



# Exploring the knowledge structure of entrepreneurship education and entrepreneurial intention

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## Abstract

The literature has widely recognized entrepreneurial intention as the best variable for predicting entrepreneurial behaviour. Entrepreneurial education represents a possible way to foster that intention. The interest in stimulating entrepreneurship activity has led to a growth in the number and disparity of publications that analyse the entrepreneurship education-entrepreneurial intention. This paper carries out a bibliometric analysis using bibliographic coupling to map the field's knowledge structure. This study's results contribute to the field complementing the previous literature reviews by addressing and verifying the development of the research lines proposed by them. Our approach is methodologically original, analysing the clusters in the network, including a characterization of each of them and the most significant and representative cited references for each group. Among the main conclusions, we find that although the theoretical base of most of the studies is found in classic theories, some alternative approaches dealing with emotional variables, mentality approaches, or psychological traits are more frequent in recent years and can play an important role in the future of the field, as the factors related to the intention-to-behaviour transition are a central focus of current research. Additionally, the contradictory results in past studies have focused the new developments around the influence of contextual factors that constitute an essential new direction for this research.

**Keywords** Entrepreneurship education · Entrepreneurial intention · Knowledge structure · Bibliographic coupling · Future research lines

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## Introduction

Entrepreneurship is defined as the process of identifying new opportunities, creating new economic activities and innovation (Low & Macmillan, 1988; Schumpeter, 1934). Entrepreneurship involves combining existing productive resources in new ways or for new purposes (Schumpeter, 1947). The literature widely recognized that entrepreneurship greatly influences economic development and growth (Acs et al., 2018; Agu et al., 2021; McKeever et al., 2014). The main reason lies in entrepreneurs' contribution to innovation, job creation, and poverty reduction (Dima, 2021; Liñán et al., 2011; Ribeiro-Soriano, 2017).

Although there are some calls for further research (Nabi et al., 2017), entrepreneurship literature usually accepts that entrepreneurial intention is the best variable for predicting entrepreneurial behaviour. Based on this fact, academic efforts have focused on explaining the antecedents of that intention. While several theories explain it, there is a broad consensus about two main lines as the theoretical basis: the Theory of Planned Behavior (Ajzen, 1991; Ajzen & Fishbein, 1980), and the Entrepreneurial Event Model (Shapiro & Sokol, 1982). The former identifies three motivational factors influencing intention: attitude toward the behavior, subjective norm, and perceived behavioral control. The latter proposes that desirability, feasibility, and a propensity to act are the major factors that control an individual's intention to be an entrepreneur.

Entrepreneurship education is a possible way to foster the previous factors driving entrepreneurial intentions and strengthen entrepreneurial skills (Anwar et al., 2022; Bae et al., 2014; Bischoff et al., 2018). Considering the importance acquired by the concept of entrepreneurship over time, both as an economic motor and as an employment alternative for those who could not find a job, it is easy to understand why so many governments have increased their support for entrepreneurship education (O'Connor, 2013; Ratten & Jones, 2021; von Graevenitz et al., 2010). Many academic institutions have included in their curricula entrepreneurship-related courses and seminars to develop entrepreneurial attitudes, skills, and personal qualities to provide individuals with the necessary tools to start a new business (Fayolle, 2018; Horng et al., 2021; Wang, 2022).

This influence of entrepreneurship education on entrepreneurial intentions has provoked an avalanche of works linking both concepts, although the results have not been as conclusive as expected. Despite this development, most of the research lacks systematization and coordination, which leads to starting anew with every study (Liñán & Fayolle, 2015). It is easily identifiable by checking the empirical models used in the papers, which are not alike, resulting in inconclusive and questioned results (Lorz et al., 2013), despite the broad agreement regarding the theoretical basis (Mikić et al., 2018). Due to these many inconsistent and ambiguous findings, researchers have undertaken qualitative and quantitative reviews to organize the existing knowledge and create a shared basis from which to continue. These reviews have mostly been done independently in the entrepreneurial intentions (Table 1) and the entrepreneurship education research fields (Table 2).

**Table 1** Review studies on entrepreneurial intentions

Author(s)	Year	Journal	Type of study	Sample
<b>Liñán and Fayolle</b>	2015	International Entrepreneurship and Management Journal	Systematic literature review	409 papers from Scopus, Web of Science (Social Science Citation Index), ABI-Inform/ProQuest, and Science Direct (2004–2013)
<b>Arias et al.</b>	2016	Intangible capital	Bibliometric study	396 papers from Scopus (1996–2015)
<b>Alferaih</b>	2017	The International Journal of Entrepreneurship and Innovation	Meta-Analysis	123 empirical studies from Web of Science, EBSCO and Scopus
<b>Dolhey</b>	2019	Journal of research in marketing and entrepreneurship	Bibliometric analysis	1,393 papers from Scopus (2000–2018)
<b>Donaldson</b>	2019	International Entrepreneurship and Management Journal	Systematic literature review	163 papers from Scopus (2014–2018)
<b>Singh and Onahring</b>	2019	Journal of Global Entrepreneurship Research	Review of literature	(1977–2018)
<b>da Silva Sousa et al.</b>	2019	Revista Gestão e Secretariado	Bibliometric analysis	813 papers from Scopus (1993–2018)

Source: The Authors

Table 2 Review studies on entrepreneurship education

Author(s)	Year	Journal	Type of study	Sample
Dainow	1986	Journal of Small Business & Entrepreneurship	Systematic literature review	58 articles from journals, government documents and reports and conference proceedings (1966–1984)
Bécharad and Grégoire	2005	Academy of Management Learning and Education	Systematic literature review	112 journal articles from CELCEE (1984–2001)
Pittaway and Cope	2007	International small business journal	Systematic Literature review	185 academic papers from entrepreneurship journals and ABIProquest (1980–2004)
Dickson et al.	2008	Journal of Small Business and Enterprise Development	Systematic literature review	Articles obtained from ABI/Inform Complete, the Social Sciences Research Network (SSRN) electronic library, the Journal Storage Project (JSTOR) electronic library, and the Organization for Economic Co-Operation and Development (OECD) publication archive (1995–2006)
Mwasalwiba	2010	Education + Training	Semi-Systematic literature review	108 articles from ABI/INFORM Fulltext and Emerald Fulltext (1984–2010)
Lorz et al.	2013	Entrepreneurship education	Systematic literature review	39 impact studies from EBSCO, ProQuest, and Web of Science databases (1985–1994)
Martin et al.	2013	Journal of Business Venturing	Meta-Analysis	42 papers from ABI/Inform Global Business Index, Business Source Complete, Education Full Text, ERIC (Education), PsycINFO, Google Scholar, JSTOR and Scholars Portal
Rideout and Gray	2013	Journal of Small Business Management	Systematic literature review	12 empirical studies from entrepreneurship journals (2003–2013)
Blenker et al.	2014	Methods in entrepreneurship education research	Systematic literature review	88 journal articles from ABI/Inform, Business Source Complete and Education Research Complete (2002–2012)
Loi et al.	2016	Entrepreneurship & Regional Development	Bibliometric analysis	1956 documents included in Sci-Expanded, Soci, AandHei, Cpci-S, Cpci-Ssh, Bkci-S, Bkci-Ssh, Cer-Expanded, Ic
Nabi et al.	2017	Academy of Management Learning & Education	Systematic literature review	159 articles from entrepreneurship journals listed in the ABS and ABI ProQuest, Emerald, and Science Direct (2004–2016)
Byrne et al.	2018	Handbook of research on small business and entrepreneurship	Literature Review	86 articles from entrepreneurship and education-based journals (1984–2011)
Henry and Lewis	2018	Education + Training	Literature review	66 papers from special issues on entrepreneurship /enterprise education published in Education + training (2010–2017)

Table 2 (continued)

Author(s)	Year	Journal	Type of study	Sample
Aparicio et al.	2019	European Research on Management and Business Economics	Bibliometric Review	325 scientific articles from WoS (1987–2017)
Brüme and Lutz	2020	Management Review Quarterly	Systematic Literature Review	21 quantitative and qualitative articles from journals with a Scientific Journal Ranking (SJR) above 0.337 from the field of entrepreneurship, management, and education (1997–2017)
Thomassen et al.	2020	Entrepreneurship education	Systematic literature review	26 publications from Scopus (1993–2017)

Source: The Authors

Regarding entrepreneurial intentions, Liñán and Fayolle (2015) do an excellent job describing the intellectual structure of this topic. Based on citation analysis, this study selected the most influential articles in the field. It analysed them to create a knowledge map in which they classified 409 articles published in the 2004–2013 period about entrepreneurial intent. Donaldson (2019) updated this study, analysing 163 papers published in the period 2014–2019 and observing the field's evolution in recent years.

Turning to entrepreneurship education studies, we highlight three studies: Pittaway and Cope (2007), Loi et al. (2016), and Nabi et al. (2017). Remarkably, review studies about entrepreneurship education appeared years before entrepreneurial intentions studies because this cause of training has been in the academic focus for more than half a century. Although Dainow (1986) had already reviewed studies from 1966, Pittaway and Cope (2007) explored the literature about this topic from 1980 till 2004. In this study, the authors carried out a systematic literature review and outlined a thematic framework drawn from narrative coding. In this framework, student propensity or intentionality occupies a central position. The authors highlighted the diversity of perspectives on this topic: from narrow personality traits perspectives to approaches considering social and environmental influences. However, it is noticeable that they did not consider the Theory of Planned Behaviour because most of the approaches based on this framework are later.

Loi et al. (2016) and Nabi et al. (2017) offer a more updated perspective about entrepreneurship education literature. Loi et al. (2016) make a co-citation analysis to determine the intellectual structure of the field. They concluded there were five core themes. Among them, the entrepreneurial intentions factor is the most important in this literature. Moreover, the authors show clear connections between this factor and the rest, especially evaluation.

Nabi et al. (2017) analysed 159 empirical articles published between 2004 and 2016 about the impact of entrepreneurship education in higher education on a range of entrepreneurial outcomes. The authors approach the systematic review process using a framework based on the nature of the entrepreneurship education pedagogical methods (Bécharde & Grégoire, 2005; Fayolle & Gailly, 2015) and the impact indicators (Henry & Lewis, 2018). They highlight the proportion of studies dealing with lower impact levels, i. e., short-term subjective indicators like attitude, skills, knowledge, perceived feasibility, and, especially, entrepreneurial intention.

The main conclusion to be extracted from previous reviews is the growing importance that both concepts have acquired over time and the current interest shown by scholars, academic institutions, and governments (Byrne et al., 2018; Solomon et al., 2008). In all these reviews, in both topics, we observe a growing number of studies that have analysed the relationship between these two concepts, specifically the influence of entrepreneurship education on the entrepreneurial intention of students undertaking a course or some training. Scholars reached mixed conclusions: some papers established a positive relationship between both concepts (Rauch & Hulsink, 2015; Walter & Dohse, 2012), others found a negative relationship (Ahmed et al., 2010; Newbery et al., 2016), and some studies got mixed results (Galvão et al., 2018; Karimi et al., 2016).

Although some general reviews have included this relationship as part of their analysis, it is not until 2014 when the first meta-analysis centred in the body of research dealing with entrepreneurship education-entrepreneurial intention relationship appears (Table 3). In their research, Bae et al. (2014) concluded that there was a small positive relationship between both concepts, and therefore entrepreneurship education was related positively to the participant's entrepreneurial intentions. A posterior meta-analysis (Mikić et al., 2018) reached the same conclusions, finding a slightly higher correlation coefficient than previous research.

Despite scholars' efforts to organize and harmonize the investigation field, it has kept growing in different directions without coordination or correlation between researchers. The apparent theoretic broad consensus becomes a complex ecosystem of approaches in which the consideration of additional factors and alternative methods often gets inconsistent results. Therefore, mapping the knowledge structure of the field and shedding light on research gaps and future directions is essential for this relationship. Our objective is to map the field's knowledge structure to identify the fundamental topics under research from a more holistic perspective to complement previous approaches. We have classified the most influential papers that form the field's backbone, responding to the call of Loi et al. (2016), who asked for the application of the bibliographic coupling methodology as deeper exploitation of bibliometric approaches can lead to additional insights, as well as to the most recent trends characterizing the topic.

The main contribution of our study is the provision of a clear overview of the research topics addressed in the literature, to complement the meta-analysis developed by Bae et al. (2014) and Mikić et al. (2018), who explore the relationships between entrepreneurial education and intentions. Our approach is methodologically original, analysing the clusters in the network (knowledge structure), including a characterization of each and the most significant cited references that the papers in the clusters share. Also, we have analysed the relationship between groups, attending to the links between them (again, through the analysis of shared cited references). Finally, we have discussed our results with the results of previous works (especially with Nabi et al., 2017 and Loi et al., 2016), which allowed us to reach some conclusions about the current state of the field and pinpoint research gaps and new directions.

The rest of the paper includes four sections. After presenting the introduction and the main theoretical aspects of both concepts, we describe the methodology that we have followed in detail, justifying the decisions made at every stage. Next, we present the results, describing the different thematic clusters we obtained. We discuss our results and compare them with the previous reviews, updating their conclusions and comment on future research lines. Implications for academics and practitioners, limitations and final remarks complete our work.

## Methods

To delimit entrepreneurship education-entrepreneurial intention relationship literature's knowledge structure, we have chosen the bibliographic coupling technique (Kessler, 1963). As we previously noted, Loi et al. (2016) called this kind of

**Table 3** Review studies on entrepreneurship education – entrepreneurial impact relationship

Author(s)	Year	Journal	Type of study	Sample
Bae et al.	2014	Entrepreneurship Theory and Practice	Meta-Analysis	73 studies from EBSCO host Database (Academic Search Complete and Business Source Complete), JSTOR, ABI/Inform, ProQuest Dissertations and Theses, Social Science Index Citation, Science Direct, Web of Science, Google searching and management and entrepreneurship journals (1997–2012)
Mikić et al.	2018	Economy and Market Communication Review	Meta-Analysis	45 papers from EBSCO, ProQuest, ScienceDirect, JStor and Google Scholar (1997–2017)

Source: The Authors



methodological approach in this field. Figure 1 illustrates its logic with example documents A to D. There are different relations between the documents. A and B share three cited references, while B and C have just one cited document in common. Both pairs of documents have a relationship through their intellectual base, but A and B's link is stronger than B and C's link. According to this technique, as document D does not share any of its cited references with the rest of the documents (A, B, and C), it has no relationship.

Kovács et al. (2015) propose a scheme to deliver this kind of analysis. We have followed it with some adaptations, covering the following four steps:

### 1. Building the database of citing references

To complete the objectives established for this research it is necessary to build a database that includes all the relevant research in the intersection of the topics we analyse. We decided to use the Scopus database because it covers all the relevant journals in the field. We have preferred to include sources that publish research about entrepreneurship, even if it is not a central topic for them. We have set some criteria to avoid including papers without a minimum of academic resonance.

We established our time window between 2010 and the present. Although the relationship between entrepreneurship education and entrepreneurial intention has been studied for a long time, the studies around this topic have grown considerably in the last ten years (before 2010, the number of documents per year indexed in the Scopus database about this topic is less than four per year). Previous studies about this relationship gathered document samples that finished between 2011 (Bae et al., 2014) and 2014 (Loi et al., 2016). Using a sample starting in 2010, we can observe the field's evolution and discuss what changes have happened in the relationship study. Moreover, in such a dynamic area, as citation habits change, the bibliographic coupling technique is best performed within a shorter timeframe (Glänzel & Thijs, 2012).

We ran our query in the Scopus database in July 2020 (Table 4). Recently, Baier-Fuentes et al. (2019) argued that this database has become a good alterna-

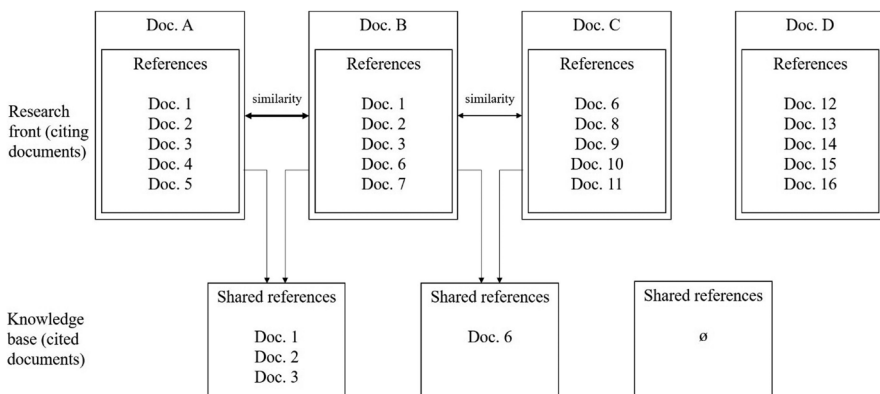


Fig. 1 Bibliographic coupling (Source: The Authors)

**Table 4** Search strategy and filtering process

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Query: (Date 07/28/2020)  
 (TITLE-ABS-KEY ((intent\* W/4 entrep\*) OR (intent\* W/4 new venture) OR (intent\* W/4 Start?up)  
 OR (intent\* W/4 New business) OR (intent\* W/4 New firm)) AND TITLE-ABS-KEY (training OR  
 education))

Conditions:

Limit to: Articles

Limit to: 2010–2020

Results: 707

Filtering criteria:

Remaining:

- Empirical analysis dealing with entrepreneurial education and entrepreneurial intention

Excluding:

- Meta-analysis, literature review, bibliographic analysis
- Theoretical documents
- Documents in which entrepreneurial education or entrepreneurial intention are not central

Results: 298

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Source: The Authors

tive to the Web of Science (WoS), explaining that Scopus has more extensive coverage. Moreover, these authors concluded that this database performs better when the study is dealing with relatively immature fields. Mongeon and Paul-Hus (2016), who stated that Scopus is one of the most complete databases in the social sciences, pointed out that Scopus includes most of the journals indexed in WoS and some others that are not included in that database. The International Journal of Entrepreneurial Behaviour and Research, Journal of Entrepreneurship Education and International Journal of Entrepreneurship and Small Business constitute some examples.

In the query, we included the two components of the relationship: entrepreneurial intention and education/training. In the first part of that query, following Liñán and Fayolle (2015) and Donaldson (2019), we searched in title-keywords-abstract fields the terms INTENT\* and ENTREPR\* but using the operator W/ (number). This operator returns those documents that include both terms and are not far away from the number of words set in “number” (in our case, four). Using the same procedure, we also added the following combinations: INTENT\* W/4 NEW VENTURE, INTENT\* W/4 START?UP, INTENT\* W/4 NEW BUSINESS, INTENT\* W/4 NEW FIRM. In the other part of the query, we preferred to leave the query more open. Thus, we searched for the terms TRAINING and EDUCATION in the same fields. This option returns many documents that include non-specific entrepreneurship education actions. However, we preferred this search strategy to avoid leaving out documents that refer to education but analyse entrepreneurship training.

To consider exclusively contrasted knowledge, we searched for articles only (Podsakoff et al., 2005). This procedure returned 707 documents for the period 2010–2020. The authors reviewed the title, abstract, and keywords of these docu-

ments to verify that they dealt with the desired relationship. When this approach was not enough to be sure, we read the full text of the document. A significant proportion of these papers did not treat entrepreneurship education, or it was not central. All of them were excluded, together with all the documents that did not specifically address the topic. Also, we left out of the sample reviews and meta-analysis, and other documents whose approach was eminently theoretical. The resultant sample contained 298 documents.

## 2. Preparing the database for analysis

We employed Bibexcel software (Persson et al., 2009) to prepare the data. One of the most remarked issues of bibliographic coupling is the codification of cited references. All the bibliographic databases have some inconsistencies in this field. It is usual to find several ways to cite the same document. To avoid this, we manually checked all the cited references to fix inconsistencies. Moreover, documents often share methodological or statistical references that are not relevant to establish a thematic link. Therefore, we also excluded these references in the filtering process. After the codification process, 8891 different references remained in our database. In the results section, we analyse the most cited documents in this database.

## 3. Mapping the documents using the bibliographic coupling procedure

To perform the bibliographic coupling, we had to make three decisions. First, we had to choose a similarity measure to normalize them. According to Boyack and Klavans (2010), the results obtained after normalizing are more accurate. There are several approaches to measure similarity. Van Eck and Waltman (2009) performed an in-depth analysis of some of them, and they concluded that the association strength (AS) measure is the best option to normalize co-occurrence data. In this study, we adopted this measure, calculating the association between each pair of citing documents employing the following formula:

$$AS_{AB} = \frac{C_{AB}}{s_A s_B}$$

where  $C_{AB}$  is the number of shared references between citing documents A and B,  $s_A$  is the number of cited references in document A, and  $s_B$  is the number of cited references in document B. The intensity of the relationship between documents is proportional to the ratio between the number of overlapping references between documents and the number of cited references. Several studies have adopted this procedure (García-Lillo et al., 2021; Kovács et al., 2015; Mariani & Borghi, 2019; Skute et al., 2019).

Second, we had to choose a grouping procedure. There are different ways to cluster the citing references. This research has used the Louvain community detection algorithm (Blondel et al., 2008). Pajek (Batagelj & Mrvar, 1999) includes it. Its logic rests on optimizing clusters' modularity. It maximizes the different sub-networks' density, compared with connections among groups (Zupic & Čater, 2015).

Third, we had to establish criteria to include documents in the coupling. One of the most usual critiques of this technique is the flip side of one of its main

advantages: this technique lets us represent very novel documents that, sometimes, will not have a real impact in the field. We can set conditions related to the sources' position in a ranking or document's impact measures to avoid it. In this case, we decided to use the second option, and we required that documents have at least one citation per year on average, that is, the total number of citations has to be higher than the number of years since the article was published (we have considered that if an article was published in 2020, it was published one year ago, keeping in mind the moment of data retrieving). This minimum is a non-very demanding condition but keeping in mind the size of our sample is an adequate one.

Another condition to establish is setting a threshold for coupling: the number of cited references necessary to consider two documents linked. We have followed the procedure suggested by Mura et al. (2018), trying different thresholds to get a meaningful but parsimonious map. We finally set the minimum to 13 documents. That was the best solution because of the number of clusters, the stability of the results, and their internal consistency.

#### 4. Analysing the network

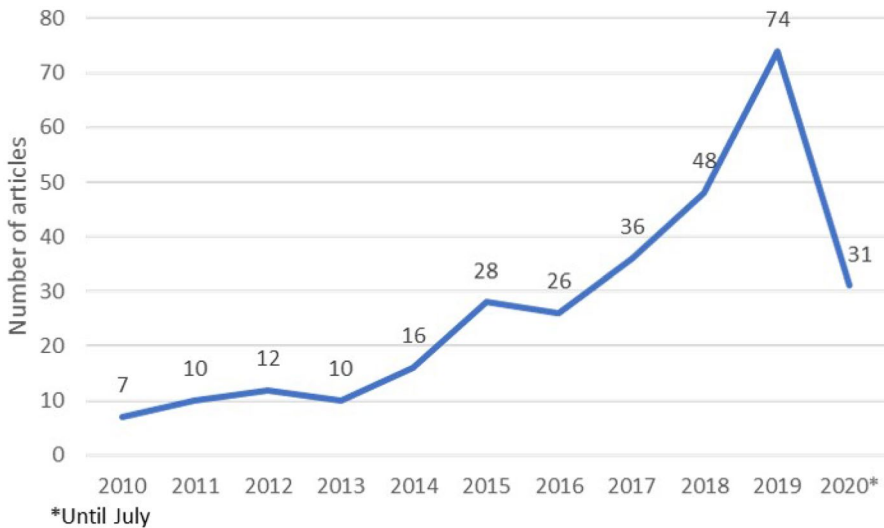
We calculated different metrics about cluster size, date, and scientific impact of the documents to analyse the clusters. We determined the cluster's density (the weighted degree of each subnetwork) to measure the intensity of the relationships among documents in a cluster (between them) and the centrality (the weighted degree of each cluster in the entire network) to measure the relationship among clusters. We interpret the density as the cluster development's degree and the centrality as the importance of that sub-topic in a field. Callon et al. (1991) built a strategic diagram, using these two measures, in which they distinguish among four kinds of themes: Motor (high-centrality, high-density), Transversal and Basic (high-centrality, low-density), Highly Developed and Isolated (low-centrality, high-density), and Emerging or Declining (low-centrality, low-density). The group's position in this matrix, its position in the network, its connections with other subnetworks, and its different measures about its evolution and academic resonance can help us analyse each cluster's role and potentiality.

## Results and discussion

### Database description

Figure 2 shows the evolution of the number of papers in our final sample. We can observe how the topic has been receiving more attention from academics over the period, with an average annual increase in the number of papers of more than 33 per cent. In 2019, the last full year (2020 only includes articles published before July), this number grew by 54.16 per cent.

The most frequent source in the final sample was the Journal of Entrepreneurship Education (21 articles), followed by Education+Training (18 documents). Other



**Fig. 2** Evolution of article's sample (Source: The Authors)

publications with a relevant number of articles were *Journal of Small Business Management*, *International Journal of Management Education*, *International Entrepreneurship and Management Journal*, and *International Journal of Entrepreneurship and Small Business*. Tables 5 and 6 show the sample's top ten articles ranked by the number of citations and the top ten cited references by number of appearances in our database, respectively.

Regarding cited documents, it is notable that several of these publications constitute the base of the Theory of Planned Behaviour and its translation to the entrepreneurship arena. Also, we have to highlight the inclusion of Shapero and Sokol's (1982) work about the Entrepreneurship Event Model, the article of Zhao et al.

**Table 5** Top ten articles in the sample (number of citations)

Author(s) (year)	Source	Citations (Scopus)
Oosterbeek et al. (2010)	European Economic Review	478
von Graevenitz et al. (2010)	Journal of Economic Behavior and Organization	310
Fayolle and Gailly (2015)	Journal of Small Business Management	259
Piperopoulos and Dimov (2015)	Journal of Small Business Management	171
Rauch and Hulsink (2015)	Academy of Management Learning and Education	167
Zhang et al. (2014)	International Entrepreneurship and Management Journal	164
Sánchez (2013)	Journal of Small Business Management	162
Sánchez (2011)	International Entrepreneurship and Management Journal	157
Packham et al. (2010)	Education + Training	128
Karimi et al. (2016)	Journal of Small Business Management	114

Source: The Authors

**Table 6** Top ten cited references in the sample

Author(s) (year)	Source	Citations (Sample)
Ajzen (1991)	Organizational Behaviour and Human Decision Processes	171
Krueger et al. (2000)	Journal of Business Venturing	152
Souitaris et al. (2007)	Journal of Business Venturing	140
Liñán and Chen (2009)	Entrepreneurship Theory and Practice	104
Shapero and Sokol (1982)	Encyclopedia of entrepreneurship	103
Peterman and Kennedy (2003)	Entrepreneurship Theory and Practice	92
Krueger and Brazeal (1994)	Entrepreneurship Theory and Practice	77
Zhao et al. (2005)	Journal of Applied Psychology	75
Bird (1988)	Academy of Management Review	75
Bae et al. (2014)	Entrepreneurship Theory and Practice	74

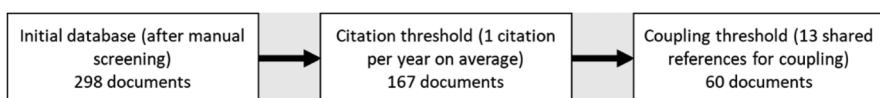
Source: The Authors

(2005), in which they explore the self-efficacy role (Bandura, 1977) in the development of entrepreneurial intentions, and Liñán and Chen (2009) article, in which the authors built the Entrepreneurial Intention Questionnaire. These works represent the conjunction of theories and concepts that constitutes the base for the analysed relationship.

### Bibliographic coupling results

One hundred sixty-seven documents met the criterium of having at least one citation per year on average. Applying the bibliographic coupling technique and using the threshold of 13 documents (coherent with minimums used in similar works as Mura et al. (2018), García-Lillo et al. (2021) or Huertas-Valdivia et al. (2022) we got six groups containing sixty documents. We performed a sensitivity analysis with thresholds from 10 to 15, not finding significant differences in the composition of most groups between 10 and 13, although the number of nodes included in the network decreased from 82 to 60 and some disconnected groups dropped. With a threshold of 15, the number of articles remaining in the network decreased to 44, and the number of clusters increased to 10, with some of them very specialized. For the sake of interpretability, we selected the mentioned threshold. Figure 3 shows the number of documents in the sample in each phase of the process.

In Fig. 4, we represent the energized network, using the Kamada-Kawai algorithm, included in Pajek (Batagelj & Mrvar, 1999). The vertices colour represents



**Fig. 3** Documents in each phase (Source: The authors)

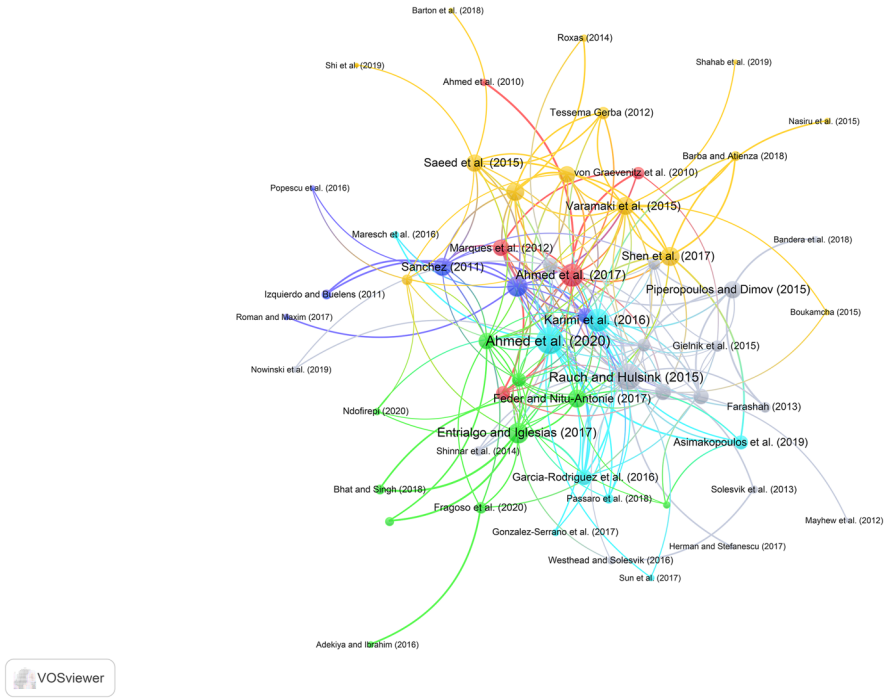


Fig. 4 Bibliographic coupling network (Source: The Authors)

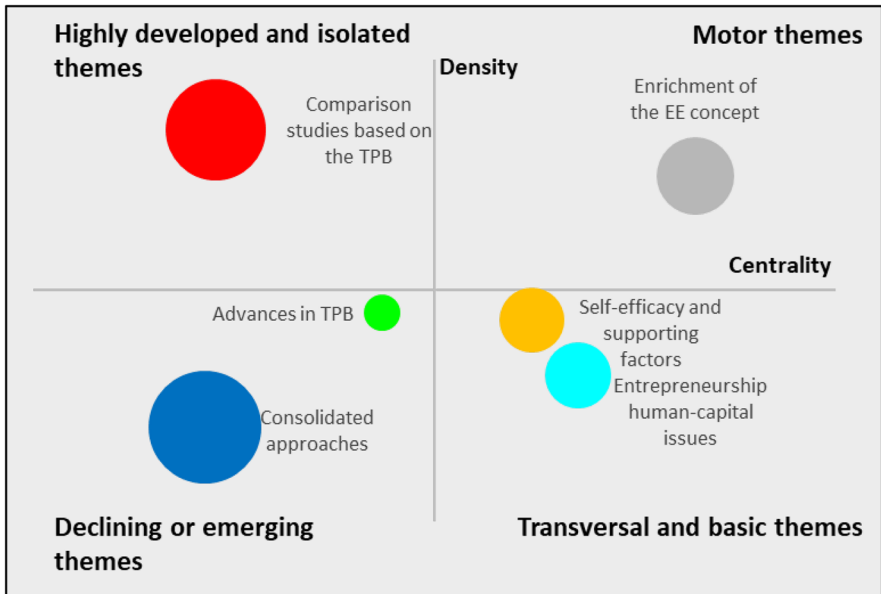


Fig. 5 Strategic Diagram (Source: The Authors)

Table 7 Some clusters' characteristics

Topic	n°	Aver. pub. year	Cited ref. av. age	Aver. cit (Scopus)	Representative docs	Representative cited references
<b>Consolidated Approaches</b>	6	2013.83	1998.51	106.83	Fayolle and Gailly (2015), Sánchez (2011)	Shapiro (1982), Peterman and Kennedy (2003), Robinson et al. (1991)
<b>Comparison Studies based on the TPB</b>	5	2013.40	2000.31	85.00	Marques et al. (2012), Ahmed et al. (2017)	Fayolle et al. (2006), Kolvereid (1996), Liñán (2004)
<b>Enrichment of the EE Concept</b>	17	2015.53	2003.23	51.18	Piperopoulos and Dimov (2015), Rauch and Hulsink (2015)	Soutaris et al. (2007), Wilson et al. (2007), Oosterbeek et al. (2010)
<b>Self-efficacy and Supporting Factors</b>	14	2016.21	2003.06	35.36	Zhang et al. (2014), Saeed et al. (2015)	Liñán and Chen (2009), Zhao et al. (2005), Boyd and Vozikis (1994)
<b>Entrepreneurship Human-Capital Issues</b>	8	2017.38	2003.60	36.00	Karimi et al. (2016), Ahmed et al. (2020)	Martin et al. (2013), Unger et al. (2011)
<b>Advances in TPB</b>	10	2017.80	2003.93	11.10	Entrialgo and Iglesias (2017), Feder and Nijū-Antonie (2017)	Carr and Sequeira (2007), Liñán and Santos (2007), and Kickul et al. (2008)

Source: The Authors



the belonging cluster, and the vertices size the weighted degree in the network. Figure 5 portrays the strategic diagram, where the balls' size represents the average number of citations. Finally, Table 7 summarizes relevant information of the clusters. We have selected the most representative articles according to the centrality in the cluster. For the most representative cited articles, we have picked them based on a combination of criteria regarding the proportion of citing papers in the cluster and the proportion of citations in the clusters. Specifically, we have calculated two ratios for each cited reference in each cluster: the percentage of documents in the cluster citing the reference, and the proportion of citations of that paper regarding the total citations in the database (the sixty papers included in this analysis). This way, we have considered that a cited reference is representative in the cluster when the percentage of documents in the cluster citing the reference is over 40% and the proportion of citations of that reference by documents in the cluster regarding total citations is over 20%. These percentages have been determined analysing the data of the different clusters.

### Consolidated approaches

This group's centrality and density measures place it in the declining/emerging quadrant of the matrix. The average age of the documents and the number of citations is eloquent: some very influential papers in this area based on cited references from a previous stage in the field form the core of this cluster. This fact explains the low cluster's centrality and confirms the topic's dynamicity, with studies in the late years of the decade citing an entirely different reference base. The average publication year of the cited references for this group is 1998.51, older than the rest of the clusters. According to the distribution of this cluster in the network we can distinguish two kinds of articles: the representative ones (Fayolle & Gailly, 2015; Sánchez, 2011, 2013), and the rest, which share a considerable proportion of the intellectual base with the first ones but do not have other relevant links in the network.

All this information together draws a group of six articles focused mainly on the effect of university students' participation in entrepreneurship programs on their business intentions. These works are rooted in the leading theories on entrepreneurial intent such as the Theory of Planned Behaviour (TPB) (Ajzen, 1987, 1991; Ajzen & Fishbein, 1980), the Theory of Social Learning and Self-Efficacy (Bandura, 1977), and the Model of the Entrepreneurial Event (Shapiro & Sokol, 1982). These theories aim to predict entrepreneurial intention based on people's effort or perceived capabilities to carry out that entrepreneurial behaviour and other variables like initiative-taking, consolidation of resources, management, relative autonomy, and risk-taking. On this basis, this set of studies' main contribution is to confirm that the above theories can deviate from their initial objective (a predictor of behaviour) to be indicators of the impact of specific entrepreneurship education programs.

Following Liñán and Fayolle (2015) and Donaldson (2019), the vast majority of this group agrees with the tendency to study educational entrepreneurship outcomes in the form of intentional impact, mainly through ex-ante and post-course

measurements (Fayolle & Gailly, 2015; Sánchez, 2011). Results reveal a trend in the literature that tries to consolidate fundamental theories as indicators of the impact of specific entrepreneurship education programs on intentions. Within the framework raised by Loi et al. (2016), these contributions are rooted in the Entrepreneurial Intentions stream. This first cluster frames their models in classical contributions. Due to this, its connection with the rest of the literature is lower.

Due to its seniority, it does not address any of the future investigation lines proposed by Nabi et al. (2017). Instead, this group's contributions seem to be a foundation for the rest of the clusters rather than a development path. The study by Fayolle and Gailly (2015) is an evident influence for the clusters "Entrepreneurship human-capital issues" and "Advances in Theory of Planned Behaviour."

### Comparison studies based on the Theory of Planned Behaviour

This group is the smallest in the network, with just five articles. They are very dispersed throughout the decade. Its high impact is due to von Graevenitz et al. (2010), one of the most influential papers in this field. The high-density points to a high proportion of shared intellectual base among the documents, despite the differences in the moment of publication. The low centrality suggests a less intense relation with the rest of the clusters. These two characteristics suggest this is a highly developed and isolated theme, although we are cautious about this interpretation because of the papers' different ages. The difference between the age of the intellectual base among the papers is noticeable in the graph. Some of the articles are in the centre of the network (Ahmed et al., 2017; Galvão et al., 2018), while others, even with a higher academic resonance, are in more peripheral spots.

Most of the cluster's articles share several references. All five cited Souitaris et al. (2007) and Krueger and Brazeal (1994). Almost all the papers cite other very well-known references. In particular, Fayolle et al. (2006), Kolvereid (1996), Liñán (2004), and Oosterbeek et al. (2010) are shared by four of them. Three other features characterize the studies in this cluster. Like others, this group follows the Theory of Planned Behaviour as the backbone. Also, several of them incorporate the Entrepreneurial Intention Questionnaire (EIQ) as a measurement tool. Finally, most studies take a comparative approach to entrepreneurial attitude, subjective norms, perceived behavioural control, and intentions among students participating in specific entrepreneurial education and general education programs, adopting an experimental methodology.

Liñán and Fayolle (2015) and Donaldson (2019) detect a research trend based on comparing entrepreneurial intention of different groups of participants, in which this cluster fits. While these authors identified articles addressing participant diversity based on the country of origin or the school, current research focuses on the program's content. In addition, these articles' results report mixed effects, calling for more research in this line, including control groups and pre-post analysis.

The intellectual base of this group can be found in Loi et al. (2016) Introspection and Pedagogy streams, primarily through the papers of Kuratko (2005) and especially of Oosterbeek et al. (2010). This cluster is clearly at the extreme of pedagogy, containing various studies that have inspired later developments, especially in the group “Enrichment of the entrepreneurship education concept.” Despite this influence, this group is not a development path. It does not address Nabi et al. (2017) future research lines.

### **Enrichment of the entrepreneurship education concept**

This group shows a high dispersion throughout the decade, with papers published from 2012 till 2020. Its average moment of publication is in the middle of the analysed period. However, it is remarkable that the average publication year of the cited documents is the second youngest, i.e., this cluster’s intellectual base is more modern than expected. Also, we have to highlight the group’s high impact, although it has many recent studies. Its position in the matrix, in the motor themes quadrant, points to a very connected group, internally and externally. The cluster strongly shares its intellectual base among the documents that form it and, also, with the rest of the network clusters. These characteristics place it mostly in the centre of the network, although the cluster also contains some less central papers.

Digging into the cited references of this cluster, we observe that some of the classics in the field, like Shapero (1982), appear less frequently. However, references that analyse the relationship between entrepreneurship education and entrepreneurial intention are the main characters. Fourteen of the documents reference the work of Souitaris et al. (2007), which analyses this relationship from the Theory of Planned Behaviour, differentiating among learning, inspiration, and incubation resources effects. The article of Wilson et al. (2007), which studies the influence of entrepreneurship education and gender on self-efficacy and entrepreneurial intention, is cited by twelve. Twelve papers cite Oosterbeek et al. (2010), which analyses entrepreneurial skills and psychological traits and their influence on entrepreneurial intention. Finally, we have to highlight the citations of Bandura’s self-efficacy research (1977, 1986).

Although the Theory of Planned Behaviour (TPB) remains the predominant assumption, many of the seventeen articles in this cluster incorporate other related theories, such as the Action Regulation Theory (Frese, 2009; Frese & Zapf, 1994) in Gielnik et al. (2015) and the Regulatory Focus Theory (Higgins, 1989, 1997), in Piperopoulos and Dimov (2015). As a result, entrepreneurial training and education are not only addressed from the perspective of participation in specific courses or programs. The articles adopt new approaches such as the relevance of the course’s characteristics to become an entrepreneur: type of agent teaching it; selective or compulsory; theoretical or practical; academic or non-academic nature. Entrepreneurial education is also presented in the form of the student’s perceived value of the course.

Other reviews have found some of these factors relevant. Liñán and Fayolle (2015) established that the results obtained through different teaching techniques

were among the main topics relating to entrepreneurial intention and entrepreneurship education. They emphasized the need to evaluate the entrepreneurship education program's characteristics to assess their results and improve the program proposal. Loi et al. (2016) also identified the pedagogy or methods and approaches for teaching entrepreneurship as a fundamental research theme. They found that the Pedagogy stream was the least influential (with the lowest average citation growth rate). However, they highlighted several works that configured that group. Some of those works (Bécharde & Grégoire, 2005; Edelman et al., 2008; Fiet, 2001; Katz, 2003, 2008; Neck & Greene, 2011) constitute the intellectual structure of our cluster.

We have to highlight the considerable number of documents published on this topic and the disparity of approaches and nuances. This diversity and vigour indicate that the analysis of the effect of the entrepreneurship education program's nature on entrepreneurial intention is in an early stage of development. In this line of thought, Nabi et al. (2017) also concluded that the influence of contextual aspects such as the type of course or institution type needs more research. This analysis would allow specifying minimal pedagogical details affecting intention and understanding the reasons for the contradictory findings in entrepreneurship intention studies. Nabi et al. (2017) were clear: pedagogical methods underpinning impact require research. Our research confirms that the work has started but is in progress. This theme's motor nature and its evolution during the period studied suggest this cluster has high research potential.

Another aspect to highlight is that unlike the other clusters, which use predictive variables of entrepreneurial behaviour –the attitude towards behaviour, subjective norms, or control of perceived behaviour–, some studies in this cluster incorporate a perspective of action rather than intention (Gielnik et al., 2015; Rauch & Hulsink, 2015). In this sense, most of the documents measure entrepreneurial intention through the Entrepreneurial Intention Questionnaire (EIQ) developed by Liñán and Chen (2006, 2009). According to the authors, it is a pure-intention measure, based on the existing theoretical and empirical literature on applying the Theory of Planned Behaviour.

Donaldson (2019) divided the studies included in his sample between those focused on intentional impacts (ends) and those centred on design-based components (means). In our map, we identified this same distinction about the need to analyse the course characteristics and not only participation or not in some kind of entrepreneurship education program.

### **Self-efficacy and supporting factors**

This cluster is the third youngest, with a relatively updated intellectual base. It is in the middle of the quadrants, represented in the right part of the matrix, which implies a group whose connections with other clusters are strong. The medium density points to a less internally connected group. However, a closer examination of the subnetwork suggests two different reasons that explain this circumstance. First, several articles have just one connection inside the group (five works are in this case). Second, we can identify two subgroups inside the cluster: one is around the

works of Zhang et al. (2014) and Saeed et al. (2015), and the other finds its central work in Varamäki et al. (2015). This circumstance is also noticeable in the network. Both subgroups share some classic references about the Theory of Planned Behaviour and Entrepreneurship Event Model. Also, Liñán and Chen (2009) is a common influence. However, the first subgroup found a solid intellectual base in works about self-efficacy (Boyd & Vozikis, 1994; Zhao et al., 2005), while the other subgroup explores concepts related to support for entrepreneurship (university, familiar).

The impact metrics of this group are unremarkable. However, at least three works stand out: Zhang et al. (2014), Saeed et al. (2015), and Barba-Sánchez and Atienza-Sahuquillo (2018). The research included in this cluster is articulated around the Theory of Planned Behaviour and the Model of Entrepreneurial Event, pointing out the need for more multi-perspective view analysis of the effect of entrepreneurship education on intentions. To this end, some of the articles conceive (2015) entrepreneurial education as a support factor within extended models that include other elements driving entrepreneurship intentions. In this vein, various studies highlight universities' role in shaping students' entrepreneurial self-efficacy thanks to educational support, concept development support, business development support, and institutional support (Saeed et al., 2015; Shi et al., 2019). Other authors also consider that university support must be analysed together with other support –structural and family (Shen et al., 2017) or other factors like entrepreneurial passion or perceived creativity disposition (Nasiru et al., 2015).

This group finds its intellectual base in the Entrepreneurial Intention stream (Loi et al., 2016). Crant (1996), Chen et al. (1998), and Peterman and Kennedy (2003), among others, constitute the structure supporting the core of this cluster. Liñán and Fayolle (2015) remarked on the importance of the university characteristics and the university business interface. Universities are crucial elements in developing the best context to offer entrepreneurial courses. However, we have to point out that while previous literature focused on the university context –governance and leadership, organizational culture, infrastructure –, current research seems to be more interested in the supporting role of these institutions for future entrepreneurs (e.g., Saeed et al., 2015; Shen et al., 2017) Donaldson (2019) stressed the entrepreneurial process as an emerging topic, highlighting the influence of supporting factors like family on entrepreneurial intentions. This author identified a research line consisting of complementing intention models by adding variables, reconfiguring the model, or posting new conceptual ones.

These studies are compatible with the research line stressed by Nabi et al. (2017) about exploring contextual reasons for contradictory findings in impact studies. This circumstance and the cluster's evolution, density, and centrality characteristics suggest this is also a high potential research line.

## **Entrepreneurship human-capital issues**

This cluster is the second youngest in the network. All its articles have a publication year after 2016 and, its average age of cited documents of 2003.60. Although its number of citations is below the average, its youth explains it. Two studies gathered

a high proportion of the citations (Karimi et al., 2016; Maresch et al., 2016). This cluster is one of the most central and one of the less dense. This high centrality implies that this group shares a more significant proportion of its intellectual base with the rest of the network. All of them suggest it is a transversal theme. Still, the papers that form the group have fewer cited references in common.

The transversal nature of the group disseminates its nodes in the network: there are two very central articles (Ahmed et al., 2020; Karimi et al., 2016), and the rest are in opposite positions in the graph. Maresch et al. (2016) are close to the Consolidated approaches cluster, and García-Rodríguez et al. (2016), Passaro et al. (2018) and Asimakopoulos et al. (2019) are between the Enrichment of entrepreneurship education concept cluster and the Advances in the Theory of Planned Behaviour group, the last cluster in our analysis.

In that intellectual base, it stands out that all the eight papers in the cluster cite Ajzen (1991) and Krueger et al. (2000). However, it is more interesting that seven of them cite Martin et al. (2013), a meta-analysis about the formation of human capital in entrepreneurship, and four of them cite Unger et al. (2011), another meta-analysis in a similar topic.

In this group, several of the eight articles provide a comprehensive approach to both the Theory of Planned Behaviour (TPB) for assessing entrepreneurial intent and entrepreneurship education. In this case, they have introduced emotional competencies as predictive factors because of their role in improving entrepreneurs' confidence and self-identification. Entrepreneurship-related human capital is presented as an outcome of the entrepreneurial intention since it represents the knowledge base and capabilities developed through business experience or continuous higher entrepreneurial education programs (Passaro et al., 2018). Karimi et al. (2016) link entrepreneurship education with the opportunity identification perception, which mediates the relationship between the former concept and entrepreneurial intention. In the framework provided by Loi et al. (2016), this cluster finds its roots in the Evaluations stream. Martin et al. (2013), Oosterbeek et al. (2010), and von Graevenitz et al. (2010) play a fundamental role in the intellectual structure of this group. Also, influence from the Pedagogy stream is evident.

On the other hand, this cluster also presents a more in-depth vision of entrepreneurial education, delving into the human-capital issue. In this vein, this factor is broken down into components according to various criteria. Ahmed et al. (2020) address three elements of entrepreneurial education programs based on the positive effects: learning benefits, inspiration benefits, and incubation resources. Besides the skills acquired in education programs, Passaro et al. (2018) incorporates the student's knowledge base and the parents' education. Finally, Sun et al. (2017) suggested a model of entrepreneurship education that comprises four components: Know-what, Know-why, Know-who, and Know-how. According to Nabi et al. (2017), the literature underemphasized this research direction at that time. However, it seems that currently, there is an incipient interest in novel impact indicators related to emotion-based and mindset approaches.

Other issues have been identified. Researchers have included personality traits in the Theory of Planned Behaviour, studying their influence on the intention's antecedents. We agree with Donaldson (2019) when he affirms the renewed interest the literature has shown in psychological characteristics explaining entrepreneurial behaviour. Therefore, this cluster goes deeper into the line of extension of the Theory of Planned Behaviour. Attending to the evolution of this line in the period and the theme's transversal nature, we also consider it a future research topic, complementary to Nabi et al. (2017) proposal.

### **Advances in Theory of Planned Behaviour**

This cluster is the youngest in the network. Its centrality and its density are below the average. Its low citations' number is notable, partially explained by its youth. All the documents in this line are published in 2016 or later. Consequently, the average age of its cited references is the youngest. All these characteristics suggest it is an emerging cluster. It is also coherent with its position in the network, with a fewer number of central articles.

Among the cited references, all of the documents share the essential reference of the Theory of Planned Behaviour (Ajzen, 1991). Most of them also cited Krueger et al. (2000), one of the primary references in this theory's conjugation with Shapero's Entrepreneur Event Model (Shapero, 1982). In the intellectual base of this cluster, another three references stand out: Carr and Sequeira (2007), Liñán and Santos (2007), and Kickul et al. (2008). They all analyse the family entrepreneurship exposure factor and its incidence in the entrepreneurial intention or its antecedents.

This cluster contains ten articles that support their models using the Theory of Planned Behaviour (Ajzen, 1987, 1991; Ajzen & Fishbein, 1980). It means that the main factors studied to predict the impact of the exposure to entrepreneurial education are the degree to which the person holds a positive or negative personal valuation about being an entrepreneur –attitude toward the behaviour –, the perceived social pressure to carry out entrepreneurial behaviours –subjective norm –, and the perception of the feasibility to become an entrepreneur –perceived behavioural control–. In these studies, relationships between entrepreneurship education and these antecedents are analysed, including moderation and mediation effects on entrepreneurial intention. Additionally, most of the studies include other variables that are involved in the relationship. Gender is the most commonly studied variable; however, other factors such as country of origin, and work experience are also addressed. Family background holds a distinguished place. According to Liñán and Fayolle (2015) and Donaldson (2019), this topic is consistent with studies applying intention models across students' contextual backgrounds such as country or culture, or education level, identifying these factors as moderators.

Among the studies that make up this cluster, two of them are the most representative: Entrialgo and Iglesias (2017) and Feder and Nițu-Antonie (2017). The first one analyses the effect of entrepreneurship education and role models (family background) on attitude towards entrepreneurship and perceived behavioural control, considering gender's moderating role. According to the Theory of Planned

Behaviour, the second article studies the influence of exposure to role models and some psychological characteristics of the antecedents of entrepreneurial intention. Also, the authors consider the moderating role of gender between the antecedents and the entrepreneurial intention. Finally, they include a hypothesis linking educational background (entrepreneurship education) and entrepreneurial intention.

Some of this cluster's intellectual roots are in the factors proposed by Loi et al. (2016), especially in the Entrepreneurial Intentions and Evaluation streams. However, it is remarkable that some of these roots are in more modern works, like Liñán and Fayolle (2015), Karimi et al. (2016), and Liñán et al. (2011). The modernity of the intellectual base is one of the main features of this group.

Even though Pittaway and Cope (2007), Nabi et al. (2017), and Donaldson (2019) systematic reviews followed this same line and noted the possibility of factors such as gender or student background potentially moderating the outcomes of entrepreneurial education in intention, these authors agree on the need to undertake more research assessing this relationship to test whether this moderating effect is genuinely substantial. Donaldson (2019) detected a growing interest in the role of perceived proximal precursory constructs –attitudes towards entrepreneurship or perceived ability to search for opportunities– to examine their possible mediating and moderating effects. The incorporation of these new models and variables can help obtain more significant results. The strategic diagram position and the rest of the characteristics of this group suggest this is an emerging group.

## Conclusions

Entrepreneurial intention has been widely accepted as the most accurate variable for predicting entrepreneurial behaviour, affirming, at the same time, that entrepreneurial education can foster said intention, and therefore, has a direct effect on entrepreneurship. This has resulted in a set of articles analysing this relationship from different perspectives and generating conflicting results. Our study sheds light on the knowledge structure of the field through a bibliometric analysis using bibliographic coupling technique. Although this paper contributes to the field by complementing previous literature reviews, the results obtained invite additional research to further develop the understanding of the field.

After an exhaustive analysis of recent critical systematic literature reviews on entrepreneurial intention and entrepreneurship education, we can confirm that the combination of these themes remains an evolving topic that requires further research and reflection. In the last several years, this topic's evolution has been astonishing, changing the base in which the studies are rooted. Pittaway and Cope (2007) systematic review reveals that the largest body of literature on entrepreneurship education has focused on contextual factors within which these courses occur. Joining the studies of Fayolle and Gailly (2015) and Donaldson (2019), two studies constitute the fundamental references for our discussion: Loi et al. (2016) and Nabi et al. (2017). Although both focus on a different sample of articles - Loi et al. (2016) in the research of entrepreneurship education from 1991 to 2014 while Nabi et al. (2017)



focus on the higher education context literature from 2004 to 2016 -, their conclusions are compatible with our results.

Fayolle and Gailly (2015) and Donaldson (2019) provide a classification framework for topics in the field of entrepreneurial intention. Although both reviews have a more general object of study, their conclusions are compatible and let us observe how the field has evolved in recent years. Loi et al. (2016) make a co-citation analysis that lets them disentangle the field's intellectual structure. They depicted five core streams: Introspection (articles studying the need to respond to the challenges associated with enhancing the quality of entrepreneurship education); Entrepreneurial intentions (articles defining entrepreneurship as an intentional process); Pedagogy (works reflecting on the methods and approaches for teaching entrepreneurship); Entrepreneurial learning (analysing how the learning process in entrepreneurship happens); and Evaluations (investigations about entrepreneurship education outcomes). The authors presented a framework in which they distinguished two extremes in the study of entrepreneurship education: a pole more focused on pedagogy, represented by the Introspection and Pedagogy streams, and another more focused on evaluation, represented by the Entrepreneurial Intention and Evaluations streams. We have addressed these streams' influence in our map, establishing the relationships between that intellectual structure and the knowledge structure derived from our bibliographic coupling network. Finally, Nabi et al. (2017) provided a compilation of future research lines in entrepreneurship education (Table 8). This framework constitutes an excellent departure point to analyse topics the literature has addressed, topics that have emerged outside of this framework, and to determine potential next steps in this relationship research.

**Table 8** Future Research Directions: Types of Entrepreneurship Education Impact and Pedagogical Models (Nabi et al., 2017)

#### **Reaffirmation of past reviews**

1. Higher level impact indicators (more than 3 years after entrepreneurship education), including entrepreneurial behaviour
2. More detail about the specifics of the pedagogy in impact studies

#### **New or underemphasized research directions**

1. Types of impact
  - A. Focus on novel impact indicators related to emotion-based and mindset approaches
  - B. Focus on impact indicators related to the intention-to-behaviour transition
  - C. Explore contextual reasons for some contradictory findings in impact studies
2. Pedagogical methods underpinning impact
  - A. Investigate competence model-related pedagogical methods
  - B. Compare and contrast a broad range of pedagogical models in terms of their impact on a range of impact indicators

#### **General recommendations**

1. Explore entrepreneurship education at other levels (different from higher education)
2. Explore impact of university-based entrepreneurship education on stakeholders other than students and graduates

Source: Nabi et al. (2017: 289)

We have verified that several of the studies in the sample have concentrated on combining fundamental theories as measures of how entrepreneurship programs have affected intentions. These theories include the Theory of Planned Behaviour (TPB) (Ajzen, 1987, 1991; Ajzen & Fishbein, 1980); the Theory of Social Learning and Self-Efficacy (Bandura, 1977), and the Model of the Entrepreneurial Event (Shapero & Sokol, 1982). Alternative theories dealing with emotional variables, mentality approaches, or psychological traits have been applied to further develop the knowledge regarding this topic.

Nabi et al. (2017) suggested various future research directions to take in order to advance the subject. Following the analysis, it is possible to state that several articles have included emotional competences as predictive elements in entrepreneurial ambitions, emphasizing their significance in boosting entrepreneurs' confidence and self-identification (Karimi et al., 2016; Passaro et al., 2018). Even though there is a growing interest in these kinds of elements and the psychological traits that explain entrepreneurial behaviour, this area still has a lot of room for growth.

It was also suggested to find factors related to the intention-to-behaviour transition, which was partially done. Part of the papers included in the sample noticed the tendency to study educational entrepreneurship outcomes in the form of intentional impact, mainly through ex-ante and post-course measurements, and the incorporation of perspective of action rather than intentions (Fayolle & Gailly, 2015; Sánchez, 2011). Donaldson (2019) divided the studies included in his sample between those focused on intentional impacts (ends) and those centred on design-based components (means), already identifying the same trend that was identified in this paper and emphasizing the need to analyse more than the mere participation in some kind of entrepreneurship program.

As previously stated, due to the interest in this topic shown by researchers, the various approaches used, and the variety of results obtained, Nabi et al. (2017) emphasized the importance of analysing these contradictory results and investigating whether contextual factors could play a role in these contradictions. These contextual factors have been examined in the context of entrepreneurial education programs versus general education programs, the content and characteristics of the programs, and participant diversity based on country of origin, gender, or family background (Donaldson, 2019; Liñán & Fayolle, 2015). In the same vein, we discovered articles that argue that the individual characteristics of universities and their context can play a supporting role for future entrepreneurs (Liñán & Fayolle, 2015; Saeed et al., 2015; Shen et al., 2017). However, due to the mixed effects reported in the articles reviewed, it is still necessary to continue developing this research line.

Finally, in terms of pedagogical methods, Loi et al. (2016) identified pedagogy, methods, and approaches for teaching entrepreneurship as a fundamental research topic, and a substantial number of documents were discovered revolving around this topic, with various approaches and contradictory results. Although more research is needed, it can be stated that this line has high research potential as well as significant impact when developing entrepreneurship education programs.

## Future research lines

Throughout the results and discussion, we have remarked on the research directions proposed by Nabi et al. (2017) that the articles in our study have undertaken. We have found only a few works that address the impact on higher-level impact indicators in our sample. However, keeping in mind our specific concern about entrepreneurial intention, this was expected. The impact of specific entrepreneurship education programs on intentions was addressed, with the goal of consolidating fundamental theories such as the Theory of Planned Behaviour, the Theory of Social Learning and Self-Efficacy, and the Entrepreneurial Event Model. Emerging trends were also found on comparing entrepreneurial intention of different groups of participants, on focusing on the program's content, the course characteristics, and the different natures of entrepreneurship education, and on the supporting role of universities and individual characteristics as potential moderators on entrepreneurial intention.

Moreover, beyond our selection of articles, these studies have some challenges that make them difficult to perform, especially the difficulty of tracking students long term. Although this difficulty is recognised and understood, a call for more research in this line has been made, which should include control groups and pre-post analysis, and, if developed, would help produce more realistic results and a better understanding of the real effects of entrepreneurial education on entrepreneurial intention in the long term. The other line in this category called for more detail about pedagogy's specifics in impact studies, especially in novel impact indicators related to emotion-based and mindset approaches and the personality traits in the Theory of Planned Behaviour. As we have noted, several articles have addressed it, with particular intensity in the clusters called "Enrichment of the entrepreneurship education concept" and "Entrepreneurship human-capital issues". Still, these are open lines in this field.

Regarding other new or underemphasized research directions, the call for a focus on impact indicators related to the intention-to-behaviour transition is still undeveloped, and although some studies of the sample incorporate a perspective of action rather than intention, there is still much to develop, which has been noticed by other scholars. Without a doubt, the exploration of contextual reasons for some contradictory findings in impact studies is the most addressed research line. These factors include the gender or background of students as potential moderators of the outcomes of entrepreneurial education in intention, as well as the type of course or institution and their specific characteristics. The influence of supporting factors like family, or previous experiences could be used to complement intention models, adding new variables, modifying the model, or posting new conceptual ones. Several authors pointed out the necessity of more research and a more solid framework to avoid getting mixed results due to the disparity of methods. Also noted is the need to evolve from an isolated analysis to a multi-perspective view of the effect of entrepreneurship education on intentions, which will give better and more complete perspectives on the interaction.

Some lines remain unaddressed. The literature has not paid attention to the development of entrepreneurial identity in higher education. Also, researchers have not sufficiently analysed double-moderator interaction effects. Finally, although our study did not limit our sample, only a few studies analyse entrepreneurship education outside of higher education. Thus, we conclude this is an underemphasized line. Similarly, to the best of our knowledge, the literature has not addressed the impact of other stakeholders, although this is not part of our study.

## Implications for academics and practitioners

If we start with entrepreneurship fostering economic development, the goal is to encourage entrepreneurship, not only the intention. Although the literature in psychology affirms that intention is the best predictor for action, that relationship differs considerably from a perfect correlation. We have to concentrate resources in that step, figuring out the conditions and mechanisms that help intentions to become actions. However, this step is not possible if there is no accurate and comprehensive data that allows researchers to shed light on it.

Moreover, although entrepreneurship education, as a means to get the knowledge and skills, could be a necessary condition for starting a company, it is not a sufficient one. Public and private initiatives fostering entrepreneurship should conceive entrepreneurship education inside of a more holistic plan. Our map of the topic shows that academics consider additional conditions, actions, and resources to complete that plan.

Finally, the literature explores pedagogical methods and other conditions about teaching and the background of the students producing promising results. These conclusions should be incorporated in entrepreneurship education programs' design, considering what kind of methods are more effective for different situations.

## Limitations

This study is not free of limitations. As a bibliometric approach, we have made some decisions that condition our results. The choice of database (in our case, Scopus) determines the papers included in the first step. Although we consider this database to offer a comprehensive view of the field, this is a starting condition that we have to keep in mind. In this line, we have restricted our results to articles to avoid the inclusion of work-in-progress or less contrasted research. However, we are conscious that this decision could leave out some relevant works. The authors have also explored the papers that the query returns to avoid the inclusion of non-relevant studies. This step adds subjectivity to the process. In this same line, searching for documents based solely on keywords does not ensure comprehensive results. The pattern used, and number of documents analysed may have restricted the interpretation of some results. Although the keywords

used were selected to include all the possible outcomes, we have realised that some aspects that could be relevant, such as the impact of other stakeholders in entrepreneurial education, and therefore on entrepreneurial intention, were not addressed by the sample analysed, so some important information regarding this aspect could be missing. Finally, the bibliographic coupling technique's election has some advantages, previously acknowledged, and some inconveniences. Although we have made some decisions to minimize those pitfalls, we only can mitigate them, not completely avoid them.

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