduce entrepreneurial intentions by increasing employment attractiveness; EE remains important.	Limited to Spanish context; model requires further validation.	Conduct longitudinal studies and examine economic cycle effects on entrepreneurial intentions.

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Shirokova et al. (2022)	TPB; Institutional Theory	GUESSS; 1,434 students from 142 universities in 9 countries	Strong legal institutions facilitate the transition from entrepreneurial intentions to actions; financial systems show limited influence.	Self-reported data; student sample; limited generalizability.	Explore additional institutional factors and validate findings with broader entrepreneur samples.
Bergmann et al. (2023)	Person–Context Interaction Theory	GUESSS; 16,382 students (2013–2016)	Entrepreneurial climate promotes solo and team startups; gender and entrepreneurship courses shape startup type.	Potential endogeneity; omitted personal preferences and social networks.	Examine personal preferences, social networks, and mixed startup pathways.

Table 2 presents insights from 21 articles that inform the longitudinal research. These articles guide future research aimed at exploring the emergence of entrepreneurial intention (Cassol et al., 2022; Criaco et al., 2017; Leiva et al., 2021; Moreno-Gómez et al., 2020; Palmer et al., 2021; Ramos-Rodríguez et al., 2019), entrepreneurial career choice (Knatko et al., 2016), entrepreneurial activities (Karpinskaia et al., 2025; Smolka et al., 2018; Weiss et al., 2023), succession intention (Romaní et al., 2022), students' business performance (Laskovaia et al., 2017), trust in the workplace (Gillanders et al., 2021), and entrepreneurs' use of reasoning (Braun & Sieger, 2021) through the analysis of longitudinal GUESSS data.

Table 2
Research proposing for longitudinal future studies based on GUESSS data

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Knatko et al. (2016)	Resource-Based View; Contingency Theory	GUESSS 2013–2014	Human capital promotes entry into knowledge-intensive industries, while financial capital supports entry into capital-intensive industries.	Cross-sectional design; simplified industry classification.	Examine industry choice across different individual and national contexts.
Shirokova et al. (2016)	Theory of Planned Behaviour (TPB)	GUESSS 2013–2014	Individual and environmental factors moderate the intention–behaviour relationship in entrepreneurship.	Cross-sectional; self-reported data; student sample.	Investigate affective mechanisms and intention-to-action processes.

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Smolka et al. (2018)	Effectuation Theory; Causation Theory	GUESSS; 1,453 entrepreneurs	Both causation and effectuation improve venture performance, with their combination producing the strongest effect.	Cross-sectional; recall bias; cultural differences not fully considered.	Refine effectuation measures and examine its antecedents and outcomes.
Criaco et al. (2017)	Social Comparison Theory	21,895 students from 33 countries	Entrepreneurial parents increase perceived feasibility and desirability but may also discourage entrepreneurial intentions through social comparison.	Cross-sectional; indirect measurement of social comparison.	Use longitudinal designs and directly measure social comparison.
Laskovaia et al. (2017)	Effectuation & Causation Theory	Student entrepreneurs	National culture shapes venture performance through effectuation and causation logics.	Student sample; self-reported, cross-sectional data.	Test the model with experienced entrepreneurs and examine causation further.
Sieger & Minola (2017)	Entrepreneurial Self-Efficacy Theory	Students from 19 countries	Family financial support strengthens entrepreneurial intentions, especially with high self-efficacy and family cohesion.	Possible non-response bias.	Explore resource valence and family resource mechanisms.
Palmer et al. (2021)	Social Learning Theory; TPB	3,342 students (Austria & Liechtenstein)	Entrepreneurial family background, dominance, and TPB factors positively influence entrepreneurial intentions.	Self-reported data; limited geographical scope.	Examine parental role modelling and regional differences.
Ramos-Rodríguez et al. (2019)	TPB	851 Spanish university students	Attitudes, perceived behavioural control, human capital, and social capital influence entrepreneurial intentions and timing.	Cross-sectional; self-reported; Spain only.	Study entrepreneurial timing using longitudinal designs.

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Gillanders et al. (2021)	Interpersonal Trust Theory	Students working in startups	Inappropriate workplace sexual behaviours reduce coworker trust, with effects varying by gender and hierarchy.	Cross-sectional; limited generalizability	Explore causal relationships and different organizational settings.
Moreno-Gómez et al. (2020)	TPB	3,703 Colombian students	Parental role models strengthen entrepreneurial intentions, with stronger effects among men.	Colombia-only sample; limited parental characteristics.	Examine parental role models across cultures and family characteristics.
Braun & Sieger (2021)	Ambidexterity Theory	1,460 student entrepreneurs from 19 countries	Family financial support encourages the combined use of causation and effectuation.	Limited examination of alternative antecedents.	Investigate financial support, bricolage, and individual ambidexterity.
Leiva et al. (2021)	TPB	9,012 students from 9 Latin American countries	TPB variables increase entrepreneurial intentions, while entrepreneurship courses show a negative association.	Limited understanding of course effects.	Examine student heterogeneity and improve entrepreneurship education.
Cassol et al. (2022)	TPB	326 Brazilian students	Entrepreneurship education strengthens entrepreneurial intentions, while social recognition has little effect.	Single institution; cross-sectional during COVID-19.	Study teaching practices and broader social norms.
Romaní et al. (2022)	TPB; Social Learning Theory	16,185 Latin American students with entrepreneurial parents	Commitment and parental role models influence succession intentions, although parental role models may discourage succession.	Sample bias; Latin American context only.	Explore university context and commitment in succession decisions.
Karpinskaia et al. (2025)	Resource-Based View; Schwartz's Value Theory	22,163 nascent entrepreneurs from 32 countries	Proactiveness and cultural values accelerate venture creation progress.	Cross-sectional; outdated cultural measures.	Conduct longitudinal studies and adopt updated cultural measures.

Authors	Theory	Sample	Key Findings	Limitations	Future Research
Weiss et al. (2023)	Mixed Embeddedness Theory	208,636 students from 54 countries	In-group support and national embeddedness reduce the entrepreneurial gender gap among young women.	Cross-sectional; university student sample.	Investigate cultural influences and macro-level determinants using longitudinal designs.

DISCUSSION

The use of GUESSS longitudinal data to investigate the link between entrepreneurial behaviour, intention, and their antecedents was conducted at multiple levels of context. At the university level, the type of entrepreneurship education, e.g., compulsory and elective entrepreneurship courses, evidently affects entrepreneurial skill differently. GUESSS 2013 and 2016 longitudinal samples from 8 European countries provided evidence that only elective entrepreneurship education affects entrepreneurial skill. The effect of compulsory entrepreneurship education depended on students' perceptions of their parents' business performance. Its effect was significantly positive only if the parents' business performance was high (Hahn et al., 2020). Furthermore, according to GUESSS data for 2013/2014 and 2016, the university's entrepreneurial climate positively influenced the formation of both solo and team start-ups among students. However, the compulsory course could reduce team formation in business. this positive effect was reduced (Bergmann et al., 2023).

At the country level, according to analyses of GUESSS 2011 and 2013 longitudinal data, the entrepreneurial intention–actions link was influenced by national culture dimensions, long-term orientation, indulgence, and the quality of legal institutions. While power distance, individualism, and uncertainty avoidance, along with long-term orientation and indulgence, weakened the relationship, masculinity was the only national culture dimension that strengthened the positive impact of entrepreneurial intention on entrepreneurial actions (Bogatyreva et al., 2019). In addition, legal institutions also helped university students to translate their entrepreneurial intentions into actions (Shirokova et al., 2022). However, GUESSS longitudinal data from 2013 and 2018 surveys indicated the adverse moderating effect of economic growth on the positive relationship between entrepreneurial intention and entrepreneurial attitude, self-confidence to become an entrepreneur and support from the close environment (Gil-Soto et al., 2022).

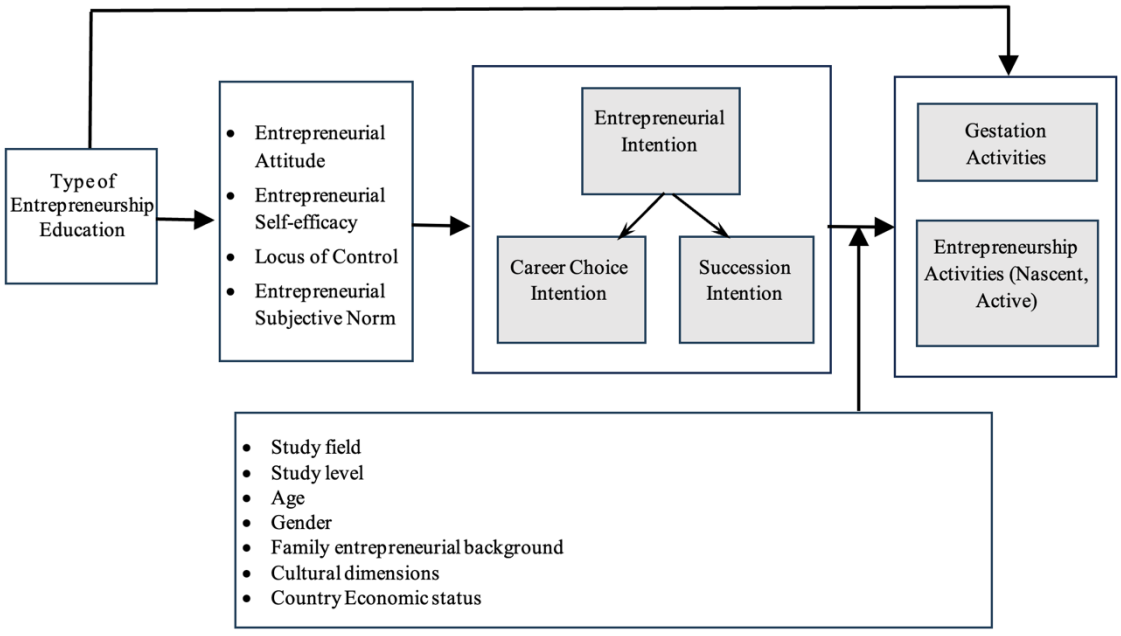
These five longitudinal studies encouraged future research to investigate more specific antecedents of entrepreneurial intention and behaviour, as well as to examine the possible moderating effects of various contexts. For instance, future research may wish to investigate the potential effect of students' prior experiences on the impact of entrepreneurship education (Hahn et al., 2020; Liu, 2024; Malebana & Mothibi, 2023) considering various impacts of entrepreneurship education programs on students with diverse degrees of pre-existing capabilities (Lyons & Zhang, 2018; Ouragini & Lakhal, 2023; Schultz, 2022). This inquiry is deemed essential as it has been noted that prior knowledge enhances one's capacity to comprehend information and derive more valuable insights from entrepreneurship education (Hahn et al., 2017). On the contrary, individuals

with an existing entrepreneurship background derived from past experiences may not gain further advantages from such educational initiatives (Fayolle & Gailly, 2015). Future studies may also focus on examining the potential combination moderating effects of family and university entrepreneurial environment on the relationship between entrepreneurship education program and students' characteristics, such as entrepreneurial attitude, self-efficacy or career intention, along with the diversity arising from students' level (bachelor, master, PhD) or field of study (Hahn et al., 2020). At a more macro level, these longitudinal articles suggested future studies to explore the potential influence of cultural context, such as religion, ethnicity, sub-national culture (Bogatyreva et al., 2019; Shirokova et al., 2022), as well as economic context, such as economic cycles (Gil-Soto et al., 2024), on the entrepreneurial intention-action link.

Considering the main variables in the GUESSS longitudinal data (see Appendix 1), it is possible to examine the combined effects of entrepreneurial attitude, self-efficacy, locus of control, and subjective norms on career choice intention, succession intention, gestation activities, and entrepreneurial activities, either directly or through entrepreneurial intention. Further, drawing on longitudinal GUESSS data and the existing literature, the literature highlights the need for further investigation into the moderating effects of individual, family, cultural, and institutional variables on the relationship between entrepreneurial intentions and actions. It is worth noting that GUESSS provides longitudinal data on various aspects of students' profiles, such as their field of study, academic level, age, gender, religious affiliation, and nationality, as well as information on their families' entrepreneurial backgrounds and the performance of family businesses. Although specific details on cultural and institutional factors are not provided, scholars could examine these factors using the survey participants' nationalities (see Appendix 2). As discussed above, this article presents a comprehensive research model, as visualised in Figure 1. This model is a new, comprehensive framework proposed using the available GUESSS variables.

Figure 1

Comprehensive longitudinal research model of entrepreneurship education impacts



In addition, the GUESSS longitudinal data may address issues inherent in cross-sectional data, such as causality, temporal effects, and cross-cultural generalizability. Cross-sectional research is fundamentally limited in its ability to establish causal relationships between entrepreneurship education and subsequent entrepreneurial outcomes, leaving causal links uncertain (Savitz & Wellenius, 2023). The GUESSS project addresses this by administering online surveys every 2–3 years. It has successfully identified participants who contributed to multiple survey waves, a fundamental requirement for longitudinal, and thus causal, analysis. The longitudinal datasets, such as those from 2018 and 2021 or from 2021 to 2023, are intended to allow researchers to examine causal relationships in entrepreneurial intentions and behaviours over time. Furthermore, GUESSS' longitudinal studies aim to move beyond mere correlations by tracking variables such as entrepreneurial intention and the subsequent formation of entrepreneurial actions, including team or solo start-ups. For instance, longitudinal research has examined how the quality of legal institutions affects the translation of entrepreneurial intentions into action.

The impact of entrepreneurship education is a long-term process that short-term or single-point-in-time measures cannot accurately capture (Brüne & Lutz, 2020). GUESSS longitudinal data address this needs to capture temporal change by measuring long-term impact, analysing dynamic contexts, and studying development. The entire survey design is based on a multi-year global survey to understand the long-term impact of entrepreneurship education. The surveys are conducted on a biennial or triennial basis (every 2–3 years) to capture these temporal shifts. The data enables the study of how changes in external factors influence entrepreneurial outcomes over time. For example, a longitudinal study used GUESSS data from 2013 and 2018 to examine how changes in the economic context influence entrepreneurial intentions and their antecedents. Future research is also encouraged to use the data for longitudinal analyses of the economic context and the effects of economic cycles on entrepreneurial beliefs. Finally, the data can be used to investigate the development of entrepreneurial intention over time, a direction explicitly called for by researchers who rely on cross-sectional GUESSS data.

Cross-sectional findings are often limited in their generalizability, particularly when moving across different cultural and institutional contexts (Schoefer et al., 2019). The GUESSS longitudinal data are well-suited to addressing this through global reach and comparative study, incorporating national contexts and exploring deeper cultural variations. GUESSS is a global project that has amassed over 226,000 samples from 57 nations by 2023, making the collected data highly valuable for comparative studies among countries. The previously reviewed studies included samples from as few as eight and as many as 34 countries, thereby providing a rich cross-cultural dataset. Research has consistently shown that national culture dimensions, such as long-term orientation and indulgence, significantly influence the link between entrepreneurial intention and action. The data are used to examine the role of institutional context (e.g., legal institutions) in the transition from entrepreneurial intentions to actions. To further improve generalizability, researchers are encouraged to use the GUESSS data to examine the effects of multiple levels of cultural influence, including religion, ethnicity, and subnational culture. GUESSS already provides longitudinal data on participants' nationality and religious affiliation, allowing scholars to proxy and explore these complex cultural dynamics.

CONCLUSION

Existing longitudinal GUESSS-based research indicates that entrepreneurship education, especially elective courses, influences entrepreneurial skills, and that the university entrepreneurial climate fosters solo and team start-ups. Furthermore, national-level factors, such as culture and legal institutions, significantly moderate the relationship between entrepreneurial intention and action. The implications are that future research should examine more specific antecedents and moderating effects at the individual, family, university, and country levels, and consider students' prior experiences, ethnicity, and subnational culture. The impact of this collaborative approach is the potential to establish a new standard in entrepreneurship education research, enabling a deeper understanding of effective strategies that promote entrepreneurial behaviour beyond intentions

This review has several limitations that provide opportunities for future research. First, although GUESSS offers a unique longitudinal and cross-national dataset, the available variables do not fully capture important contextual factors such as students' prior experiences, ethnicity, sub-national culture, institutional environments, and economic cycles. Future GUESSS surveys should incorporate these variables to enable more comprehensive analyses. Second, the reviewed studies rely heavily on the Theory of Planned Behaviour (TPB), indicating a need for greater theoretical diversity. Future research should integrate alternative perspectives, including Social Cognitive Theory, Social Cognitive Career Theory, the Entrepreneurial Action Model, the Entrepreneurial Event Model, Effectuation Theory, and Institutional Theory, to better explain entrepreneurial development over time. Finally, future studies should exploit the longitudinal and international nature of GUESSS by adopting multi-country collaborations, applying advanced causal and longitudinal analytical methods, refining survey instruments for cross-cultural validity, and encouraging multinational research teams. Such efforts will improve methodological rigour, enhance the generalisability of findings, and strengthen the evidence base for entrepreneurship education and policy.

Authors Contribution

E. P: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, and Visualization, Writing – review & editing

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Competing interests

The author has declared that there are no conflicts of interest

Data availability

The data were provided upon request to corresponding author

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Appendix 1. Main Variable

Variable Name	References
University environment	Franke & Lüthje (2004)
Program learning	Souitaris et al. (2007)
Entrepreneurship Education Type (Compulsory or Elective)	GUESSS's definition
Entrepreneurial attitude	Liñán & Chen (2009)
Entrepreneurial self-efficacy	Zhao et al. (2005), Chen et al. (1998)
Locus of control	Levenson (1973)
Subjective norms	Liñán & Chen (2009)
Entrepreneurial team information	Harper (2008), Ruef et al. (2003)
Entrepreneurial intention	Liñán & Chen (2009)
Career choice intention Succession intention	Liñán & Chen (2009) (adapted)
Gestation activities	GEM/PSED
Entrepreneurial Activities (Nascent or Active)	GUESSS's definition
Student's Firm Performance	Dess & Robinson Jr (1984), Eddleston et al. (2008)
Family firm performance	Dess & Robinson Jr (1984). Eddleston et al. (2008)

Appendix 2: Control Variable

Variable Name	References
Family Background: self-employed, business owner	NACE
Personal Info: Study field, Study Level, Age, Sex, Nationality, Religion	NACE
Industrial Sector	NACE