Bibliometric Analysis of Global University Entrepreneurial Spirit Students' Survey (GUESSS): The State of the Art, Theoretical Insights and Future Directions

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Abstract

Research on youth entrepreneurship offers unique contributions to our understanding of how different contexts affect the unfolding of nascent and active entrepreneurs. This study conducts a bibliometric review and thematic content analysis of academic studies investigating student entrepreneurship based on the "Global University Entrepreneurial Spirit Students' Survey" (GUESSS) project. To the best of our knowledge, no bibliometric or systematic review has been conducted to date reflecting on the evolution of existing GUESSS work. We fill this gap by analysing 117 articles using bibliometric techniques to delineate the conceptual, intellectual, and social structure of the GUESSS scholarship, supplementing it with the tenets of a structured systematic review. We identify six thematic clusters and foundational theories that shaped the theoretical developments within our study pool. We outline theoretical implications and provide cluster and cross-cluster limitations. We develop a future research agenda bridging GUESSS with the broader research on small business and entrepreneurship.

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Keywords: GUESSS; Bibliometric analysis; Student Entrepreneurship; New Ventures; Entrepreneurial intentions; Entrepreneurial education

Analisi bibliometrica della Global University Entrepreneurial Spirit Students' Survey (GUESSS): stato dell'arte, approfondimenti teorici e direzioni future della ricerca

Sommario

La ricerca sull'imprenditorialità giovanile offre spunti unici alla comprensione di come i diversi contesti influenzino lo sviluppo di imprenditori attivi e nascenti. Il presente studio conduce una revisione bibliometrica e un'analisi tematica dei contenuti degli studi accademici che indagano l'imprenditorialità studentesca basandosi sul progetto "Global University Entrepreneurial Spirit Students' Survey" (GUESSS). Allo stato attuale delle conoscenze, non è stata condotta alcuna revisione bibliometrica o sistematica che rifletta sull'evoluzione del lavoro esistente relativo al progetto GUESSS. Lo studio colma questa lacuna analizzando 117 articoli attraverso tecniche bibliometriche per delineare la struttura concettuale, intellettuale e sociale della produzione scientifica GUESSS, integrandola con i principi di una revisione sistematica strutturata. Vengono identificati sei cluster tematici e le teorie fondanti che hanno plasmato gli sviluppi teorici all'interno del campione di studio. Sono inoltre delineate le implicazioni teoriche e forniti i limiti relative alle analisi a livello di cluster e inter-cluster. Infine, lo studio sviluppa un'agenda di ricerca futura che collega il progetto GUESSS con la più ampia ricerca sulle piccole imprese e sull'imprenditorialità.

Keywords: GUESSS; Analisi bibliometrica; Imprenditorialità studentesca; Nuove imprese; Intenzione imprenditoriale; Educazione imprenditoriale

1. Introduction

The concept of student entrepreneurship, which can be defined as the venture creation activities of students and recent graduates (Bergmann *et al.*, 2016), has been a subject of considerable interest among scholars specialising in entrepreneurship (Hahn *et al.*, 2021). This interest stems from the recognised economic impact of student ventures (Åstebro *et al.*, 2012) and their vital role in knowledge transfer from universities to markets (Meoli *et al.*, 2020). Beyond that, entrepreneurs and their creative abilities are considered a crucial resource that contributes to the sustainability transition in society (Rosário and Figueiredo, 2024), as they play a key role in shaping opportunities, navigating uncertainty, and transforming institutional frameworks (Sarasvathy, 2004). Therefore, given the considerable influence that student

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entrepreneurs exert on strategic management and the performance of their ventures, it is critical to develop a comprehensive understanding of the evolution of the student entrepreneurship research stream to advance both scholarship and practice. Furthermore, the post-pandemic landscape has renewed scholarly interest in this phenomenon, as student entrepreneurs are increasingly recognized as key agents of resilience and digital transformation in a rapidly changing global economy.

Besides its association with economic growth, the interest in student entrepreneurship has recently been reinforced by the recognition that the study of this phenomenon can generate broader contributions to the entrepreneurship literature (Clarysse *et al.*, 2022). For example, it can increase our knowledge of how a predisposition for, and interest in, entrepreneurial careers are formed, given the particular stage of students' lives (Shirokova *et al.*, 2016). Moreover, the embeddedness of students in the university and family contexts (Hahn *et al.*, 2020) provide a unique opportunity to understand how relevant others and contextual conditions facilitate entrepreneurial entry (Meoli *et al.*, 2020). For these reasons, research on student entrepreneurship can offer unique contributions to our understanding of how context affects the unfolding of nascent and active entrepreneurship processes, for example in terms of networking (Kaandorp *et al.*, 2020), founder decision-making (Braun and Sieger, 2021) and the enhancement of young women's entrepreneurship (Weiss *et al.*, 2023).

The Global University Entrepreneurial Spirit Students' Survey (GUESSS) established in 2003 is the largest global research project on student entrepreneurship. The main goal of GUESSS is to capture trends and generate novel insights into student entrepreneurship through collecting data in various countries globally every 2-3 years, which allows detailed cross-country comparisons and within-country analyses in both cross-sectional and longitudinal analyses. More specifically, the GUESSS community investigates and compares entrepreneurial activities, and the antecedents and outcomes of university students worldwide, publishing research articles and reports (Sieger *et al.*, 2021; 2024). The latest wave of GUESSS included more than 226,000 students from 57 different countries (Sieger *et al.*, 2024). The inclusion of a diverse range of universities and countries ensures a multifaceted research approach, facilitating the identification of contextual factors that influence the phenomenon of student entrepreneurship (Bergmann *et al.*, 2016). The GUESSS survey is grounded in the utilisation of validated scales, with several of these encompassing emergent themes within the entrepreneurship literature. These themes include founders' micro-foundations, such as their social identity (Karpinskaia *et al.*, 2025; Sieger *et al.*, 2016), Dark Triad founder personality traits (Shirokova *et al.*, 2024) and founders' affective

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commitment (Dawson *et al.*, 2014). At the meso level of a firm, the studies in our pool examine innovation ambidexterity strategy (He and Wong, 2004) and the causal and effectual decision-making logics of new ventures (Braun and Sieger, 2021; Smolka *et al.*, 2018). This renders the dataset particularly valuable in investigating specific questions concerning student entrepreneurship antecedents, processes and outcomes, which would be impossible to answer with archival data, such as decision-making or well-being (Braun and Sieger, 2021; Hahn, 2020).

This study provides a comprehensive bibliographic overview of the GUESSS scholarship between 2003 and 2024. To ensure a robust review, we designed a hybrid methodology that supplemented a bibliometric review with the tenets of a structured systematic review (Paul and Criado, 2020). Although various concepts and constructs have been introduced to the entrepreneurship literature to explore and explain student entrepreneurship dynamics at individual, family, university and contextual levels, to the best of the authors' knowledge, no systematic review has been conducted to date that has examined the existing work and reflected on how the GUESSS scholarship has evolved and been shaped to date. Our work seeks to fill this gap by conducting a rigorous review of academic studies generated by the GUESSS scholarship to date. We address three research questions in our study:

RQ1: What intellectual structure and pattern of publications exist in the GUESSS research in terms of the performance (top journals, most prolific contributors and institutions)?

RQ2: What social structure and conceptual composition exist in the GUESSS research in terms of the core themes, critical concepts and theories?

RQ3: How can the extant GUESSS research on student entrepreneurship be advanced?

To answer our research questions, we analysed 117 scientific GUESSS articles that were published between 2003 and 2024. Utilising bibliometric techniques in accordance with the recent methodological standards (Lampe *et al.*, 2020), we conducted a performance analysis and science mapping. There is a broad consensus that bibliometric review is the most appropriate combination of methodological approaches to achieve this aim (Mukherjee *et al.*, 2022). In line with recent bibliometric analyses in top entrepreneurship journals (Lampe *et al.*, 2020; Forliano *et al.*, 2021), we then manually analysed the contents of each article to identify and discuss in more detail the thematic clusters that emerged from the bibliometric analysis. The structured component of our review aimed at unpacking theories, and enabled us to identify theoretical lenses, concepts and emerging theories in six clusters, that have been used by the GUESSS scholarship to date (Paul and Criado, 2020).

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The remainder of this paper is structured as follows: we first elaborate on the review methodology and the results of the bibliographic data collection and extraction followed by the results of the bibliometric analysis and science mapping. The latter allowed us to identify the social and conceptual structure as well as the intellectual structure of the studies in our pool. Six clusters were obtained performing a Bibliographic Coupling Analysis with VOSviewer. Each cluster was then manually analysed to unpack theories and concepts that have shaped the GUESSS scholarship to date. Results presentation is finally followed by the discussion and conclusion section, outlining detailed limitations within and across clusters, and the future research agenda.

2. Methodology

Bibliometrics was introduced by Pritchard in 1969 as a method that applies statistical tools to analyse bibliographic data (Pritchard, 1969). This approach tends to be more objective and extensive in scope than other types of reviews particularly in terms of objectivity and breadth, and the ability to identify patterns and trends within large datasets (Fan *et al.*, 2022).

The use of this methodology is widespread in the field of entrepreneurship (Lampe *et al.*, 2020) and it has been used to analyse the body of scientific works based on entrepreneurship datasets, such as the Global Entrepreneurship Monitor (GEM) (Álvarez *et al.*, 2014). For these reasons, the bibliometric method was deemed suitable to achieve our research goal. Following the guidelines in applying bibliometric methods (Mukherjee *et al.*, 2022) and inspired by other bibliometrics research (Forliano *et al.*, 2021), we followed a two-step review approach for our bibliometric analysis (bibliometric performance analysis and science mapping analysis) followed by a thematic content analysis. To ensure a robust review, we designed a hybrid methodology that supplemented a bibliometric review with the tenets of a structured systematic review (Paul and Criado, 2020). In addition to conducting a bibliometric review, we addressed the aspect of 'What' (Callahan, 2014) knowledge emerged about the phenomenon of student entrepreneurship. This corresponds to the 'Theory development' (T) aspect in established frameworks for conducting SLRs (Paul and Criado, 2020). Applying a hybrid methodology enabled the development of more comprehensive and in-depth review (Paul and Barari, 2022). The theory development' (T) aspect was used to unpack the fundamental theories employed by GUESSS scholars (cfr. Table A2 in Appendix A). Previous studies have applied a similar methodology by integrating bibliometric and structured reviews (Bahoo *et al.*, 2020).

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2.1 Bibliographic Data Collection and Extraction

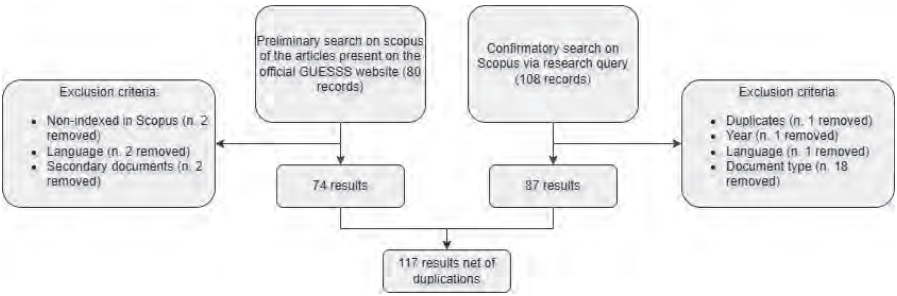
As for the choice of the bibliographic database from which to extract the necessary data for the purposes of our analysis, we chose to use the articles registered in Scopus, given the extensiveness of the database (in comparison to Clarivate Analytics' Web of Science) and that it provides the necessary treatability of the meta-data of each contribution (in comparison to Google Scholar) (Adriaanse and Rensleigh, 2011). For the construction of our bibliographic sample, to ensure the comprehensiveness of our research strategy, we followed a step-by-step procedure, starting with the publications found on the official GUESSS website[1]. On the day of the analysis (April 11th, 2024) the survey's website included 80 references, of which only 78 were recorded in Scopus and as such exportable in a compatible bibliographic format, and only 76 of which were indexed including the necessary meta-data of each contribution. We also decided to exclude papers written in languages other than English to maintain a consistent review process, as such excluding 2 more works, rounding up the total number of articles obtained from the survey's website to 74. We then carried out, in the second step, a confirmatory search directly in Scopus, via the search query in Table C1 in Appendix C.

Dealing with the publications' selection criteria, given the high level of specificity of our research objective, we decided to restrict the Scopus search strategy to journal articles only. In this way, as in Guillén *et al.* (2022), it was possible to ensure that our sample included only contributions that had undergone the double-blind review process required by academic journals. Regarding the timeframe, given that the Global University Entrepreneurial Spirit Students' Survey was established in 2003[2], we deemed it appropriate to include only studies published from the year 2000 onwards. As before, we also decided to exclude papers written in languages other than English. Following Scopus' syntax, the search with the abovementioned query on the database was performed in the title, abstract, and keywords (authors keywords + index keywords) fields (string TITLE-ABS-KEY), in line with prior bibliometric reviews (e.g., Pisani *et al.*, 2017), applying the aforementioned restrictions, resulting in 83 records. In the third step, we compared the two lists obtained via the survey's website (74 references) and through a direct search on Scopus (108 references) removing duplicates, obtaining a final sample of 117 references (cfr. Appendix B). Fig. 1 summarises the different phases of our research strategy.

[1] https://www.guesssurvey.org/publications/publications/academic-journals.html
[2] https://www.guesssurvey.org/keyfacts/

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Fig. 1: The different phases of the data extraction activity



Source: Authors' elaboration on search and selection process data.

The sample of papers resulting from the database search and selection process was then analysed using primarily two techniques: performance analysis and science mapping (Noyons *et al.*, 1999).

In this review, we employed both quantitative and qualitative indicators to evaluate the performance, in terms of productivity and impact, of researchers, institutions, countries, articles, and journals. Quantitative indicators, which measure productivity, allowed us to identify the most prolific contributors, institutions, and journals based on research output and citation counts (Kraus *et al.*, 2022). On the qualitative side, we assessed the scientific impact by highlighting the most influential papers, measured through normalised citation counts, which provide a more balanced comparison across different research outputs (Bornmann *et al.*, 2013). This dual approach offered an objective overview of both research productivity and the broader impact of the contributions within the GUESSS research domain. In addition to the performance analysis, we utilised scientific mapping techniques, a common method in bibliometric analysis, to uncover latent patterns in the conceptual, social, and intellectual structures of the literature over time (Börner *et al.*, 2003). The conceptual structure refers to the relationships between key concepts or terms in the literature. To analyse this, we focused on the co-occurrence of authors' keywords, which serve as a reflection of the core content of their studies. The social structure analysis, meanwhile, explored the connections between various actors, such as authors, institutions, or countries, revealing collaborative networks. Finally, the intellectual structure analysis examined the relationships among documents, authors, and journals, which helped trace the evolution of ideas and contributions within the field. This methodology is grounded in extensive bibliometric research that underscores the value of performance analysis and science mapping across a wide range of academic disciplines (Cobo *et al.*, 2011). The scientific mapping relied on

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the 1.6.20 version of VOSviewer (van Eck and Waltman, 2010), a free, open-source similarity visualisation software for overlaying and visualising sets of bibliographic data (such as journal article authors, co-authors, and citation networks), in order to unveil their hidden structures and relations.

2.2 Performance Analysis

Performance analysis uses indicators related to publication trends and citation counts, sorted by authors, journals, countries and affiliations, to compare the productivity and impact of different actors in a field (Massaro *et al.*, 2016).

2.3 Science Mapping

Science mapping is a powerful, graph-based technique for analysing and presenting the relationships between different scientific topics. Through science mapping, researchers can gain valuable insights into the structure and development of scientific fields, identify key research trends and emerging areas of interest, and explore the connections between authors and different areas of research (i.e., a field's *conceptual, social and intellectual structures*) (Cobo *et al.*, 2011). In particular, a field's social structure can be captured through a co-authorship analysis (Peters and van Raan, 1991), which enables the visualisation of the links between authors, the calculation of the number of co-authored documents, the quantification of the number of co-authors, and the calculation of the average number of co-authors of an author. As such, by examining patterns of collaboration and authorship, it is possible to identify key researchers, institutions, or research groups as well as central authors and collaboration patterns in addition to supporting the definition of thematic clusters. To uncover a field's conceptual structure, methods such as Keyword Co-occurrence Analysis (KCA), text mining, or topic modelling (e.g., Latent Dirichlet Allocation) can be used to identify prevalent concepts, themes, or trends in the literature by examining the content of research outputs, focusing on keywords, abstracts, or full-text documents. Finally, the intellectual structure of a field can be described, among others, through *bibliographic coupling* (Kessler, 1963), which involves studying the references used together in different documents to identify common topics and patterns in the literature. This type of analysis can be used to identify gaps or potential avenues in the field, understand the relationships between publications, research themes, or methodologies, and reveal clusters of related research and the evolution of research topics over time (Jarneving, 2007).

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3. Results of the Bibliometric Analysis

3.1 Performance Analysis

This section presents a bibliometric analysis based on different performance indicators typically used in bibliometric reviews (Durieux and Gevenois, 2010). The analysed performance indicators are the following: i) publication activity in terms of publications per year; ii) productivity by country and by affiliation; iii) publication activity in terms of most prolific authors; iv) productivity in terms of most prolific journals; v) the top journals in terms of global citations; vi) the top journals by impact factor and ranking; and, vii) the top articles by number of citations. The output of the database search and selection process consisted of a sample of 117 publications by 246 authors affiliated with 143 institutions in 40 countries, published in 68 journals, and referred to 8457 cited references (Table C2 in Appendix C).

3.1.1 Articles' Evolution over Time

The analysis of the number of publications over time (Figure 2) shows an increasing trend, suggesting a growing utilisation of the GUESSS dataset by the academic community. The cyclical pattern of publications with peaks and valleys across years can be explained by the wave-based nature of the survey (cfr. Table C3 in Appendix C). It can be observed, indeed, that the number of papers in the GUESSS sample has increased over time, with the 2011 and 2018 GUESSS waves having the highest number of papers. This could be indicative of the growing interest among scholars in student entrepreneurship research in recent years. In addition, the considerable presence of works employing longitudinal data suggests an interest among the scholarly community in examining multiple time periods by exploiting data from multiple GUESSS waves.

Table C4 in Appendix C ranks the 15 most influential papers in the sample by normalised citations (average citations per year since publication), covering topics such as entrepreneurship education, the intention-action link, family support in start-up activities, and the entrepreneurial climate at universities, and spanning journals including Technological Forecasting and Social Change, Research Policy, the Journal of Small Business Management, Small Business Economics and European Management Journal. Most papers date from 2016-2022, though a few more recent (2023-2024) publications have already accumulated substantial citations, pointing to the growing impact of GUESSS scholarship.

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Fig. 2: Distribution of publications over time



Source: Authors' elaboration on SCOPUS data.

3.1.2 Articles' Geography

According to Table C5 in Appendix C, the most prolific country in terms of publication activity is the Russian Federation, followed closely by the United States of America and Germany, Italy, Spain and Switzerland. Other countries with high publication activity include Colombia, France and the Netherlands.

Table C6 in Appendix C provides information on the top 15 institutions in terms of publication activity. The Graduate School of Management of St. Petersburg State University is the most prolific institution, followed by Università degli studi di Bergamo. Other highly productive institutions include the University of St. Gallen and Rotterdam School of Management Erasmus University.

3.1.3 Authors

Table C7 in Appendix C lists the top 15 authors in terms of publication activity related to the Global University Entrepreneurial Spirit Students' Survey. The most prolific author is Shirokova, G., who has published 19 papers

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based on the survey. The second most prolific author is Minola, T., with 10 papers. Other authors with a high number of publications include Sieger, P., Bogatyreva, K., Edelman, L.F., Gubik, A.S., Hahn, D., Leiva, J.C., and others. These authors have made significant use of the GUESSS survey in order to contribute to research on student entrepreneurship.

3.1.4 Journals

Tables C8-C10 in Appendix C rank the top 15 journals by publication activity, by global citations of GUESSS-based articles, and by impact factor and ranking (H-INDEX, SJR, ABS/AJG) respectively, together mapping the most active, most influential and most prestigious outlets for GUESSS scholarship (Vanclay, 2012; Bar-Ilan, 2008).

The main takeaways from this performance analysis are the following: i) the most prolific authors are the delegates of the GUESSS survey, especially in Russia and Italy. This could be a proxy for the fact that the community of GUESSS is a "closed community" since the availability of national data is restricted to delegate committees. Based on this, our review could be an incentive to rethink the access to the GUESSS dataset similarly to other datasets on entrepreneurship (e.g. GEM), contributing in a more efficient way to datasets designed to capture entrepreneurial dynamics (Acs *et al.*, 2008); ii) regarding the journals, to the contrary to other unconventional entrepreneurship forms (such as immigrant entrepreneurship), student entrepreneurship appears to be of interest mainly to entrepreneurship journals (Aliaga-Isla and Rialp, 2013). In addition, Small Business Economics looks an ideal outlet for researchers interested in this topic since it publishes research addressing all aspects of entrepreneurship with a special emphasis on the economic and societal relevance of research findings for scholars, practitioners and policy makers.

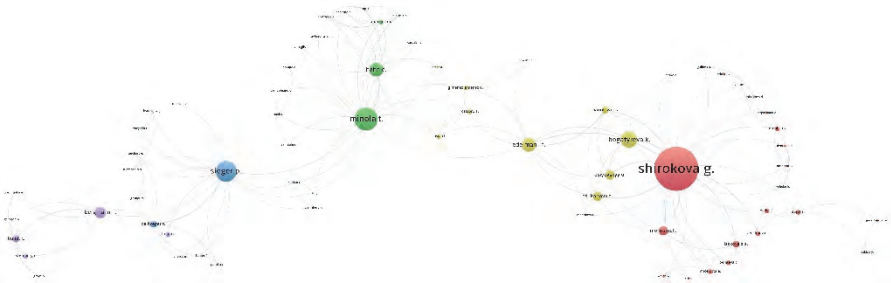
3.2 Science Mapping

3.2.1 Social and Conceptual Structure

Based on the conceptualisations presented in Section 2.3, the following analyses aim to uncover, through bibliometric mapping and clustering techniques, the social and conceptual structures of the works included in our database. In particular, the social structure is manifested through the construction of co-authorship maps of the authors and countries or territories, which are presented in Figures 3 and 4.

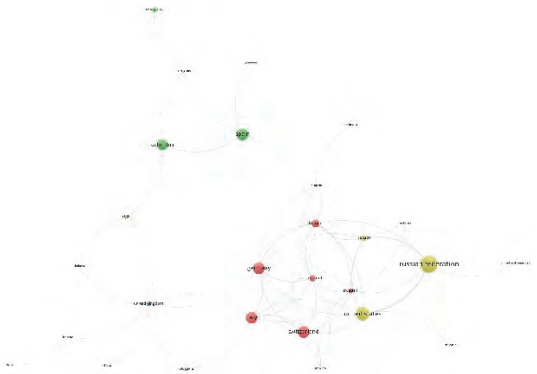
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Fig. 3: Cooperation network between authors



Source: Authors' elaboration using VOSviewer.

Fig. 4: Cooperation network between countries and territories



Source: Authors' elaboration using VOSviewer.

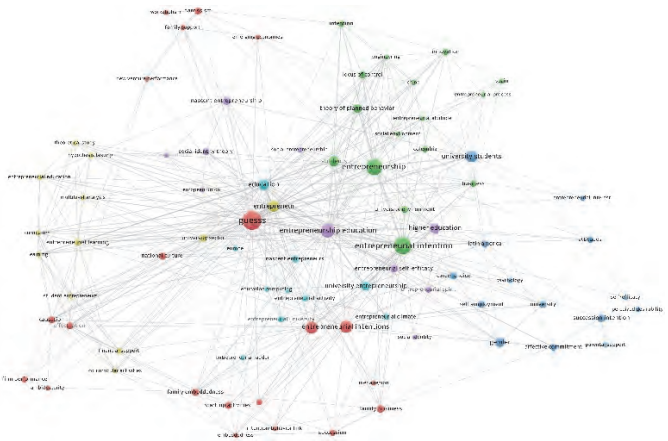
Figure 3 displays the network of collaboration among authors. Each node represents an author, and the lines connecting the nodes represent co-authorship relations. The size of the node indicates the number of publications by the author, and the thickness of the lines represents the frequency of collaboration between the authors. Figure 4 presents the cooperation network among countries or territories. Each node represents a country or territory, and the lines connecting the nodes indicate collaborative relations between them. The size of the node is proportional to the number of publications from that country or territory, and the thickness of the lines signifies the extent of collaboration between the countries or territories. The two maps, analysed together, highlight the global distribution of the research and the extent of international collaboration in the field. In particular from figure 3, a certain tendency to keep co-authorship networks within national boundaries seems clear, although there are a few strong links between countries, e.g.

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USA/Russia (Edelman *et al.*, 2016; Manolova *et al.*, 2019; Shirokova *et al.*, 2022), and Italy/Switzerland, represented by the co-authorship relationship between the two GUESSS representatives of each country (Sieger and Minola, 2017).

Afterwards, in order to manifest the conceptual structure of the works included in our database, we used KCA in order to build a Keyword Co-occurrence Network (KCN), which is useful in the exploration of research topics and their relationships in many scientific fields (Bornmann *et al.*, 2018). As demonstrated by some authors (Radhakrishnan *et al.*, 2017), KCN-based analysis has shown advantages over traditional literature review approaches, like the objectivity and reproducibility guaranteed by an analysis relying on quantitative methods, higher efficiency due to processing large volumes of data more quickly and its ease of visual representation of the results. The analysis was performed with VOSviewer, examining co-occurrences between author and index keywords using a full counting method; the closer two keywords appear in the map, the more frequently they co-occur (van Eck and Waltmann, 2010). The bibliometric map obtained is presented in Figure 5.

Fig. 5: Keywords co-occurrence network.



Source: Authors' elaboration using VOSviewer.

KCN allows for identifying different thematic clusters, which – combined with manual content analysis – support scholars in unpacking the different research streams within the analysed body of research (Yang *et al.*, 2012). In particular, we relied on VOSviewer's clustering function, which assigns keywords to clusters based on their co-occurrence (Bornmann *et al.*, 2018). The identified clusters were: a) family business entrepreneurship (red in Figures 5 and 6 – cfr. Tab A1a); b) country determinants (macro vs micro data) and

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Fig. 6: Word Clouds of each KCA clusters.



Source: Authors' elaboration

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cross-cultural settings (green in Figures 5 and 6 – cfr. Tab A1b); c) socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career paths (blue in Figures 5 and 6 – cfr. Tab A1c); d) the multiplicity of contexts and their impact on entrepreneurship (yellow in Figures 5 and 6 – cfr. Tab A1d); e) personality traits (micro-mechanisms) and entrepreneurial decision-making logic and behaviours (purple in Figures 5 and 6 – cfr. Tab A1e); and, f) the entrepreneurial climate at higher education institutions (light blue in Figures 5 and 6 – cfr. Tab A1f in the Appendix A).

3.2.2 Intellectual Structure

Finally, to uncover the intellectual structure of the field, we then performed through VOSviewer a Bibliographic Coupling Analysis. Similarly to the previous analysis, we obtained six clusters, this time based on the similarity of publications or authors in terms of their shared references (cfr. Figure 7). In bibliographic coupling, in fact, a link is established between two items if they have at least one common reference. The total number of links for an item indicates how many connections it has with other items in the network (its "weight" in the network, visually represented by its size), and the distance between two items is inversely proportional to the number of common references. Having been provided with the most influential works in each cluster, a manual screening of their research topics was performed, and we were able to confirm the cluster classification identified in the previous analysis. As such, using as a base the verified clusterisation obtained through the KCN analysis, we complemented our review with a thematic content analysis of the articles grouped through bibliographic coupling, presenting the research topics that warrant attention, and thereby offering insights into avenues for further research through a review of the articles included within each thematic cluster.

3.3. Content Analysis

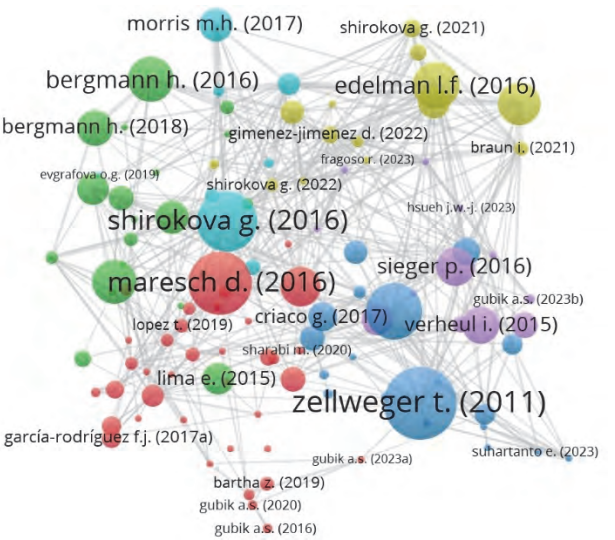
This subsection describes the thematic content of the most influential articles appearing in each cluster identified above through the bibliographic coupling analysis. To provide a comprehensive understanding of the main scholarly conversations surrounding student entrepreneurship within the GUESSS dataset, we conducted a thematic content analysis of the articles in these clusters. Building on the previously identified overarching themes from the KCA, we utilised the predefined labels as a starting point. We then

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applied a mixed-methods approach: while the labels derived from the KCA were used deductively, we conducted an inductive analysis of the content of the papers in each cluster to determine the most appropriate match between labels and clusters.

This process allowed us to assign each cluster a label that best captured its dominant theme, discussed individually below.

Fig. 7: Bibliographic Coupling network.



Source: Authors' elaboration using VOSviewer.

Within these clusters, we identified core concepts and theories examined in the domain of GUESSS research, which are summarised in Table A1 in Appendix A. Below, we explain in greater detail the contents of each cluster to identify the emerging theories and main findings. By manually analysing each thematic cluster, we address the aspect of 'What' (Callahan, 2014) knowledge emerged from our study pool, which corresponds to the structural tenet, namely, 'Theory development' (T) (see Paul and Criado, 2020).

Cluster 1: Socio-demographic Characteristics (e.g. gender, age, education level, culture) and Entrepreneurial Career Paths

Our analysis reveals that the Theory of Planned Behavior (Ajzen, 1991) was the most dominant theory employed by the works in the cluster 1 (e.g. Leiva *et al.* 2021; Silva *et al.*, 2021) followed by the Theory of Entrepreneurial

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Intentions (Bird, 1988), which was found in the works of Bernhofer and Han (2014) and García-Rodríguez *et al.* (2017). These were followed by institutional theory (DiMaggio and Powell, 1983; North, 1990) [see Moreno-Gómez *et al.* (2022)] and the Motivation-Opportunity-Ability (MOA) model by MacInnis and Jaworski (1989) employed in García-Rodríguez *et al.*'s (2017) study. The application of Social Learning Theory (Bandura, 1971) was not used extensively in this cluster with some exceptions in Moreno-Gómez *et al.*'s (2020; 2022) studies, which examined the moderating role of gender in the relationship between parental role models and entrepreneurial intentions of students. Social role theory application (Eagly, 1987) was found in Leiva *et al.* (2021), whilst Sharabi and Polin (2020) examined the career motives of student entrepreneurs according to the degree of religiosity through the lens of agency theory (Fama, 1980). Horvath (2016) employed Social Cognitive Career Theory (SCCT) (Lent *et al.*, 2000) to test a model of entrepreneurial interest using self-efficacy and outcomes expectations as predictors.

Intrapersonal relationships in connection with entrepreneurial thinking and behavior was studied through the lens of Human Capital Theory (Becker, 1964) by Maresch *et al.* (2016) in this cluster. Silva *et al.* (2021) merged TPB with MOA to examine the influence of entrepreneurial educational programmes on entrepreneurial students' intention. Some studies have integrated several theories and models to examine various mechanisms of socio-demographic characteristics (e.g. gender, age, education level) and entrepreneurial career paths. For example, García-Rodríguez *et al.* (2017) used a combination of Theory of Planned Behavior and the MOA model to examine the impact of the social and cultural environment on the entrepreneurial potential in less innovative regions. Moreno-Gómez *et al.* (2022) combined TPB, institutional economic theory, and the theory of social learning with entrepreneurial activity to examine the gender perspective of the parental role model influence on nascent entrepreneurs. Finally, many of the studies in this cluster provide broader contributions on entrepreneurial careers and their antecedents. For example, one line of research considers the entrepreneurial careers of "joiners" (Bartha *et al.*, 2019), i.e., university students employed in start-ups, focusing on the role of workplace experience as an element of personal background shaping their career.

Cluster 2: Entrepreneurial Climate at Higher Education Institutions

Similar to cluster 1, TPB was the most commonly used theory in cluster 2 (Valencia-Arias *et al.*, 2022) followed by Human capital theory (Becker, 1964) – see the works of Hahn *et al.* (2017), Sancho et al. (2021). An integrative theoretical framework consisting of Social Learning Theory

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(Bandura, 1971) and organisational climate theory (Rentsch, 1990) was used in Bergmann *et al.* (2016) to investigate the climate for entrepreneurship at higher education institutions. Previous scholarly investigations (see Sancho *et al.*, 2021) have employed a combination of institutional theory and the theory of entrepreneurial intentions to examine whether a favourable entrepreneurial climate is enough to become an entrepreneurial university. In addition to the previously mentioned theories and models, our findings reveal additional theoretical frameworks that have gathered attention and relevance in examining the entrepreneurial climate at higher education institutions. These include the application of Cognitive career theory (Lent *et al.*, 2000) in Hahn *et al.*'s (2022) study, which demonstrated that entrepreneurial learning at university is negatively associated with a preference to work for small firms compared to larger firms. Furthermore, Hahn *et al.* (2020) examined the impact of entrepreneurship education on university students' entrepreneurial skills through the lens of a family embeddedness perspective (Uzzi, 1997). Additionally, Hahn (2020) drew on Social Identity Theory (Tajfel, 1978) in order to demonstrate that universities' involvement in academic entrepreneurship diminishes the negative effects of poor value creation for entrepreneurs' psychological well-being. In terms of dependent variables, most studies focus on entrepreneurial GUESSS projects, analysing data pertaining to the GUESSS 2013 and 2016 editions, and revealing that elective Entrepreneurship Education exerts a generally positive impact on students' entrepreneurial skills, which extends beyond the effects of the university. It underlines, however, that in compulsory Entrepreneurship Education courses, the positive impact on entrepreneurial skills is only observed in "students who perceive higher levels of performance in their parents' entrepreneurial activities" (Hahn *et al.*, 2020, p. 276).

Cluster 3: Family Business Entrepreneurship

The studies in this cluster show that enterprising family backgrounds affect the desirability and feasibility of the entrepreneurial career (Criaco *et al.*, 2017). Some studies focus on the specific features of the family enterprise and the family system (Gimenez-Jimenez *et al.*, 2021; Hahn *et al.*, 2021) that affect entrepreneurial career choices. A recurring theme is the role that family background plays in leading towards succession vs founding intentions (Hahn *et al.*, 2021). Apparently, an enterprising family background opens up an opportunity to undertake succession in the parents' business, but under certain conditions it can also steer students towards a founding career. Together with family the gender of the individual has been considered by some papers of this cluster, for example as contingency in the family-career

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choice relationship (Gimenez-Jimenez *et al.*, 2021). Some of the papers consider motives explicitly in the theorising. For example, Zellweger *et al.* (2011) show how career motives differ between aspiring employees, successors and founders. Campopiano *et al.* (2016) consider entrepreneurship as a means to pursue such an attitude, and it is perceived as a way to proactively contribute to undertaking responsible environmental activities.

In terms of the theories that emerged in the cluster, the Theory of Planned Behavior (Ajzen, 1991) and Theory of entrepreneurial intentions (Shapero, 1982) followed by Social Cognitive Theory (SCT) (Bandura, 1988) appear most frequently in the cluster three. Sieger and Monsen (2015) offer new theoretical insights pertaining to TPB and the Theory of Mixed Control (Monsen and Urbig, 2009) as to why individuals choose to start their own business by comparing entrepreneurial intentions to the intention to work at a university and to be employed in a firm. Applying SCT, Lyons *et al.* (2024) examined the impact of parental emotional support on the succession intentions of next-generation family business members. Through the lens of the family embeddedness perspective (Uzzi, 1997) and Knowledge spillover theory of entrepreneurship (Caiazza *et al.*, 2020), Hahn *et al.* (2021) demonstrated how family embeddedness shapes the entrepreneurial intentions of the next generation. Building on a similar family embeddedness perspective, Sieger and Minola's (2017) study reveals a negative relationship between the availability of a family's financial support and an individual's entrepreneurial intentions. In addition to previously mentioned theories and models, our results reveal additional theoretical lenses that have been instrumental in understanding the nuances of family business entrepreneurship. Applying social comparison theory (Festinger 1954), more specifically, upward social comparison dynamics between children and their entrepreneurial parents, Criaco *et al.* (2017) found that perceived parents' performance in entrepreneurship can have mixed effects for the intergenerational transmission of entrepreneurship. Drawing on a broader cross-cultural theory (Brislin, 1970), Laspita *et al.* (2012) tested a model of the transmission of entrepreneurial intentions within families in different cultures and found that the strength of both direct and indirect effects from parents on their offsprings' entrepreneurial intentions varies depending on the cultural context. Other papers in this cluster focus on motives in a less explicit way but speculate on why some specific antecedents motivate (or discourage) the pursuit of an entrepreneurial career, often recurring to mediation or moderation models. For example, Zellweger *et al.* (2016) explored the specific mediators through which family affects entrepreneurial career choices, highlighting the role of self-efficacy and discount expectations as economic and non-economic motivations to pursue successions.

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Cluster 4: Multiplicity of Contexts and their Impact on Entrepreneurship

The research in this cluster highlights the importance of contextual variables in nascent and active entrepreneurship. In general, the papers of these clusters use student entrepreneurs as a special case of embedded entrepreneurs through which they aim for broader contributions to entrepreneurial decision-making. For example, many of these studies focus on effectual vs. causation decision-making as a driver of firm performance (Smolka *et al.*, 2018) and focus on the drivers of effectuation/causation (Shirokova *et al.*, 2021) and on the contingencies in the decision-making – performance relationship. Taken together, these studies highlight the importance of combining effectuation and causation and that context, such as family or institutions, can help to combine the two processes and also to benefit from them. Similarly, Wales *et al.* (2021) focus on institutions as key contingency in the entrepreneurial orientation-performance relationship in students' ventures. Another strategic posture investigated by research in this cluster is risk-taking: Gimenez-Jimenez *et al.* (2022) looked at how gender in combination with culture affects the risk taken by entrepreneurs, using university students as an empirical setting. A special mention is deserved by papers in this cluster that focus on university students' families and universities as drivers of nascent entrepreneurs' decision-making. Apart from Braun and Sieger (2021), who focus on the effect of family financial support on student ventures' ambidexterity, Edelman *et al.* (2016) explore how family influences the scope of startup activities by nascent entrepreneurs, while Manolova *et al.* (2019) show how family shapes nascent entrepreneurs' navigation of institutional voids.

The most common theoretical underpinnings and models used to examine the interplay among the constructs in cluster 4 include Institutional theory (DiMaggio and Powell, 1983; North, 1990) and Causal and Effectual Decision-Making Logics on Venture (Sarasvathy, 2001), followed by TBP and the Mixed Embeddedness Perspective (Langevang *et al.*, 2015). Previous scholarly investigations by Shirokova *et al.* (2022) have employed a combination of TPB and an institutional perspective and found that whilst legal institutions seem to have a significant positive impact on the translation of intentions into actions, the quality of the national financial system does not seem to play a strong role in this interplay. However, in another study, Wales *et al.* (2021) demonstrated that institutions in general positively moderate the entrepreneurial orientation-performance relationship through increased resource access. Applying TPB and the social embeddedness perspective (McKeever *et al.* 2014). Weiss *et al.* (2019) found that the translation of entrepreneurial intention into start-up behaviours can be facilitated by means

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of growing regional social capital via the enhancement of social trust and regional cultural diversity. Based on a mixed embeddedness theoretical lens, Weiss *et al.* (2023) provide evidence of the joint role of micro-level and macro-level cultural layers in reducing the entrepreneurial gender gap.

Cluster 5: Personality Traits (micro-mechanisms) and Entrepreneurial Decision-making Logic and Behaviors

The research in this cluster highlights the importance of various individual-level characteristics for entrepreneurial decision-making and behaviours. The theories emerging in cluster five have their roots in the domains of sociology and psychology. Social Identity theory (SIT) (Tajfel, 1978) was the most commonly applied theory together with The Dark Triad personality traits (Hare, 1985). Drawing on Social Identity Theory and the classification of founders' social identities, namely, Darwinians, Communitarians, and Missionaries, Sieger *et al.* (2016) developed and tested a corresponding scale of the social identity of entrepreneurs. In the most recent study, Braun *et al.* (2023) further applied the lens of SIT, more specifically, whether having a Communitarian or Missionary founder social identity along with economic prosperity are potential explanatory factors in facilitating the transition from nascent to active entrepreneurship. Brändle *et al.* (2018) and Gonzalez-Canosa *et al.* (2021) considered social identity as a key element to understand student entrepreneurs' goals and in the formation of entrepreneurial intentions and its antecedents.

Integrating the Dark Triad constellation of three socially aversive personality traits from a psychological theory of personality with Upper echelons theory (Hambrick and Mason, 1984), Shirokova *et al.* (2024) found that narcissism can enhance new venture performance through the workaholism of the founder. Schwartz's value orientation theory (Schwartz, 1992; 1994) was applied in Karpinskaia *et al.*'s (2025) study, which demonstrated that embeddedness and harmony values are associated with lower levels of progress in the venturing process, whilst in autonomous and mastery cultures the effect of proactiveness on the venturing process is stronger. Moving the attention from family to individual non-economic motives, Baldegger *et al.* (2017) explored the role of narcissism in motivating the pursuit of an entrepreneurial career, from which narcissistic people can obtain non-economic utility. Drawing on SIT and self-efficacy theory (Bandura, 1982), Brändle *et al.* (2018) demonstrated that entrepreneurs' social identity, related to the type of opportunity they pursue, might shed light on different levels of entrepreneurial self-efficacy. The papers in this cluster also examined the role of mental disorders (Verheul *et al.*, 2015; 2016), in particular ADHD, in stimulating entrepreneurial intentions or actual self-employment.

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Cluster 6: Country Determinants (macro vs micro data) and Cross-Cultural Settings

The research in this cluster highlights the importance of various country-level characteristics and cross-cultural conditions that strengthen or weaken entrepreneurial decision-making and behaviours. TPB appears to serve as the theoretical lens to help in providing a nuanced understanding of the intention–behaviour link. Shirokova *et al.* (2015) found that both individual (family entrepreneurial background, age, gender) and environmental characteristics (university environment, uncertainty avoidance) impact on the translation of entrepreneurial intentions into entrepreneurial actions. Morris *et al.* (2017) and Shirokova *et al.* (2015) applied embeddedness theory (Granovetter, 1992) to produce research evidence to support the notion that prior business experience moderates the relationships between student involvement in university initiatives and start-up activities, with the entrepreneurial self-efficacy strengthening the effect of the translation of entrepreneurial intentions into action. Shirokova *et al.*'s (2016) study examined how local institutions, culture and other environmental and personal factors facilitate or frustrate the translation of founding intentions into actions, thereby improving our general understanding of the decision-making of nascent entrepreneurs. Other empirical works in this cluster consider the role of personal resources (human and financial capital) in shaping university students' entrepreneurial careers in terms of industry choice (e.g. Knatko *et al.*, 2016). Beliaeva *et al.* (2017) established an interesting distinction between entrepreneurial learning and entrepreneurial teaching and found a positive relationship between entrepreneurial learning and students' entrepreneurial intentions. That relationship was found to be moderated by various dimensions of national culture, being stronger in individualistic cultures and weaker in high uncertainty avoidance society.

4. Limitations within and Across Thematic Clusters and Future Research Agenda

Based on the content analysis of the papers included in the six clusters identified with bibliographic coupling, we outline a future research agenda, which is summarised in Table A2 in Appendix A and Figure 8, stemming from the limitations that emerged in each cluster.

The first cluster reveals common limitations: a narrow focus on entrepreneurial attitude determinants that neglects other influential factors, sample

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biases (over- and under-representation of specific regions), limited external validity due to concentration on specific populations (e.g. female business students), and data collection challenges in developing countries linked to fragmented business demographics and under-considered socio-cultural factors.

Future research should broaden the determinants examined (e.g. social networks, subjective vitality, affective commitment), give special attention to female entrepreneurship across disciplines beyond business studies, pursue cross-cultural replications to strengthen generalisability, diversify student samples, and investigate how educational practices and parental role models shape entrepreneurial intentions. Expanding control variables and improving data collection infrastructure in developing countries would further strengthen this stream.

The second cluster shares similar limitations with the first: prevalent measurement issues in assessing complex constructs such as entrepreneurial climate and internationalisation, data challenges (small samples, quality issues), a short-term focus that neglects long-term outcomes, and geographic/contextual restrictions (e.g. Germany, Vietnam) that limit generalisability, alongside frequently omitted non-curricular factors and gender biases.

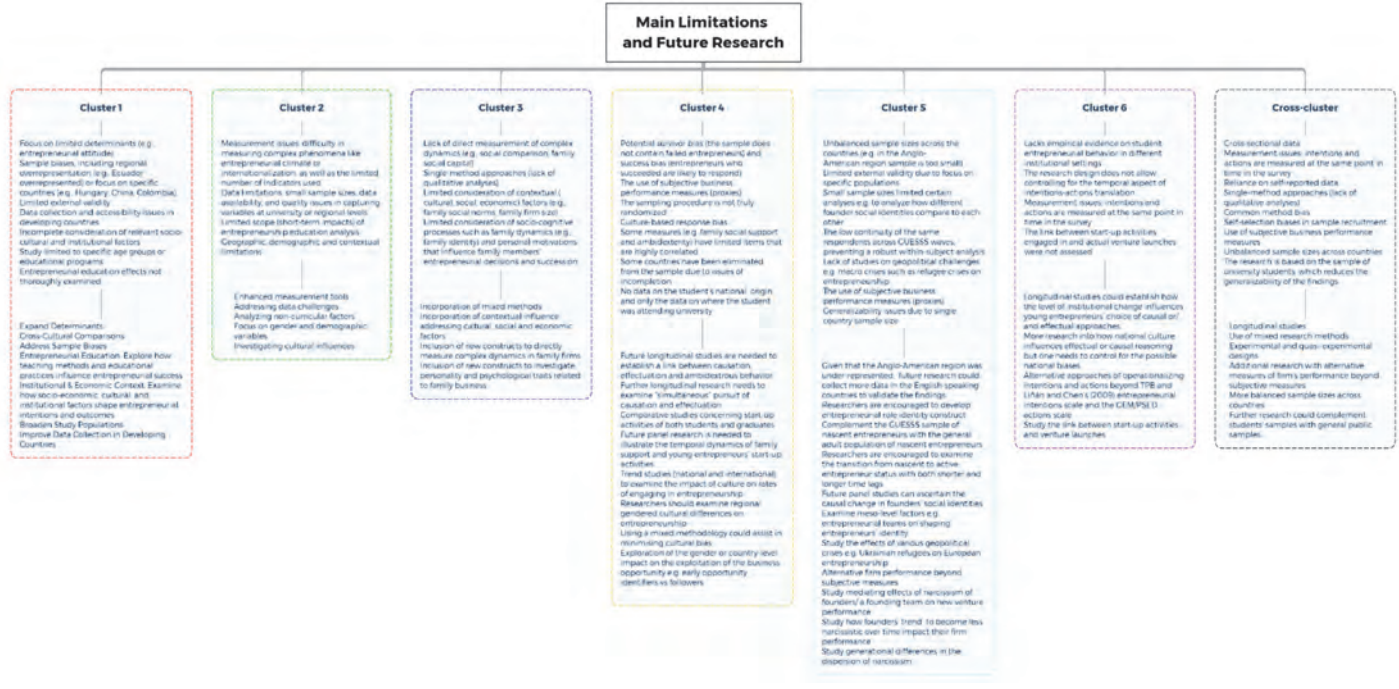
Future research should develop standardised, robust measures for these constructs, improve proxies and regional/institutional control variables to better capture long-term impacts, incorporate non-curricular factors such as family involvement, and examine how gender, demographic variables and university culture interact with entrepreneurial outcomes.

The third cluster (family business entrepreneurship) is limited by missing GUESSS variables (e.g. firm size, direct measures of family firm dynamics), samples concentrated on western students, insufficient attention to contextual and socio-cognitive factors, and an over-reliance on single quantitative methods. Future research should incorporate mixed methods, extend samples beyond western contexts, further explore socio-cognitive factors, and expand the GUESSS survey with validated scales measuring family firms' complex dynamics (e.g. social comparison, family social capital).

The fourth cluster (multiplicity of contexts) shares limitations with the previous three: a non-randomised student sample, a cross-sectional design that precludes causal claims, incomplete country coverage, survivor/success bias (failed entrepreneurs are underrepresented), and culture-related response bias. Longitudinal designs and more rigorous cross-cultural methods are proposed to address these issues.

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Fig. 8: Main Limitations and Future Research



Source: Authors' elaboration

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The fifth cluster (personality traits and decision-making) is limited by unbalanced sample sizes across countries (e.g. a smaller Anglo-American sample) and a reliance on subjective performance measures. Research on the impact of geopolitical crises (e.g. the Ukrainian refugee flow) on entrepreneurship remains scarce, and founder personality research has focused on the Dark Triad while the Big Five and generational differences in narcissism remain understudied. Longitudinal designs are again proposed as a way forward.

The sixth cluster (country determinants and cross-cultural settings) is limited by measuring intentions and actions within the same survey, and by not tracking whether start-up activities translate into actual venture launches. Future research should explore alternative approaches to operationalising intentions and actions beyond TPB, Liñán and Chen's (2009) scale and the GEM/PSED actions scale, ideally in a longitudinal setting that can also capture how institutional change shapes entrepreneurs' causal versus effectual preferences.

Our analysis demonstrated that all of the clusters share some limitations. The reliance on cross-sectional data inhibits the exploration of causal relationships and dynamic changes over time, while self-selection biases in sample recruitment (e.g. voluntary participation in entrepreneurship courses) raise concerns about validity. The over-reliance on self-reported, single-method data contributes to common-method bias and prevents a thorough examination of changes from entrepreneurial intention to actual behaviour, an issue compounded by the use of PLS-SEM, which is sensitive to weak effect sizes. The GUESSS survey being available only in English further limits the participation of non-native speakers. Opting for longitudinal designs, multi-method approaches, and experimental or quasi-experimental designs would allow researchers to capture shifts from intention to actual entrepreneurship more effectively and test hypotheses on entrepreneurship education and students' entrepreneurial behaviour more robustly.

5. Discussion and Conclusion

To the best of the authors' knowledge, this paper is the first bibliometric review on the research focused on the GUESSS project. To answer our RQs, we conducted bibliometric and content analyses in order to offer a systematisation of the last 23 years of research on student entrepreneurship using the GUESSS dataset. Using the hybrid review methodology, which combines bibliometric analysis with the structured review tenets to unpack the underlying theories, the study offers a comprehensive overview of the GUESSS scholarship on entrepreneurship and suggests a future research agenda.

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In addressing RQ1, the bibliographic coupling analysis portrayed a comprehensive intellectual structure of the GUESSS student entrepreneurship research, identifying the most influential journals, authors and institutions and revealing common patterns and potential research gaps (see Section 3.1 for the full performance analysis).

In answering the second research question, our bibliometric literature review integrates the GUESSS field's conceptual, intellectual and social structure from an interactive and holistic perspective. Through co-authorship analysis (Peters and van Raan, 1991), we find that more than 90% of the studies in our review were written by at least two authors, with Shirokova (National Research University Higher School of Economics, Russia), Minola (University of Bergamo) and Sieger (University of Bern) as the most published authors to date.

By eliciting six thematic clusters, which illustrate core research directions as well as under-researched areas, we have provided an elaborate overview of the theories underpinning the existing GUESSS research. We have mapped the core theoretical and empirical foundations underlying the evolution of this domain across the six clusters: 1) socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career paths; 2) the entrepreneurial climate at higher education institutions; 3) family business entrepreneurship; 4) the multiplicity of contexts and their impact on entrepreneurship; 5) personality traits (micro-mechanisms) and entrepreneurial decision-making logic and behaviours; and, 6) country determinants (macro vs micro data) and cross-cultural settings.

TPB was the most dominating and solidified theory in clusters I, II, III and VI, which suggests that TPB (Ajzen, 1991) remains the key theoretical lens for this field of study. Other models that studied entrepreneurship as intentional and planned actions, that offer an opportunity to explain and predict entrepreneurial activity, include Shapero's model of the 'entrepreneurial event' (1982) and Bird's entrepreneurial intentions model (1988), representing a combination of a person's rationality and intuition about their venture creation and the influence of various personal and contextual factors. Institutional theory (DiMaggio and Powell, 1983; North, 1990) was found to be a dominant theory in cluster III, themed as family business entrepreneurship, and one of the leading theories in cluster I, themed as socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career paths. Among other seminal theories that GUESSS scholars have applied in their research was Human Capital Theory (Becker, 1964) in cluster II, themed as examining various factors influencing the entrepreneurial climate at higher education institutions. Social Cognitive Theory (Bandura, 1988) appears as one of the leading theories that has been instrumental in examining family business

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(cluster III) and the link between socio-demographics and entrepreneurial career paths (cluster I). Social Identity Theory (Tajfel, 1978) and The Dark Triad personality constellation of three socially aversive personality traits -narcissism, Machiavellianism and psychopathy (Paulhus and Williams, 2002) have been emerging as key psychological lenses for examining and understanding the personality traits of founders in the GUESSS research field and how these psychological micro foundations are related to entrepreneurial decision-making (cluster V). Causal and effectual decision-making logic (Sarasvathy, 2001) has been applied to examine how entrepreneurs can influence or/and control the multiplicity of contexts and environmental contingencies in their pursuit of entrepreneurial goals (cluster IV) including macro determinants (cluster VI). Despite the fact that new ventures are often resource deprived and inexperienced (Parida *et al.*, 2016), a resource-based view (Barney 1991) was not identified among the dominating theoretical lens in cluster V, themed as personality micro-mechanisms and entrepreneurial decision-making logic and behaviours. We therefore recommend integrating more a resource-based view (Barney 1991) in future research, in order to obtain a more nuanced view of the mechanisms that founders of new ventures employ to compensate for the lack of resources. Finally, despite the growing importance of a better understanding of the "context to theory" – how contextualisation enhances theoretical advancement in the entrepreneurship research (Shirokova *et al.*, 2023) – the contingency theory approach (Venkatraman, 1990) was underrepresented in cluster VI. Through applying the contingency theory lens by means of including theoretically relevant contextual moderators the GUESSS research could advance the research frontier regarding the role of context for the theory development in youth entrepreneurship.

To address our third research question, we identified the limitations in each cluster as well as across clusters and developed detailed future research directions (see Figure 8 and Table A3 in the Appendix A). As an emergent field since 2003, GUESSS research has over-relied on TPB and other intentional, planned-behaviour theories, even though starting a business is often a lengthy, non-linear undertaking for which the intention-action link is comparatively weak. To better capture the psychology of both non-entrepreneurs and entrepreneurs, future work could extend to Schwartz Value Theory (1992) and Self-Regulation theory (Carver and Scheier, 2012), alongside social capital theory (Nahapiet and Ghoshal, 1998) to understand interpersonal trust, and explore the social legitimacy of entrepreneurship and individual dissatisfaction as drivers of youth entrepreneurship (Thurik and Dejardin, 2012). Methodologically, we encourage configurational approaches such as qualitative comparative analysis (Rippa *et al.*, 2023) to move beyond the current overuse of causal-hypothesis-testing methods.

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Finally, future GUESSS surveys could benefit from incorporating the framework of evolutionary theory (Breslin, 2008), allowing for a dynamic, multi-level analysis of students' entrepreneurial intentions. This approach is closely aligned with the concept of co-evolution, which views organisational adaptation as a two-way interaction process between organisations and their competitive environment, emphasising interdependence and mutual feedback loops (Weber, 2017). The application of co-evolutionary principles could shed light on how the reciprocal evolution of students' entrepreneurial intentions and the educational or socio-economic environment occurs (Abatecola *et al.*, 2020). For example, researchers could explore how universities and entrepreneurial ecosystems adapt in tandem, shaping and being shaped by students' evolving cognitive heuristics, routines and behaviours. Integrating this lens into GUESSS could provide nuanced insights into how dynamic interactions between individuals and their environments facilitate or constrain the emergence of entrepreneurial initiatives.

The primary purpose of GUESSS is to monitor and better understand students' entrepreneurial spirit and behaviour. The advantage of GUESSS lies in its external validity with 50-plus countries in the latest 2023 wave and the fact that it allows for capturing different stages of entrepreneurial progress – non-, intentional, nascent and active entrepreneurs. However, one of the disadvantages of GUESSS is that it focuses on university students and does not cover the general (working) population. Another area of improvement we suggest is to remedy the lack of continuity regarding some constructs in the GUESSS survey: innovation ambidexterity strategy questions were included in the 2018 wave but not in the 2021 and 2023 waves. Relatedly, we suggest that the GUESS questionnaire incorporate actual innovative ambidexterity practices as well as realised innovative ambidexterity. Given the growing prominence of the digital economy, we suggest that future GUESSS research should explicitly address digitalization as a cross-cutting theme. Including specific questions about digital entrepreneurship and digital ecosystems (DEEs) would allow scholars to investigate how digital transformation intersects with student venture creation processes and intentions in the post-pandemic era. One possible direction is that GUESSS could conduct survey waves devoted to particular trends and current pressing issues in the entrepreneurship research in order to capture these issues in depth and obtain a more nuanced picture of research sub-fields.

Building on the "closed community" pattern noted in Section 3.1, we recommend rethinking data access policies for the GUESSS dataset, potentially aligning it with more open entrepreneurship datasets such as GEM (Acs *et al.*, 2008), to enhance its contribution to understanding entrepreneurial dynamics.

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A key recommendation we propose for future GUESSS surveys is the inclusion of alternative performance measurements that go beyond subjective self-assessments. The current reliance on subjective measures of entrepreneurial success limits the scope of performance evaluation. We therefore suggest incorporating objective indicators, such as revenue growth, number of employees, or external funding raised, to provide a more comprehensive assessment of entrepreneurial outcomes. This would offer more robust data for researchers studying entrepreneurial performance and would be especially relevant for cross-country comparisons or multi-level research involving longitudinal data. In the same vein, it is also recommended that the number of individuals be increased for multi-level research involving longitudinal data. Going forward, more balanced sampling in relation to country size is advisable to ensure that the number of individuals is in line with a country size.

Finally, we are well aware of the potential limitations of bibliometric reviews (e.g., biases due to self-citations, considering documents that have already been published and indexed). In our analysis, papers were only included if they were indexed in the Scopus database as of April 11, 2024. This approach ensured that we could rely on consistent and comprehensive metadata to conduct the analyses. However, this also means that some of the most recent publications, which may not yet have been indexed by Scopus at that time, have been excluded. Despite this limitation, we believe that our review offers valuable insights into the conceptual, intellectual and social structures within the GUESSS research up to this date. Furthermore, we hope to offer useful recommendations to scholars using GUESSS. We also intend to catalyse the interest of scholars interested not only in student entrepreneurship as such, but more broadly of those scholars who would like to advance entrepreneurship research using student entrepreneurship as a valuable and unique setting.

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Appendix A
Keywords, Theories, Limitations and Future Research

Tab. A1a: Keywords in family business entrepreneurship cluster.

Keyword	Occurrences*	Links
guesss	29	54
entrepreneurial intentions	12	28
student entrepreneurship	12	33
family business	5	13
causation	4	18
effectuation	4	18
family embeddedness	4	15
narcissism	4	7
national culture	4	13
start-up activities	4	9
firm performance	3	4
intention-action gap	3	7
succession	3	8
ambidexterity	2	5
embeddedness	2	10
emerging economies	2	7
family support	2	7
intention-behavior link	2	6
mena region	2	5
new venture performance	2	8
workaholism	2	4

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A1b: Keywords in country determinants (macro vs micro data) and cross-cultural settings cluster

Keyword	Occurrences*	Links
entrepreneurial intention	24	36
entrepreneurship	21	33
students	8	25
theory of planned behavior	6	15
locus of control	4	15
university environment	4	10
business	3	17
colombia	3	5
innovation	3	13
intention	3	9
china	2	11
engineering	2	15
entrepreneurial attitude	2	7
entrepreneurial process	2	7
social environment	2	6
spain	2	7

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A1c: Keywords in socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career paths cluster

Keyword	Occurrences*	Links
university students	11	18
gender	7	13
succession intention	5	9
affective commitment	4	7
career choice	4	7
latin america	4	10
self-employment	4	6
university	4	10
attitudes	3	8
entrepreneurial interest	2	4
parental support	2	2
perceived desirability	2	2
psychology	2	7
self-efficacy	2	5

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A1d: Keywords in multiplicity of contexts and crises and their impact on entrepreneurship cluster

Keyword	Occurrences*	Links
entrepreneur	10	46
university sector	4	27
entrepreneurial learning	3	19
co-curricular activities	2	15
curriculum	2	16
entrepreneurial education	2	11
financial support	2	15
hypothesis testing	2	13
learning	2	16
multilevel analysis	2	14
student entrepreneurs	2	13
theoretical study	2	13

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A1e: Keywords in personality traits (micro-mechanisms) and entrepreneurial decision-making logic and behaviors cluster

Keyword	Occurrences*	Links
entrepreneurship education	15	42
higher education	9	18
entrepreneurial self-efficacy	5	14
nascent entrepreneurship	5	12
social identity theory	4	12
entrepreneurial spirit	3	5
european union	2	6
founder social identity	2	9
social entrepreneurship	2	6
social identity	2	3

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A1f: Keywords in entrepreneurial climate at higher education institutions cluster

Keyword	Occurrences*	Links
education	9	38
university entrepreneurship	7	14
nascent entrepreneurs	4	9
entrepreneurial activity	3	9
entrepreneurial climate	3	9
entrepreneurial university	3	9
education computing	2	7
entrepreneurial ladder	2	5
europe	2	10
societies and institutions	2	7

Source: Authors' elaboration on VOSviewer output data.
** The occurrence number of a keyword represents the frequency at which the keyword appears in a dataset, while the number of links of a keyword refers to the count of unique co-occurrence relationships it has with other keywords in the dataset.*

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Tab. A2: Theories and models employed in GUESSS research for each cluster

Cluster	Theories (origin)	Occurrences	(Selected) references
Cluster I – Socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career – paths	Theory of Planned Behavior (Ajzen,1991)	29	e.g. Bogatyreva *et al.* (2019); García-Rodríguez *et al.* (2017a;b); Gil-Soto *et al.* (2022); Leiva *et al.* (2021); Lopez *et al.* (2021); Lopez and Alvarez (2019); Silva *et al.* (2021); Ramos-Rodríguez et a. (2019); Renart *et al.* (2022)
	Entrepreneurial Intentionality models (Bird, 1988; Krueger, 1993; Shapero, 1975; 1982)	3	Bernhofer and Han (2014); Sekerbayeva (2023); Stabingis and Raupeliene (2023);
	Institutional theory (DiMaggio and Powell, 1983; North, 1990)	3	Lopez and Alvarez (2019); Moreno-Gómez *et al.* (2022); Skrbková and Rydvalová (2023)
	Social cognitive theory (Bandura, 1988a; 1988b; 1991)	3	Gubik (2021); Gubik and Farkas (2020); Horvath (2016)
	Entrepreneurial Event Theory (Shapero, 1982)	2	Holienka *et al.* (2017); Víquez-Paniagua *et al.* (2022)
	Theory of motivation, opportunity and ability (MOA) (MacInnis and Jaworski, 1989; MacInnis *et al.*, 1991)	2	García-Rodríguez *et al.* (2017); Silva *et al.* (2021)
	Social learning theory (Bandura, 1971; Scherer *et al.*,1989)	2	Moreno-Gómez *et al.* (2020; 2022)
	Social role theory (Eagy, 1987; Eagly and Wood, 1999; Eagly *et al.*, 2000)	1	Leiva *et al.* (2021)
	Human capital theory (Becker, 1964; Mincer, 1958)	1	Maresch *et al.* (2016)
	Agency theory (Eisenhardt, 1989; Fama, 1980; Hill and Jones, 1992; Long and Walkling, 1984).	1	Sharabi and Polin (2020)
	Cognitive career theory (SCCT) (Lent, Brown, and Hackett, 2000)	1	Horvath (2016)

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Cluster	Theories (origin)	Occurrences	(Selected) references
	Interpersonal trust theory (Mayer *et al.*, 1995)	1	Gillanders *et al.* (2021)
Cluster II – Entrepreneurial climate at higher education institutions	Theory of Planned Behavior (Ajzen,1991)	4	Iazzolino *et al.* (2019); Laspita *et al.* (2023); Lima *et al.* (2015); Valencia-Arias *et al.* (2022)
	Implementation intention theory (Gollwitze, 1999)	1	
	Human capital theory (Becker, 1964; Mincer, 1958)	3	Hahn *et al.* (2017); Leiva *et al.* (2022; 2023); Sancho (2021)
	Social learning theory (Bandura, 1971; Scherer *et al.*, 1989)	2	Bergman *et al.* (2016; 2018)
	Organizational psychology theory and team formation literature i.e. organizational climate (Schneider, 2000; Schneider, White, and Paul, 1998)	2	Bergman *et al.* (2016; 2018)
	Institutional theory (DiMaggio and Powell, 1983; North, 1990; 2005)	2	Guerrero *et al.* (2016); Sancho (2021)
	Entrepreneurial Intentionality models (Bird, 1988; Krueger, 1993; Shapero, 1975; 1982)	1	Sancho *et al.* (2021)
	Social Identity theory (Stets and Burke, 2000; Tajfel, 1978; Tajfel and Turner, 1986).	1	Hahn (2020)
	Cognitive career theory (SCCT) (Lent, Brown, and Hackett, 2000)	1	Hahn *et al.* (2022)
	A family embeddedness perspective (Uzzi, 1997)	1	Hahn *et al.* (2020)
	Opportunity-recognition beliefs approach (Grégoire *et al.*, 2010)	1	Bergmann (2017)
	Organizational climate theory (Rentsch, 1990)	1	Bergmann *et al.* (2016)
	Endogenous growth perspective (Romer, 1990)	1	Guerrero *et al.* (2016)
Cluster III – Family business	Theory of Planned Behavior (Ajzen,1991)	8	Cano and Tabares (2017; 2018); Cano *et al.* (2017); Laspita *et al.*

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Cluster	Theories (origin)	Occurrences	(Selected) references
entrepreneurship	Entrepreneurial Intentionality models (Krueger, 1993; Shapero, 1975; 1982)	2	(2012); Ljubotina *et al.* (2018); Sieger and Monsen (2015); Sieger and Minola (2017); Tabares and Cano (2018); Zellweger *et al.* (2011)
	Social cognitive theory (Bandura, 1988a; 1988b; 1991)	3	Lyons *et al.* (2023); Sieger and Monsen (2015); Suhartanto (2023)
	Theory of mixed control (Monsen and Urbig, 2009)	2	Sieger and Monsen (2015); Zellweger *et al.* (2011)
	Social Exchange theory (Gouldner, 1960; Foa and Foa, 1980)	2	Suhartanto (2023; 2024)
	Family embeddedness perspective (Uzzi, 1997)	2	Hahn *et al.* (2021); Sieger and Minola (2017)
	Family Science and Intergenerational solidarity theory (Jaskiewicz *et al.*, 2017)	1	Gimenez-Jimenez *et al.* (2021)
	Human capital theory (Becker, 1964; Mincer, 1958)	1	Suchankova *et al.* (2023)
	Agency theory (Eisenhardt, 1989; Fama, 1980)	1	Suchankova *et al.* (2023)
	Imprinting theory (Marques *et al.*, 2022)	1	Suchankova *et al.* (2023)
	Institutional theory (DiMaggio and Powell, 1983; North, 1990)	1	Torres *et al.* (2023)
	Cross-cultural theory (Brislin, 1970)	1	Laspita *et al.* (2012)
	Entrepreneurial career theory (Schein, 1978)	1	Zellweger *et al.* (2011)
	Knowledge spillover theory of entrepreneurship (Caiazza *et al.*, 2015; 2020)	1	Hahn *et al.* (2021)
	Social comparison theory (Festinger 1954; Wood, 1989)	1	Criaco *et al.* (2017)
Cluster IV-Multiplicity of contexts and their	Institutional theory (DiMaggio and Powell, 1983; North, 1990)	7	Bakkar *et al.* (2021); Fragoso *et al.* (2024); Gimenez-Jimenez *et al.* (2022); Guerrero and

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Cluster	Theories (origin)	Occur-rences	(Selected) references
impact on entrepreneurship			Marozau (2023); Manolova *et al.* (2021); Shirokova *et al.* (2022); Wales *et al.* (2021)
	Causal and Effectual Decision-Making Logics (Mintzberg, 1978; Sarasvathy, 2001, 2008)	3	Braun and Sieger (2021); Laskovaia *et al.* (2017); Smolka *et al.* (2016)
	Theory of Planned Behavior (Ajzen,1991)	2	Shirokova *et al.* (2022); Weiss *et al.* (2019)
	Mixed embeddedness perspective (Kloosterman *et al.*, 1999; Langevang *et al.*, 2015)	2	Fragoso *et al.* (2024);Weiss *et al.* (2023)
	Family embeddedness perspective (Uzzi, 1997)	2	Braun and Sieger (2021)
	Social embeddedness perspective (Aldrich and Zimmer; 1986; McKeever *et al.* 2014)	2	Weiss *et al.* (2019; 2023)
	Social legitimacy perspective (Etzioni, 1987).	1	Laskovaia *et al.* (2017)
Cluster V – Personality traits(micro-mechanisms) and entrepreneurial decision-making logic and behaviors	Social Identity theory (Stets and Burke, 2000; Tajfel, 1978; Tajfel and Turner, 1986).	6	Braun *et al.* (2023); Brändle *et al.* (2018); Gonzalez-Canosa *et al.* (2021); Hsueh *et al.* (2023); Karpinskaia *et al.* (2025); Sieger *et al.* (2016)
	The Dark Triad personality traits (Christie and Geis, 1970; Hare, 1985; Raskin and Terry, 1988)	3	Baldegger *et al.* (2017); Shirokova *et al.* (2024)
	Self-efficacy (Bandura, 1981)	2	Brändle *et al.* (2018); Gonzalez-Canosa (2021)
	Theory of Planned Behavior (Ajzen,1991) and Theory of entrepreneurial intentions (Krueger, 1993; Shapero, 1975; 1982)	2	Verheul *et al.* (2015; 2016)
	The person–environment (P–E) fit theory (Kristof, 1996; Kristof-Brown *et al.* 2005)	2	Baldegger *et al.* (2017); Verheul *et al.* (2015; 2016)
	Identity theory (Callero, 1985)	1	Karpinskaia *et al.* (2023)

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Cluster	Theories (origin)	Occur-rences	(Selected) references
	The gestation process perspective (Alsos and Kolvereid, 1998)	1	Alshibani *et al.* (2023)
	Social cognitive theory (Bandura, 1988a; 1988b; 1991)	1	Brändle *et al.* (2018)
	Schwartz's value orientation theory (Schwartz, 1992; 1994a,b)	1	Karpinskaia *et al.* (2023)
	Upper echelons theory (Hambrick and Mason, 1984; Hambrick and Pettigrew, 2001)	1	Shirokova *et al.* (2023)
	Effectuation theory (Sarasvathy, 2001, 2008)	1	Sieger *et al.* (2016)
	Social legitimacy perspective (Etzioni, 1987; Suchman, 1995).	1	Karpinskaia *et al.* (2023)
	Resource-based view (RBV) (Barney 1991)	1	Karpinskaia *et al.* (2023)
Cluster VI – Country determinants (macro vs micro data) and cross-cultural settings.	Theory of Planned Behavior (Ajzen,1991)	4	Bogatyreva and Shirokova (2017); Beliaeva *et al.* (2017); Shirokova *et al.* (2015; 2016)
	Human capital theory (Becker, 1964; Mincer, 1958)	2	Knatko *et al.* (2016); Shirokova *et al.* (2015)
	Resource-based view (RBV) (Barney 1991)	2	Knatko *et al.* (2016); Shirokova *et al.* (2017)
	Embeddedness theory (Granovetter, 1992).	2	Morris *et al.* (2017); Shirokova *et al.* (2015)
	Effectuation theory (Sarasvathy, 2001, 2008)	1	Shirokova *et al.* (2017)
	Contingency approach (Drazen and Van de Ven 1985, Fry and Smith 1987, Volberda *et al.* 2012)	1	Knatko *et al.* (2016)
	Social role theory (Eagly and Wood, 1999; Eagly, 1987; Eagly *et al.*, 2000)	1	Shirokova *et al.* (2016)

Source: Authors' elaboration

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Tab. A3: Limitations and Future Research recommendations for each cluster

Cluster	Limitations	Future research recommendations
1. Socio-demographic characteristics (e.g. gender, age, education level, culture) and entrepreneurial career – paths	• Focus on limited determinants (e.g., entrepreneurial attitude determinants) and lack of consideration of other potential factors. • Sample biases, including regional overrepresentation (e.g., Ecuador overrepresented) or focus on specific countries (e.g., Hungary, China, Colombia). • Limited external validity due to focus on specific populations (e.g., female business students, university students in Canary Islands, Kazakhstan, etc.). • Data collection and accessibility issues in developing countries, especially in Latin America (e.g., fragmented business demographics data). • Incomplete consideration of relevant socio-cultural and institutional factors (e.g., economic context, university culture). • Study limited to specific age groups (e.g., last-year students, young adults) or educational programmes (e.g., business degrees). • Entrepreneurial education effects not thoroughly examined (e.g., role of education methods, didactics, or parental role models).	• Expand Determinants: Study a broader range of determinants affecting entrepreneurial attitudes (e.g., social networks, subjective vitality, affective commitment). • Cross-Cultural Comparisons: Replicate studies in other regions and countries to test the generalisability of results (e.g., across developing countries in Latin America, beyond Hungary or Colombia). • Address Sample Biases: Broaden the sample to include a more diverse range of students (e.g., non-university students, other university programs). • Entrepreneurial Education: Investigate the impact of educational practices (e.g., teaching methods, classroom innovations) and entrepreneurial education on entrepreneurial outcomes. • Institutional and Economic Context: Delve into how different socio-economic, cultural, and institutional contexts (e.g., economic conditions, university environments) impact entrepreneurial intentions and outcomes. • Broaden Study Populations: Include older populations and professionals to understand entrepreneurial intention formation across different life stages and the factors incentivising the transition from student (nascent entrepreneur) to adult (actual entrepreneur).

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Cluster	Limitations	Future research recommendations
		• Improve Data Collection in Developing Countries: Facilitate the collection of comprehensive and comparable data in developing countries, addressing issues related to technology and accessibility.
2. Entrepreneurial climate at higher education institutions	• Measurement issues: Difficulty in measuring complex phenomena like entrepreneurial climate or internationalisation, as well as the limited number of indicators used. • Data limitations: Small sample sizes, data availability, and quality issues in capturing variables at university or regional levels. • Limited scope of entrepreneurship education analysis: The studies focus primarily on the short-term impacts of entrepreneurship education, overlooking the long-term outcomes. • Geographic and contextual limitations: Results are based on specific contexts (e.g., Germany or Vietnam) and might not hold in different cultural or geographic settings.	• Enhanced measurement tools: Developing standardised models and more robust measures for complex phenomena like university internationalisation and entrepreneurial climate, including more detailed EE measures. • Addressing data challenges: Future research should address data availability issues by improving proxies and incorporating control variables at the regional or institutional levels to measure long-term economic and social impacts. • Analysing non-curricular factors: Future studies should consider including additional variables (e.g., family involvement) to capture the full scope of entrepreneurial ecosystems. • Focus on gender and demographic variables: Studies should delve deeper into how gender and regional differences affect entrepreneurship education and outcomes across different contexts. • Investigating cultural influences: Future research could focus on the interaction between university culture, regional factors, and entrepreneurial behaviour, incorporating unobserved contextual influences.

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Cluster	Limitations	Future research recommendations
3. Family business entrepreneurship	• Lack of direct measurement of complex dynamics (e.g., social comparison, family social capital) • Limited consideration of contextual (cultural, social, economic) factors (e.g., family social norms, family firm size) • Limited consideration of socio-cognitive processes (e.g., family identity)	• Incorporation of contextual influence • Inclusion of new constructs to directly measure complex dynamics in family firms • Inclusion of new constructs to investigate personality and psychological traits related to family business
4. Multiplicity of contexts and their impact on entrepreneurship	• Cannot confirm causality due to cross-sectional data • Potential survivor bias (the sample does not contain failed entrepreneurs) and success bias (entrepreneurs who succeeded are likely to respond) • The use of subjective business performance measures (proxies) • The sampling procedure is not truly randomised • Culture-related response bias • Some measures (e.g. family social support and ambidexterity) have limited items that are highly correlated • Some countries have been eliminated from the sample due to issues of incompletion • No data on the student's national origin	• Future longitudinal studies are needed to establish a link between causation, effectuation and ambidextrous behaviour • Further longitudinal research needs to examine "simultaneous" pursuit of causation and effectuation • Comparative studies concerning start-up activities of both students and graduates • Future panel research is needed to illustrate the temporal dynamics of family support and young entrepreneurs' start-up activities • Trend studies (national and international) to examine the impact of culture on rates of engaging in entrepreneurship • Researchers should examine regional gendered cultural differences on entrepreneurship • Using a mixed methodology could assist in minimising cultural bias • Exploration of the gender or country-level impact on the exploitation of the business opportunity e.g. early opportunity identifiers vs followers

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Cluster	Limitations	Future research recommendations
5. Personality traits (micro-mechanism) and entrepreneurial decision-making logic and behaviors	• Unbalanced sample sizes across the countries (e.g. in the Anglo-American region sample is too small). • Limited external validity due to focus on specific populations • Small sample sizes limited certain analyses e.g. to analyse how different founder social identities compare to each other • The low continuity of the same respondents across GUESSS waves, preventing a robust within-subject analysis • Lack of studies on geopolitical challenges e.g. macro crises such as refugee crises on entrepreneurship • The use of subjective business performance measures (proxies) • Generalisability issues due to single country sample size	• Given that the Anglo-American region was under-represented, future research could collect more data in the English-speaking countries to validate the findings. • Researchers are encouraged to develop entrepreneurial role identity construct • Complement the GUESSS sample of nascent entrepreneurs with the general adult population of nascent entrepreneurs • Researchers are encouraged to examine the transition from nascent to active entrepreneur status with both shorter and longer time lags • Future panel studies can ascertain the causal change in founders' social identities • Examine meso-level factors e.g. entrepreneurial teams on shaping entrepreneurs' identity • Study the effects of various geopolitical crises e.g. Ukrainian refugees on European entrepreneurship • Alternative firm performance beyond subjective measures • Study mediating effects of narcissism of founders/ a founding team on new venture performance • Study how founders' trend of becoming less narcissistic over time impacts their firm performance • Study generational differences in the dispersion of narcissism

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Cluster	Limitations	Future research recommendations
6. Country determinants (macro vs micro data) and cross-cultural settings	• Lacks empirical evidence on student entrepreneurial behaviour in different institutional settings • The research design does not allow for controlling for the temporal aspect of intentions-actions translation • Measurement issues: intentions and actions are measured at the same point in time in the survey • The link between start-up activities engaged in and actual venture launches was not assessed	• Longitudinal studies could establish how the level of institutional change influences young entrepreneurs' choice of causal or/and effectual approaches. • More research into how national culture influences effectual or causal reasoning but one needs to control for the possible national biases • Alternative approaches of operationalising intentions and actions beyond TPB and Liñán and Chen's (2009) entrepreneurial intentions scale and the GEM/PSED actions scale • Study the link between start-up activities and venture launches
Cross-cluster	• Cross-sectional data • Measurement issues: intentions and actions are measured at the same point in time in the survey • Reliance on self-reported data • Single-method approaches (lack of qualitative analyses) • Common method bias • Self-selection biases in sample recruitment • Use of subjective business performance measures • Unbalanced sample sizes across countries • The research is based on a sample of university students, which reduces the generalisability of the findings. • Several papers do not formulate an explicit research question or a reference framework	• Longitudinal studies • Incorporation of mixed methods • Experimental and quasi-experimental designs • Additional research with alternative measures of firm performance beyond subjective measures • More balanced sample sizes across countries • Complement student sample with general population sample of entrepreneurs

Source: Authors' elaboration.

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Appendix B – Bibliometric Analyses Sample

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Appendix C – Sample Descriptive and Performance Statistics

Tab. C1: Search query in Scopus

Search Terms in Scopus		
Field Tag	Title, Abstract, and Keywords	TITLE-ABS-KEY("guesss" OR "Global Universit* Entrepr* Spirit* Student* Survey")
Boolean		AND
Document Type	Article	LIMIT-TO (DOCTYPE,"ar")
Boolean		AND
Publication Year		PUBYEAR > 1999
Boolean		AND
Language		LANGUAGE(ENGLISH)

Source: Authors' elaboration

Tab. C2: Descriptive statistics of resulting publications

Publications	117
Authors	246
Journals	68
Institutions	143
Countries	40
Cited references	8457

Source: Authors' elaboration on search and selection process data.

Tab. C3: Distribution of papers in sample by GUESSS waves

GUESSS edition	# of papers
2006	1
2008	0
2011	24
2013/2014	22
2016	19
2018	27
2021	12
longitudinal data	11

Source: Authors' elaboration.

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Tab. C4: Citation analysis of the 15 most relevant documents in the dataset ordered by normalized citations

Most influential Papers by normalized citations (Top 15)	Authors	Year	Journal	Citations	Norm. Cit.
Business model innovation and young firm performance: the role of founder personality	Veksler K., Dvorkina D., Amarantov I., Shirokova G., Bodolica V.	2024	IEEE Transactions on Engineering Management	12	46.67
When do entrepreneurial intentions lead to actions? The role of national culture	Bogatyreva K., Edelman L.F., Manolova T.S., Osiyevskyy O., Shirokova G.	2019	Journal of Business Research	135	44.34
What drives university engineering students to become entrepreneurs? finding different recipes using a configuration approach	Rippa P., Ferruzzi G., Holienka M., Capaldo G., Coduras A.	2023	Journal of Small Business Management	15	43.13
A chip off the old block? The role of dominance and parental entrepreneurship for entrepreneurial intention	Palmer C., Fasbender U., Kraus S., Birkner S., Kailer N.	2021	Review of Managerial Science	54	35.56
Get it together! Synergistic effects of causal and effectual decision-making logics on venture performance	Smolka K.M., Verheul I., Burmeister-Lamp K., Heugens P.P.M.A.R.	2018	Entrepreneurship: Theory and Practice	155	29.97

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Most influential Papers by normalized citations (Top 15)	Authors	Year	Journal	Citations	Norm. Cit.
The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective	Hahn D., Minola T., Bosio G., Cassia L.	2020	Small Business Economics	97	29.39
The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs	Maresch D., Harms R., Kailer N., Wimmer-Wurm B.	2016	Technological Forecasting and Social Change	342	28.85
Women entrepreneurs' progress in the venturing process: the impact of risk aversion and culture	Gimenez-Jimenez D., Edelman L.F., Dawson A., Calabrò A.	2022	Small Business Economics	26	27.61
Exploring the intention–behavior link in student entrepreneurship: Moderating effects of individual and environmental characteristics	Shirokova G., Osiyevskyy O., Bogatyreva K.	2016	European Management Journal	313	26.41

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Most influential Papers by normalized citations (Top 15)	Authors	Year	Journal	Citations	Norm. Cit.
Promoting entrepreneurship based on university students' perceptions of entrepreneurial attitude, university environment, entrepreneurial culture and entrepreneurial training	Valencia-Arias A., Arango-Botero D., Sánchez-Torres J.A.	2022	Higher Education, Skills and Work-Based Learning	24	25.49
An intergeneration solidarity perspective on succession intentions in family firms	Gimenez-Jimenez D., Edelman L.F., Minola T., Calabrò A., Cassia L.	2021	Entrepreneurship: Theory and Practice	38	25.02
Student entrepreneurship and the university ecosystem: a multi-country empirical exploration	Morris M.H., Shirokova G., Tsukanova T.	2017	European Journal of International Management	95	23.68
National culture, effectuation, and new venture performance: global evidence from student entrepreneurs	Laskovaia A., Shirokova G., Morris M.H.	2017	Small Business Economics	87	21.68
The climate for entrepreneurship at higher education institutions	Bergmann H., Geissler M., Hundt C., Grave B.	2018	Research Policy	111	21.46
The influence of university entrepreneurship-oriented training in the transformation of intentions into new businesses	Sancho M.P.L., Ramos-Rodríguez A.R., Frende Vega M.D.L.á.	2022	International Journal of Management Education	19	20.18

Source: Authors' elaboration on SCOPUS data.

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Tab. C5: Top 15 countries and territories in terms of publication activity

Most prolific Countries (Top 15)	Papers in the sample
Russian Federation	19
United States of America	15
Germany, Italy, Spain, Switzerland	13
Colombia	12
France	9
Netherlands	7
Canada, Hungary	6
Costa Rica, Sweden, United Kingdom	5
Chile, Slovakia	4

Source: Authors' elaboration on SCOPUS data.

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Tab. C6: Top 15 institutions in terms of publication activity.

Most prolific Institutions (Top 15)	**Papers in the sample**
Graduate School of Management – St. Petersburg State University	26
Università degli Studi di Bergamo	13
University of St. Gallen	9
Rotterdam School of Management – Erasmus University	8
Miskolci Egyetem, *University of Bern,* *HSE University,* *Instituto Tecnológico de Costa Rica,* *Bentley University*	6
Universidad de Cádiz, *Universidad de Medellín*	5
Univerzita Komenského v Bratislave, *Universidad EAFIT*	4
University of Calgary, *Universidad de la Laguna,* *University of Florida,* *Jönköping University,* *Technische Universität München,* *Universitat Autònoma de Barcelona,* *Universidad Católica del Norte,* *Princess Nourah Bint Abdulrahman University,* *Montpellier Business School,* *Warrington College of Business,* *Haskayne School of Business*	3

Source: Authors' elaboration on SCOPUS data.

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Tab. C7: Top 15 authors in terms of publication activity.

Most prolific Authors (Top 15)	Papers in the sample
Shirokova, G.	19
Minola, T.	10
Sieger, P.	9
Bogatyreva, K.	7
Edelman, L.F., *Gubik, A.S.,* *Hahn, D.,* *Leiva, J.C.*	6
Bergmann, H.	5
Cano, J.A., *Holienka, M.,* *Mora-Esquivel, R.,* *Morris, M.H.,* *Osiyevskyy, O.,* *Ramos-Rodríguez, A.R.,* *Tabares, A.,* *Tsukanova, T.*	4

Source: Authors' elaboration on SCOPUS data.

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Tab. C8: Top 15 journals in terms of publication activity.

Most prolific Journals (Top 15)	**Papers in the sample**
Small Business Economics	10
Entrepreneurship and Regional Development	5
Academia Revista Latinoamericana De Administracion, *Entrepreneurship Research Journal,* *Espacios,* *Journal of Business Venturing,* *Journal of Small Business Management*	4
Entrepreneurial Business and Economics Review, *Entrepreneurship Theory and Practice,* *International Journal of Management Education,* *Journal of Business Research,* *Studies in Higher Education*	3
Danube, *European Journal of International Management,* *Higher Education Skills and Work Based Learning,* *International Entrepreneurship and Management Journal,* *International Journal of Entrepreneurial Venturing,* *International Small Business Journal,* *Researching Entrepreneurship,* *Journal of Business Venturing Insights,* *Journal of Entrepreneurship in Emerging Economies,* *Journal of Technology Transfer* *Management Research,* *Technological Forecasting and Social Change*	2

Source: Authors' elaboration on SCOPUS data.

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Tab. C9: Top 15 journals in terms of global citations

Most cited Journals (Top 15)	Citations	Number of papers	Citations per paper
Journal of Business Venturing	1042	4	260.5
Small Business Economics	645	10	64.5
Technological Forecasting and Social Change	355	2	177.5
European Management Journal	313	1	313
Entrepreneurship: Theory and Practice	230	3	76.67
Journal of Small Business Management	224	4	56
Journal of Technology Transfer	190	2	95
Journal of Business Research	168	3	56
Entrepreneurship and Regional Development	137	5	27.4
European Journal of International Management	116	2	58
Research Policy	111	1	111
Journal of Business Venturing Insights	96	2	48
European Journal of Epidemiology	58	1	58
Journal of Entrepreneurship in Emerging Economies	55	2	27.5
Review of Managerial Science	54	1	54

Source: Authors' elaboration on SCOPUS data.

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Tab. C10: Top 15 journals by impact factor and ranking (H-INDEX, SJR, ABS / AJG).

Most influential Journals by impact factor (Top 15)	Citations	H-INDEX	SJR (June 2024)	ABS / AJG (2024)
Research Policy	111	289	3.22	4*
Journal of Business Research	168	265	3.13	3
Journal of Business Venturing	1042	224	4.81	4*
Entrepreneurship: Theory and Practice	230	198	5.82	4*
Technological Forecasting and Social Change	355	179	3.12	3
Sustainability	2	169	0.67	/
Small Business Economics	645	167	2.53	3
European Journal of Epidemiology	58	138	3.19	/
Journal of Small Business Management	224	132	1.63	3
Studies in Higher Education	43	129	1.61	3
International Journal of Contemporary Hospitality Management	47	126	2.84	3
European Management Journal	313	124	1.79	2
International Small Business Journal	50	113	1.96	3
Entrepreneurship and Regional Development	137	112	1.37	3
IEEE Transactions on Engineering Management	12	112	1.2	3

Source: Authors' elaboration on the latest available SJR and ABS / AJG data.

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