Characteristics and Effects of Entrepreneurship Education Programs: a Systematic Review

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Abstract
In recent decades, due to the unprecedented enthusiasm for processes related to teaching entrepreneurship, the subject of “entrepreneurship education” has been widely investigated. Several entrepreneurship education programs have been developed and tested under the hypothesis that it is possible to teach entrepreneurship and that such training is effective to develop both entrepreneurs and their ventures. Several studies, including systematic reviews and meta-analyses, have sought to understand the relationship between the interventions proposed in entrepreneurship education programs and their potential outcomes, such as the acquisition of different behavioral repertoires and business growth. In contrast, the content developed in different programs has not received attention. The aim of this systematic review is to describe aspects related to the interventions proposed in entrepreneurship education programs; specifically, this review aimed at determining what the interventions intended to develop, the characteristics of pedagogical strategies employed in these interventions, and the types of outcomes of such interventions. The results of the review showed that some important aspects, such as personalized learning in some stages of the interventions, the target audience, the formal preparation of mentors, and the development of specific content for achieving intended goals, need better consideration for the improvement of entrepreneurship education programs.

Keywords Entrepreneurship education · Entrepreneurial behavior · Training · Skills

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The last three decades have seen a massive resurgence of entrepreneurship, causing it to be included on political agendas and seen by many as a viable career option and personal achievement (Azim, 2013; Marcovitch & Saes, 2020). According to Schumpeter (1988), entrepreneurship is a process of “creative destruction” through which existing products or production methods are destroyed and replaced by new products or production methods. In other words, it is a complex phenomenon that can occur in various settings, moments, and stages of the market production chain (Bessant & Tidd, 2019). Thus, regarding economic development, entrepreneurship not only involves increasing production and per capita income, but also starting and implementing changes in the structure of an enterprise, and consequently, in society as a whole (Hisrich & Peter, 2004). Over the past three decades, unprecedented enthusiasm on this subject has been observed, political agendas and in which many people continue to seek fundamentals on entrepreneurial knowledge and skills, considering it as an alternative for professional and personal fulfillment (Azim, 2013; Marcovitch & Saes, 2020). Filion (2021), in turn, emphasizes that, although there is no universal definition for what an entrepreneur is, it is necessary to take into account elements such as: (i) an entrepreneur is one who innovates by recognizing opportunities; (ii) making decisions with a certain degree of risk; (iii) so that this leads to actions that require an efficient use of resources, thus producing a new added value.

Additionally, scholars have also indicated that entrepreneurs represent one of the main agents of a country’s social, economic and technological development, and that entrepreneurship education should be perceived as a strategy for developing and supporting them (Botha et al., 2007; Ceresia, 2018; Lindberg et al., 2017). Regarding the educational content of entrepreneurship education, entrepreneurs need to hold a wide variety of attributes. These attributes involve a set of skills that enable individuals to interact and achieve their goals (Dias et al., 2008; Jones et al., 2019). Therefore, entrepreneurship education refers to any pedagogical program or development process designed to help students to acquire entrepreneurial attitudes and skills. Entrepreneurship education includes different types of training depending on the specific stages of the participants’ development (Bridge et al., 1998; Curtis et al., 2020; Fayolle et al., 2006; Kakouris & Liargovas, 2020). Among the main objectives of an entrepreneurship education program, according to Garavan and O’Cinneide (1994), the entrepreneur’s development and his enterprise may be considered central. According to Martin et al. (2013), the general element in the development of entrepreneurs is a fusion of three main aspects: (i) intention to engage in entrepreneurship, (ii) entrepreneurial knowledge and skills, and (iii) positive perceptions regarding entrepreneurship. In turn, the general element in entrepreneurial results is a combination of two main subgroups: (i) the possibility of initiating one’s own business and (ii) entrepreneurial performance (including success in terms of duration, financial performance, and personal income).

The intention to engage in entrepreneurship is among the most investigated aspects and can be understood as the desire to hold or initiate one’s own enterprise (Bae et al., 2014; Ceresia, 2018; Jamaluddin et al., 2019; Lyons & Zhang, 2017). However, the relationship between “entrepreneurship education” and the “intention to engage in entrepreneurship” is influenced by the idea that a person genuinely
interested in pursuing an entrepreneurial career would be more likely to enroll in an entrepreneurship program than one who does not express such interest (Kolvereid & Moen, 1997). In other words, a legitimate hypothesis is that post-intervention entrepreneurial intentions are not influenced by training because they are derived from pre-intervention entrepreneurial intentions (Bae et al., 2014; Ceresia, 2018). Recent investigations have presented ambiguous results regarding this hypothesis; while some studies have confirmed this hypothesis (Jamaluddin et al., 2019; Lortz et al., 2011; Martin et al., 2013), others have demonstrated a negative relationship between entrepreneurship education and the intention to engage in entrepreneurship (Oosterbeek et al., 2010; Lyons & Zhang, 2017). In an attempt to shed light on the issue, comprehensive qualitative and quantitative analyses were carried out, including meta-analyses. However, the gaps pointed out in these studies have not yet been resolved, and some authors question how much entrepreneurship education programs would really be beneficial for people who do not wish to undertake (Bae et al., 2014; Lyons & Zhang, 2017).

Regarding entrepreneurial skills, there is a growing number of studies investigating the effectiveness of educational programs for entrepreneurs with respect to their entrepreneurial development (Cohen et al., 2020; Laguna-Sánchez et al., 2020; Oosterbeek et al., 2010; Unger et al., 2011). McClelland (1961), a behavioral psychologist, was one of the first scholars to describe the ten main skills necessary for an entrepreneur. These skills are characterized by behavioral patterns that enhance a business chance of success and are known as characteristics of entrepreneurial behaviors (CEB). CEB include: seeking opportunities and initiatives, persistence, the courage to take calculated risks, demanding quality and efficiency, commitment, searching for information, setting goals, systematic planning and monitoring, independence and self-confidence, and persuasion and networking. Many other authors have provided additional entrepreneurial skills (e.g., Aileron, 2013; Green & Brown, 2017; Robinson, 2017), which have been added to CEB in training programs for entrepreneurs (e.g., empathy, communication, identification of opportunities, ability to sell).

Similar to the studies on the intention to engage in entrepreneurship, ambiguous results were also reported in studies on the effects of training programs on the development of entrepreneurial skills. For example, after Oosterbeek et al. (2010) have investigated whether participation in these programs results in the development of new behavioral patterns in their participants; they observed that the participants did not present significant behavioral changes as to skill acquisition. However, other studies achieved divergent results, as the interventions were able to develop new behaviors crucial for promoting entrepreneurship (e.g., Botha, 2006; Cohen et al., 2020; Laguna-Sánchez et al., 2020; Morris et al., 2013; Stumpf et al., 1991).

Also, the development of specific knowledge related to entrepreneurship (e.g., financial management, sales strategies, internationalization processes) is among the most frequent objectives of entrepreneurship education programs. Bruhn and Zia (2013) conducted a study that aimed to train entrepreneurs to understand financial management to improve the results for business profitability. The analyses evidenced a significant difference between control group and experimental group, wherein the participants of such programs demonstrated a greater knowledge after training. The
development of specific knowledge appears to be a less challenging and a more consensual process than the development of skills. However, the ability to apply what has been learned also depends on an environment that provides situations and interactions for practicing acquired knowledge and skills (Abetti & Savoy, 1991; Saukkonen et al., 2016). This alerts us to the difference between the knowledge acquired and assessed after training and the knowledge applied to real-life situations.

With respect to the general variable in entrepreneurial results, some studies have drawn a connection between the effects of participating in an entrepreneurship education program and practical indicators (Bruhn & Zia, 2013; Dyer et al., 2016; Hantman & Gimmon, 2014; Klinger and Schündeln, 2011; Martínez et al., 2018; Unger et al., 2011). For example, Klinger and Schündeln (2011) learned that entrepreneurship training was capable of providing participants with significant instruction on starting new businesses and that these participants would be four to nine times more likely to initiate entrepreneurial ventures than individuals who did not receive such guidance. These authors also highlighted that successful preparation in creating new businesses depends on training stages and that the initial and introductory stages seem to be more relevant to this aspect.

The results related to the growth in the number of employees, gross income, start new business, personal income, and other aspects (Botha et al., 2007; Bruhn & Zia, 2013; Dominguinhos & Carvalho, 2009; Dyer et al., 2016; Galvão et al., 2020) have also been widely analyzed as to the participation in entrepreneurship education programs. Botha et al. (2013) determined the number of employees and customers before and after the entrepreneurs participated in a 6-month program. By the end of the intervention, a greater increase in the number of employees and customers was observed in the enterprises of experimental group participants than in control group participants. Furthermore, a comparison between pre- and post-intervention data on enterprises of experimental group participants revealed a significant difference. Similarly, in their review, Martin et al. (2013) pointed out that participation in entrepreneurship education programs promotes the increase of enterprise growth rates. Galvão et al. (2020), in turn, conducted a study that had as one of its objectives to provide guidelines for opening new businesses. The authors argue that factors external to the development of entrepreneurial skills, such as funding and reduction of bureaucracy, were decisive for the results found and would need to be addressed so that the programs are more effective in terms of opening new businesses.

Despite numerous studies providing diverse results on the impacts of entrepreneurship training, an ambiguity regarding the results is observed. This can be attributed to: (i) a lack of methodological rigor in studies that assessed the programs effects; (ii) the need to use more sophisticated statistical analysis methods; and, (iii) the considerable diversity of methods and content in entrepreneurship courses, training or programs. Overall, these aspects inhibit the assessment, comparison, replication, and/or improvement of procedures (Bae et al., 2014; Ceresia, 2018; Curtis et al., 2020; Martin et al., 2013; Ribeiro et al., 2020; Unger et al., 2011).

Moreover, an evident characteristic in this area of research refers to the indirect assessment of entrepreneurial skills taught in training programs. In other words, different skills may be part of the program content (e.g., empathy, communication, identification of opportunities, financial management, sales strategies),
but evidence on whether the individual has acquired these skills is based on general measures only partially related to each of these skills (e.g., determining the number of clients before and after participation in the program). In this context, a more direct and clearly outlined investigation of the learning processes inherent to each of these skills and the acquisition and transfer of this knowledge to entrepreneurial activities (Curtis et al., 2020; Ribeiro et al., 2020; Unger et al., 2011) might be considerably important to the future development of training programs. According to Baer et al. (1968), an efficient learning process demonstrates the following aspects: importance of altered behavior and its quantitative characteristics, experimental manipulations responsible for the change, technologically accurate description of all strategies used to produce the change, types of effects of these procedures, and general character of such changes. Besides, in a process of behavioral change, the concern should not only be about “what” to teach. There should also be an equal emphasis on the chances of the individual exhibiting the desired behavior based on the stipulated strategies and time limit (Skinner, 1965). Therefore, a better understanding of the learning processes proposed by entrepreneurship education programs is necessary. A thorough investigation of these processes could provide critical information about the relationship between objectives, strategies, and results of each program.

Also, an investigation of the learning processes that occur in entrepreneurship education programs could certainly emphasize the need to observe the particularities of the participants in these training programs (Kakouris & Liargovas, 2020). For example, Smith-Hunter and Boyd (2004) argued that programs that teach and promote female entrepreneurship should consider specific aspects, such as the types and number of resources offered. Since women are a disadvantaged population, creating personalized approaches to their occupational reality is necessary; otherwise, the results could be unsatisfactory. Another aspect to consider in the learning process refers to the role played by facilitators and educators. Regarding this, Garavan and O’Cinneide (1994) stated that such agents need to be formally trained and prepared to interact with entrepreneurs. Furthermore, Nabi et al. (2016) attempted to demonstrate that certain teaching methods are more successful than others in preparing potential entrepreneurs for an entrepreneurial career. Learning strategies centered on the student through active learning, such as problem-solving or collaboration and discussion, also seem to favor the educational process in these contexts (Asykin et al., 2019; Dilts and Fowler, 1999; Nabi et al., 2017; Ribeiro et al., 2020).

In spite of certain studies, little attention seems to have been given to the study of specific educational variables, such as the programs design, pedagogical approach, and the types of outcomes promoted in the program (Fayolle et al., 2006; Nabi et al., 2017). Given the existing gaps in this research area and the importance of a better understanding of the learning processes as to the interventions proposed in entrepreneurship education programs, this systematic review aimed to meet the following objectives: (i) identification of the aims of entrepreneurship education programs; (ii) description of the characteristics of the pedagogical strategies of these programs (e.g., duration, execution, target audience, who the mentors are and how they are trained, number of participants etc.); and, (iii) identification of the types of outcomes of the programs on participants and/or ventures.
Method

This systematic review followed the recommendations of Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) that organizes the preparation, analyses, and publications of systematic reviews (Moher et al., 2009).

Search and Selection of Studies

Regarding electronic searches carried out in the period March 02, 2020 to January 15, 2021 in databases: Medline (PubMed), PsycINFO, Latin American and Caribbean Health Sciences Literature (LILACS), Scopus, and Web of Science. The search terms “entrepreneurship” and “training program” were applied in all the databases, and all the papers that contained both of these terms in the title and/or abstract were included. The terms used in the study were originated from Medical Subject Headings (MeSH) database.

While searches were not restricted by publication date, they were restricted to papers written in Portuguese, English, or Spanish. The identified papers were entered Rayyan®, an application (Ouzzani et al., 2016) used to promote the exclusion of duplicates and to carry on the selection process.

The following inclusion criteria were adopted: (i) full-text papers published in scientific journals indexed in the aforementioned databases; (ii) papers that defined entrepreneurship as any activity that aims to implement an idea, project, or business; (iii) papers that defined entrepreneurship education programs as any activity or training that aims to develop participants’ interest and/or capacity to engage in entrepreneurship or to develop their ventures; (iv) papers that provided a description of the interventions that were applied in the study (e.g., duration, number of meetings, format of the activities); (v) papers that sought to assess the effects of an entrepreneurship education program on the participants and/or on their ventures.

First of all, for the selection process, all titles and abstracts of the papers were read. If the absence of any of the aspects listed in the inclusion criteria was detected in this reading, the paper was excluded. Subsequently, the remaining papers were read in full and reassessed according to the criteria.

Reviews, meta-analyses, book chapters, theses, dissertations, and other publications that did not undergo a peer review process were excluded. Two reviewers (MMS and DARA) independently selected the studies, and disagreements were solved based on discussions oriented by the inclusion criteria.

Procedures for Data Extraction and Analysis

Data were collected from the construction of a spreadsheet specifically designed for the study purpose that contained all the information relevant to understanding the studies. A spreadsheet with 46 columns was created, and each column
analyzed one issue directed toward the main objectives of the review. Two reviewers extracted the data independently (MMS and DARA), and disagreements were resolved through discussion.

An assessment was made of the methodological quality of each of the included studies based on the following nine aspects proposed by Hawker et al. (2002): (i) abstract and title, (ii) introduction and objectives, (iii) methods and data, (iv) sampling, (v) data analysis, (vi) ethics and bias, (vii) results, (viii) generalization, and, (ix) implications and utilities. This checklist was chosen because it addresses aspects that can be thoroughly evaluated in studies with experimental and non-experimental designs.

A spreadsheet was also created for this stage, wherein the papers were evaluated under all these aspects and classified into one of four response options. In addition to the classifications, as suggested by Hawker et al. (2002), scores were applied to each classification: good = 40 points; reasonable = 30 points; insufficient = 20 points; and, very insufficient = 10 points. At the end of the evaluations, the points were added and the means were calculated for each study and for each aspect analyzed. To facilitate the understanding of the results among the studies, the following criteria was adopted: low quality ($M < 20$ points), average quality ($20 < M < 30$), and high quality ($30 < M < 40$).

Two independent reviewers (MMS and DARA) performed the analyses. Firstly, they defined the criteria that would be used for each classification in each of the nine aspects. Subsequently, they piloted a sample of three papers to ensure they shared the same understanding regarding the criteria. Finally, the results of the reviewers assessments were compared, and disagreements were solved through debates.

## Results

The systematized searches revealed 1056 publications on entrepreneurship education programs, 137 of which were repeated entries. Most of the papers were excluded for not evaluating the potential effects of training on participants or their enterprises or for not presenting descriptions of the interventions conducted. Finally, 31 publications were included in the review for analysis. Figure 1 presents the details of the selection and inclusion process of publications in the review.

### General Aspects of the Studies

An analysis of the 31 publications allowed us to observe the widespread nature of entrepreneurship education programs. The studies were conducted in more than 20 countries, including the US, Sweden, Uganda, Mexico, Finland, Belgium, Germany, and Indonesia. The sample consisted of studies conducted between 1991 and 2020, seven of which were carried out before 2010 (i.e., Abetti & Savoy, 1991; Botha et al., 2007; Dominguinhos & Carvalho, 2009; Henry et al., 1998; Klofsten, 2000; Otto, 1999; Stumpf et al., 1991). Regarding the number of participants, the total sample included approximately 8050 participants, and three studies had samples
with more than 1000 participants (Dyer et al., 2016; Lafortune et al., 2018; Martínez et al., 2018). Two studies did not accurately report the number of participants (Azim, 2013; Klofsten, 2000). As to the type of population, the participants were mainly college students and entrepreneurs (people who owned a business before participating in the study). However, the studies also included several different groups: an exclusively female sample (Botha et al., 2007), older adults (Hantman & Gimmon, 2014), inmates (Patzelt et al., 2014), adolescents in high school students (Sánchez, 2013), and Tibetan refugees (Nayak et al., 2019). Table 1 presents the details of these studies.

**Aspects of the Content Presented and Developed in the Programs**

The first objective of this review was to investigate the elements that entrepreneurship education programs intend to improve in participants. The objective of 58% of the programs was to develop both entrepreneurial skills and management knowledge in the participants. Additionally, the objective of 16.1% of the programs was to simultaneously develop the participants’ intention to engage in entrepreneurship, entrepreneurial skills, and management knowledge (Cohen et al., 2020; Galvão...
| Identification — Country                      | Population (N)                  | What it wanted to develop | Content described in programs |
|-----------------------------------------------|---------------------------------|---------------------------|------------------------------|
| Abetti and Savoy (1991) — USA                 | College students, entrepreneurs (95) | ES and MK                 | MK                           |
| Stumpf et al. (1991) — USA                    | Entrepreneurs and contributors (317) | EI, ES, and MK            | MK                           |
| Henry et al. (1998) — Ireland                 | Entrepreneurs (35)              | ES., MK, and NT           | MK                           |
| Otto (1999) — Belgium                         | Entrepreneurs (20)              | ES, IS, and MK            | MK                           |
| Klofsten (2000) — Sweden                      | College students (NI)           | ES and MK                 | MK                           |
| Botha (2006) — South Africa                   | Women entrepreneurs (180)        | ES and MK                 | MK                           |
| Dominguinhos and Carvalho (2009) — Portugal   | College students (22)           | ES and MK                 | MK                           |
| Ojala and Heikkilä (2011) — Finland           | College students, entrepreneurs (32) | IK and I                  | MK                           |
| Klinger and Schündeln (2011) — USA and Germany| Entrepreneurs (665)             | ES and MK                 | MK                           |
| Bruhn and Zia (2013) — Bosnia-Herzegovina    | Entrepreneurs (445)             | FK                        | MK                           |
| Morris et al. (2013) — USA                    | College students (40)           | ES and MK                 | ES                           |
| Azim (2013) — Bangladesh                      | Entrepreneurs (NI)              | ES and MK                 | MK                           |
| Hantman and Gimmon (2014) — Israel            | Seniors (22)                    | ES and MK                 | MK                           |
| Patzelt et al. (2014) — USA                   | Inmates (12)                    | ES and MK                 | ES and MK                    |
| Sánchez (2013) — Spain                        | High school students (710)      | EI and ES                 | ES                           |
| Rauch and Hulsink (2015) — Netherlands         | Master’s students (163)         | ES and MK                 | MK                           |
| Dyer et al. (2016) — Mexico                   | Entrepreneurs (1198)            | ES and MK                 | MK                           |
| Gielnik et al. (2016) — Uganda                | Entrepreneurs (178)             | ES and MK                 | ES and MK                    |
| Saukkonen et al. (2016) — Finland             | College students, entrepreneurs (40) | ES and MK              | MK                           |
| Lindberg et al. (2017) — Sweden               | College students (73)           | ES and MK                 | MK                           |
| Lyons and Zhang (2018) — USA                  | College students (335)          | ES and MK                 | NI                           |
| Ferrandiz et al. (2018) — Spain               | College students (28)           | EI and ES                 | ES                           |
| Lafortune et al. (2018) — Chile               | Entrepreneurs (1712)            | ES and MK                 | NI                           |
| Martínez et al. (2018) — Chile                | Entrepreneurs (1255)            | ES and MK                 | MK                           |
| Identification — Country | Population (N) | What it wanted to develop | Content described in programs |
|-------------------------|----------------|--------------------------|------------------------------|
| Sendouw (2019) — Indonesia | College students (60) | EI, ES, and MK | NI |
| Jamaluddin et al. (2019) — Malaysia | College students (40) | EI, ES, and MK | MK |
| Nayak et al. (2019) — India | Refugees Tibetans (6) | ES and MK | MK |
| Laguna-Sánchez et al. (2020) — Spain | College students (107) | ES, IS, and MK | ES and MK |
| Cohen et al. (2020) — USA | College students (149) | EI, ES, and MK | MK |
| Galvão et al. (2020) — Portugal | Potential entrepreneurs (103) | EI, ES, MK | MK |
| Spinuzzi et al. (2020) — USA | Entrepreneurs (8) | ES and MK | MK |

FK finance knowledge, MK management knowledge, IK investment knowledge, ES entrepreneurial skills, IS interpersonal skills, I internationalization, EI entrepreneurial intention, N sample size, NI no information, NT networking.
et al., 2020; Jamaluddin et al., 2019; Sendouwa et al., 2019; Stumpf et al., 1991). Other objectives such as the development of interpersonal skills Laguna-Sánchez et al., 2020; Otto, 1999) and knowledge related to the internationalization of business (Ojala & Heikkilä, 2011) were also observed among the studies.

Another aspect refers to the content employed by these programs to promote entrepreneurial intentions, entrepreneurial skills, or management knowledge. Among the studies, 70.9% of the programs described content related only to management knowledge. Other studies that presented program descriptions revealed content related to only entrepreneurial skills (Ferrandiz et al., 2018; Morris et al., 2013; Sánchez, 2013) or to both entrepreneurial skills and management knowledge (Gielnik et al., 2016; Laguna-Sánchez et al., 2020; Patzelt et al., 2014). It was observed that no study described content related to the development of entrepreneurial intention. Table 1 presents a detailed description of the aspects highlighted in this paragraph.

Aspects Related to Programs Characteristics

The second objective of this review was to describe the general characteristics of the educational programs for entrepreneurs, such as the program duration, performance, and mentor preparation. Only five programs considered in this review were newly created interventions; they were either created based on the objectives of the studies or had been implemented for the first time (Bruhn & Zia, 2013; Cohen et al., 2020; Gielnik et al., 2016; Hantman & Gimmon, 2014; Saukkonen et al., 2016). The other studies examined existing programs in which the researchers did not make contributions to their execution; in some cases, heavily replicated versions of the existing programs were employed (e.g., Klofsten, 2000; Ojala & Heikkilä, 2011).

Regarding the selection criteria for participants, seven studies (22.6%) stated that no criteria were employed for participation, as the interested participants’ registration was considered sufficient (Cohen et al., 2020; Dyer et al., 2016; Lafortune et al., 2018; Laguna-Sánchez et al., 2020; Rauch & Hulsink, 2015; Sánchez, 2013; Stumpf et al., 1991). Three other studies (9.7%) presented specific criteria related to the characteristics of the programs’ target audience (Hantman & Gimmon, 2014; Martínez et al., 2018; Patzelt et al., 2014). Other studies disclosed criteria related to the motivation to engage in entrepreneurship or to having an entrepreneurial idea (e.g., Abetti & Savoy, 1991; Lyons & Zhang, 2018; Nayak et al., 2019).

The program format, that is, whether the program was a presence or distance learning proposal, was also investigated. No program fully implemented a distance learning format. However, three studies (9.7%) presented a hybrid format, including both in-person and distance learning activities (Henry et al., 1998; Morris et al., 2013; Nayak et al., 2019). The remaining studies referred to programs that were conducted entirely in a classroom.

The way in which the participants carried out the activities proposed by the program was analyzed. The activities were performed in diverse ways: the participants developed their activities individually (e.g., Botha et al., 2007; Ferrandiz et al., 2018; Henry et al., 1998), in groups (e.g., Dyer et al., 2016; Otto, 1999; Stumpf...
et al., 1991), or in both manners, alternating between individual and group activities (e.g., Galvão et al., 2020; Klofsten, 2000; Lindberg et al., 2017).

Besides evaluating how the participants performed their tasks, the way in which the programs provided instructions and mentorship was also examined. Three studies reported that these actions were carried out in a personalized manner—in other words, meetings were conducted individually with each participant or group (Nayak et al., 2019; Sendouwa et al., 2019; Spinuzzi et al., 2020). The other studies varied between a collective format, which provided generic instructions and/or mentorship (e.g., Azim, 2013; Bruhn & Zia, 2013; Otto, 1999), and a hybrid format, which alternated between collective and personalized actions (e.g., Henry et al., 1998; Martinez et al., 2018; Ojala & Heikkilä, 2011).

In relation to the duration of the programs, a wide variety was observed. Some programs had a short duration (e.g., 11 days) (Azim, 2013; Stumpf et al., 1991), while others had a duration of 2 years (Rauch & Hulsink, 2015). Furthermore, the number of meetings of each program differed widely. Three programs (9.7%) conducted up to five meetings (Bruhn & Zia, 2013; Saukkonen et al., 2016; Stumpf et al., 1991) and four other programs (12.9%) conducted from 18 to 36 meetings (Abetti & Savoy, 1991; Dyer et al., 2016; Nayak et al., 2019; Otto, 1999).

At last, an investigation of the instructors and/or mentors, that is, the people who interacted with the participants during the proposed tasks, was conducted. Five (16.1%) programs employed only successful professionals and entrepreneurs as instructors (Botha et al., 2007; Dominguinhos & Carvalho, 2009; Henry et al., 1998; Ojala & Heikkilä, 2011; Otto, 1999). Eight programs (25.8%) employed university professors alone as instructors (Bruhn & Zia, 2013; Cohen et al., 2020; Ferrandiz et al., 2018; Jamaluddin et al., 2019; Lindberg et al., 2017; Lyons & Zhang, 2018; Morris et al., 2013; Sánchez, 2013). Among all the studies, only three programs (9.7%) were executed by facilitators who received training by the team responsible for the program and were trained to interact and monitor the participants’ tasks (Azim, 2013; Saukkonen et al., 2016; Stumpf et al., 1991). Table 2 presents data related to the characteristics of these programs.

**Aspects Related to the Programs Effects**

The third objective of this review was to identify the outcomes of the program regarding the participants and/or their enterprises, as described by the studies. While all studies reported some result, three studies reported results only on the participants’ entrepreneurial ventures (Hantman & Gimmon, 2014; Klinger & Schündeln, 2011; Klofsten, 2000). Eight studies reported the gains for enterprises and participants (Botha et al., 2007; Dominguinhos & Carvalho, 2009; Dyer et al., 2016; Ferrandiz et al., 2018; Galvão et al., 2020; Martinez et al., 2018; Otto, 1999; Sendouwa et al., 2019). The remaining studies reported results only regarding their participants.

Concerning the types of effects observed, seven studies (22.7%) reported impacts on the participants’ intention to engage in entrepreneurship (Ferrandiz et al., 2018; Galvão et al., 2020; Jamaluddin et al., 2019; Lindberg et al., 2016; Lyons & Zhang, 2018; Otto, 1999; Sánchez, 2013). Other ten (32.2%) studies reported gains in
### Table 2  Characteristics of entrepreneurial education programs

| Identification                      | Experimental or existing | Who were the instructors/training received by the program | Participation criteria                                                                 | Instructor tracking format | Activity performance format | Nº meetings /duration (presential, DL, mixed) |
|-------------------------------------|--------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------|-----------------------------|-----------------------------------------------|
| Abetti and Savoy (1991)             | (Since 1985) “Principles of Entrepreneurship”; (since 1988) “Technological Entrepreneurship” | UP, E, EP, AA                                                                               | Demonstrate motivation for the course                                                   | Collective                 | Group                        | 6/24 w (presential)                           |
| Stumpf et al. (1991)                | Program of behavior simulation | TF (f.p.)                                                  | There were no criteria                                                                   | Collective                 | Group                        | 5/5 d (presential)                           |
| Henry et al. (1998)                 | (Since 1996) “Coca-Cola National Enterprise Award”        | E, EP                                                     | Hold an undergraduate degree or higher qualification. Have an idea for a business       | Mixed                      | Individual                   | NI/24 w (mixed)                              |
| Otto (1999)                         | (Since 1998) “Training Program of Joint Research Center” | E, EP                                                     | Demonstrate motivation for the course. Good professional background                     | Collective                 | Group                        | 18/24 w (presential)                         |
| Klofsten (2000)                     | (Since 1994) “TES ENP Program”                           | TF                                                        | Demonstrate motivation for the course. Have an idea for a business                      | Mixed                      | Mixed                        | 16/20 w (presential)                         |
| Botha (2006)                        | “TES WEP” (Woman Entrepreneurship Programme)              | E, EP                                                     | Course-compatible personality. Business profile compatible with the course              | Mixed                      | Individual                   | NI/NI (presential)                           |
| Dominguinhos and Carvalho (2009)    | “Projeto Começar”                                         | E, EP                                                     | NI                                                                                     | Mixed                      | Individual                   | NI/24 m (presential)                         |
| Ojala and Heikkilä (2011)           | (Since 1998) unspecified name                            | E, EP                                                     | NI                                                                                     | Mixed                      | Group                         | NI/10 w (presential)                         |
### Table 2 (continued)

| Identification | Experimental or existing | Who were the instructors/training received by the program | Participation criteria | Instructor tracking format | Activity performance format | Nº meetings /duration (presential, DL, mixed) |
|----------------|--------------------------|----------------------------------------------------------|------------------------|---------------------------|----------------------------|-----------------------------------------------|
| Klinger and Schündeln (2011) | “Empretec of UNCTAD” + Business Plan Competition TechnoServe | NI | Profile compatible with the course. Past experiences. Have an idea for a business | Mixed | Individual | NI/10 w (presential) |
| Bruhn and Zia (2013) | Experimental Program | UP | Demonstrate motivation for the course | Collective | Individual | 3/NI (presential) |
| Morris et al. (2013) | (Existing) unspecified name | UP | NI | NI | Group | NI/6 w (mixed) |
| Azim (2013) | (Since 1985) “Training for Entrepreneurship Development” offered by Small and Cottage Industries Training Institute (SCITI) | E, EP, TF (f.p.) | Hold a high school diploma. Financial capacity to open a business. Intention to have a business | Collective | Individual | 11/11 d (presential) |
| Hantman and Gimmon (2014) | Experimental program | UP, E, EP | Be between 60–75 years old. Not being employed. Not having experience with entrepreneurship | NI | Group | 12/NI (presential) |
| Patzelt et al. (2014) | (Existing) unspecified name | TF, E, EP | Sufficient penalty time to carry out the program. Type of crime committed | Collective | Individual | 40/20 w (presential) |
| Sánchez (2013) | “Vitamin E” | UP | There were no criteria | NI | Group | NI/32 s (presential) |
| Rauch and Hulsink (2015) | “Master of Science—(MSc)” | NI | There were no criteria | Collective | Individual | NI/48 w (presential) |
| Identification | Experimental or existing | Who were the instructors/training received by the program | Participation criteria | Instructor tracking format | Activity performance format | Nº meetings /duration (presential, DL, mixed) |
|----------------|--------------------------|------------------------------------------------------------|------------------------|----------------------------|-----------------------------|-----------------------------------------------|
| Dyer et al. (2016) | (Since 2010) Training Program of Academy for Creating Enterprise (ACE) | NI | There were no criteria | Collective | Group | PR: 25/5 w (presential) AN: 10/5 w (presential) R: 8/1 w (presential) |
| Gielnik et al. (2016) | Adapted Program “Student Training for Entrepreneurial Promotion— (STEP)” | TF | Demonstrate motivation for the course | NI | NI | 12/12 w (presential) |
| Saukkonen et al. (2016) | (Since 2001) Adapted Program “TES Supercoach1 Entrepreneurial Training— (SET)” | TF (f.p.) | NI | Collective | Group | 4/NI (presental) |
| Lindberg et al. (2017) | (Existing) unspecified name | UP | NI | Collective | Mixed | NI/5 w (presential) |
| Lyons and Zhang (2018) | “Next 36” | UP | Motivation to take the course. Life experiences. Demographic data. Passion for entrepreneurship. Academic achievement. Ability to get along with other people. Exclusive time commitment. Not having a paid job | Collective | NI | NI/NI (presential) |
| Identification                  | Experimental or existing                                                                 | Who were the instructors/training received by the program | Participation criteria                                      | Instructor tracking format | Activity performance format | N° meetings /duration (presental, DL, mixed) |
|--------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|---------------------------|------------------------------|------------------------------------------|
| Ferrandiz et al. (2018)        | (Since 2012) “Master of EDEM Business School”                                             | UP                                                       | NI                                                       | Mixed                     | Individual                  | NI/96 s (presental)                     |
| Lafortune et al. (2018)        | “Assessment Workshop” and “Coaching I” — version 2013–2014                              | E, EP, TF                                                | There were no criteria                                   | Collective                 | Individual                  | 14/14 w (presental)                     |
| Martínez et al. (2018)         | “TES Micro-entrepreneurship Support Program (MESP)” — version 2010–2011                  | NI                                                       | Be a beneficiary of “anti-poverty” program Chile Solidario | Mixed                     | Individual                  | NI/16 w (presental)                     |
| Sendouw (2019)                 | “Student Entrepreneurship Program (PMW)”                                                 | UP, E, EP                                                | NI                                                       | Personalized               | Individual                  | NI/NI (presental)                      |
| Jamaluddin et al. (2019)       | “Siswa@Fesyen”                                                                            | UP                                                       | Skilled individuals who have been approved in a sewing test | NI                        | Group                       | NI/20 w (presental)                    |
| Nayak et al. (2019)            | “Tibetan Entrepreneurship Development (TED)”                                             | UP, TF                                                   | Have an idea for a business                              | Personalized               | Mixed                       | 24/5 w (Mixed)                         |
| Laguna-Sánchez et al. (2020)   | Training Program (TP)                                                                     | UP, E, EP                                                | There were no criteria                                   | NI                        | Group                       | NI/12 w (presental)                    |
| Cohen et al. (2020)            | Experimental program                                                                      | UP                                                       | There were no criteria                                   | Collective                 | Mixed                       | 10/5 w (presental)                    |
| Galvão et al. (2020)           | “Sabor Enterpreneurship Program”                                                           | UP, TF                                                   | NI                                                       | NI                        | Mixed                       | NI/12 w (presental)                    |
| Spinuzzi et al. (2020)         | “Student Entrepreneurship Acceleration and Launch (SEAL)”                                | TF, E, EP                                                | Have knowledge of technology in their training           | Personalized               | Mixed                       | NI/9 w (presental)                     |

AA article author, NC night class, E entrepreneurs, TF trained facilitators, NI no information, EP experience professionals, RP residential program, UP university professors, R regional, d days, m month, w week
entrepreneurial skills (Botha et al., 2007; Ferrandiz et al., 2018; Henry et al., 1998; Jamaluddin et al., 2019; Morris et al., 2013; Ojala & Heikkilä, 2011; Otto, 1999; Sánchez, 2013; Rauch & Hulsink, 2015; Saukkonen et al., 2016), and two (6.4%) studies reported gains in management knowledge (Botha et al., 2007; Otto, 1999).

The types of effects indirectly related to entrepreneurship education programs objectives were also reported, such as the results as to the participants’ larger personal income (Dyer et al., 2016) or enhanced interpersonal skills (Laguna-Sánchez et al., 2020). Table 3 exhibits the detailed data on the programs’ outcomes.

**Aspects Related to the Studies Methodological Quality**

The analyses performed independently by the two reviewers (MMS and DARA) showed a 90% level of agreement in the pilot test including three papers; a 91.4% level of agreement was observed regarding the reviewers’ final analysis of the studies.

With respect to the results of the individual assessment of the methodological quality of the studies comprising this systematic review, the aspect of “Ethics and Bias” obtained the lowest mean score ($M=13.55$). Furthermore, no study obtained a maximum score of 40 points and a “good” rating as to this aspect, and only three studies obtained 30 points and a “fair” rating (Lafortune et al., 2018; Nayak et al., 2019; Saukkonen et al., 2016); the remaining studies obtained either 20 or 10 points (“bad” and “very bad” ratings, respectively). The low scores regarding this aspect are mainly explained by the lack of clear communication on issues such as confidentiality, consent, and conflicts of interest.

The other aspects evaluated herein presented mean scores above 20 points, and the “Sampling” ($M=28.39$) and “Generalization” aspects ($M=26.77$) resulted in means below 30 points. “Abstract and Title” ($M=37.10$) and “Introduction and Objective” ($M=36.45$) were the aspects with the highest means, both above 35 points.

Additionally, one paper scored 10 points in the “Methods and Data” aspect (Hantman & Gimmon, 2014), one paper scored 10 points in the “Sampling” aspect (Azim, 2013), and one paper scored 10 points in the “Generalization” aspect (Sendouw, 2019). Regarding the general classification of the studies, no paper presented an average score below 20 points, and five papers had averages above 35 points (Botha et al., 2007; Cohen et al., 2020; Dyer et al., 2016; Laguna-Sánchez et al., 2020; Martínez et al., 2018). The results regarding studies bias are demonstrated in Table 4.

**Discussion**

Based on our review of the papers, entrepreneurship education programs are on the rise, with reports of this activity being found in over 20 countries. However, we noted that most studies (83.8%) used samples limited to university students and entrepreneurs in terms of the populations studied. Among the few studies conducted with other populations, one was conducted exclusively with women (Botha et al.,
| Identification | Effects described* | Effects on participants and/or projects** |
|----------------|-------------------|------------------------------------------|
| Abetti and Savoy (1991) | Satisfaction with the course. Effectiveness of instructors | Participants |
| Stumpf et al. (1991) | Change of participants before and after behavioral simulation | Participants |
| Henry et al. (1998) | Skills gained. Program evaluation | Participants |
| Otto (1999) | Implemented projects. Quality of content. Interest in undertaking. Business knowledge. Skills to undertake | Participants; entrepreneurs |
| Klofsten (2000) | Evaluation of participants in relation to mentors, content, and the progress of the projects | Entrepreneurs |
| Botha (2006) | Acquisition of new skills, knowledge, and business growth | Participants; entrepreneurs |
| Dominguinhos and Carvalho (2009) | Student satisfaction with the program. Indicators on new companies, type of industry and number of employees | Participants; entrepreneurs |
| Ojala and Heikilä (2011) | Developed skills to manage and increase the business | Participants |
| Klinger and Schündeln (2011) | Opening of new companies. Growth of existing companies | Entrepreneurs |
| Bruhn and Zia (2013) | Financial knowledge increases. Decreased risk aversion. Increase in commercial jobs, assets, expenses, sales, profits and the use of external financing | Participants |
| Morris et al. (2013) | Entrepreneurial skill gains | Participants |
| Azim (2013) | Satisfaction with the program. Program results | Participants |
| Hantman and Gimmon (2014) | Number of companies opened after the program | Entrepreneurs |
| Patzelt et al. (2014) | Concluding the entrepreneurship course | Participants |
| Sánchez (2013) | Increased intention to be an entrepreneur. Gains in entrepreneurial skills | Participants |
| Rauch and Hulsink (2015) | Change of target behaviors | Participants |
| Dyer et al. (2016) | Increase in personal income. Increase in the number of employees. Increase in gross revenue | Participants; entrepreneurs |
| Gielnik et al. (2016) | Effect on identifying opportunities. Effect on entrepreneurial action | Participants |
| Saukkonen et al. (2016) | Gaining skills in some area of performance of entrepreneurs (marketing, strategic planning, competitiveness etc.) | Participants |
| Lindberg et al. (2017) | Gaining recognition of opportunities, and gains related to entrepreneurial intention | Participants |
| Lyons and Zhang (2018) | Entrepreneurial intention; knowledge gain | Participants |
| Identification | Described effects* | Effects on participants and/or projects** |
|----------------|-------------------|-----------------------------------------|
| Ferrandiz et al. (2018) | Students’ entrepreneurial intention gains, especially in the medium term. Gaining skills for the development of its entrepreneurial project | Participants; entrepreneurs |
| Lafortune et al. (2018) | Interest in measuring the different impacts of different types of intervention models among instructors | Participants |
| Martínez et al. (2018) | Remain in self-employment. Business results, number of employees, number of sales, profits, business practices such as marketing, planning, inventory. Asset accumulation | Participants; entrepreneurs |
| Sendouw (2019) | Positive reports from students about the experience. Conjectures by the authors of the article. Number of startup companies opened | Participants; entrepreneurs |
| Jamaluddin et al. (2019) | Relationship between entrepreneurial education and entrepreneurial intentions. Entrepreneurial interest, entrepreneurial skills and evaluation of the teaching program | Participants |
| Nayak et al. (2019) | Increased self-confidence of participants. Better fluency. Less tense body language. Participant satisfaction, etc | Participants |
| Laguna-Sánchez et al. (2020) | Acquisition of generic instrumental, interpersonal and systemic skills | Participants |
| Cohen et al. (2020) | Actively increasing the presentation of more innovative ideas | Participants |
| Galvão et al. (2020) | Look for relationships between motivation and starting a business. Motivation to participate in the course. Entrepreneurial orientation and starting a business, etc | Participants; entrepreneurs |
| Spinuzzi et al. (2020) | Increase in persuasion techniques | Participants |

*Effects the studies intended to investigate and for which any results were presented; ** refers to “to whom” or “to which” the investigated effects were directly related
| Identification                        | 1-Abstract title | 30-Introduction objective | 3-Methods data | 4-Sampling | 5-Data analysis | 6-Ethics and bias | 7-Results | 8-Generalization | 9-Implications and utilities | Average per article |
|---------------------------------------|------------------|---------------------------|----------------|------------|----------------|-------------------|-----------|------------------|-------------------------------|---------------------|
| Abetti and Savoy (1991)               | 40               | 20                        | 30             | 20         | 20             | 10                | 30        | 30               | 30                            | 25.6                |
| Stumpf et al. (1991)                  | 20               | 20                        | 30             | 20         | 30             | 10                | 30        | 30               | 20                            | 22.2                |
| Henry et al. (1998)                   | 40               | 20                        | 30             | 30         | 30             | 10                | 30        | 20               | 20                            | 25.6                |
| Otto (1999)                           | 40               | 30                        | 30             | 20         | 20             | 10                | 30        | 30               | 20                            | 25.6                |
| Klofsten (2000)                       | 40               | 30                        | 30             | 20         | 20             | 10                | 30        | 30               | 30                            | 27.8                |
| Botha (2006)                          | 40               | 40                        | 40             | 40         | 40             | 10                | 40        | 40               | 40                            | 36.7                |
| Dominguinhos and Carvalho (2009)     | 40               | 40                        | 40             | 30         | 40             | 10                | 40        | 30               | 30                            | 33.3                |
| Ojala and Heikkipää (2011)            | 40               | 40                        | 40             | 20         | 30             | 20                | 40        | 20               | 40                            | 32.2                |
| Klinger and Schündeln (2011)          | 30               | 30                        | 40             | 40         | 40             | 10                | 30        | 30               | 30                            | 31.1                |
| Bruhn and Zia (2013)                  | 40               | 40                        | 40             | 40         | 40             | 10                | 40        | 30               | 30                            | 34.4                |
| Morris et al. (2013)                  | 40               | 40                        | 40             | 20         | 40             | 10                | 30        | 20               | 40                            | 31.1                |
| Azim (2013)                           | 40               | 40                        | 30             | 10         | 20             | 10                | 30        | 20               | 20                            | 24.4                |
| Hantman and Gimmon (2014)             | 40               | 40                        | 10             | 20         | 20             | 10                | 30        | 30               | 20                            | 24.4                |
| Patzelt et al. (2014)                 | 40               | 40                        | 40             | 20         | 40             | 20                | 40        | 20               | 30                            | 32.2                |
| Identification         | 1-Abstract title | 30-Introduction objective | 3-Methods data | 4-Sampling | 5-Data analysis | 6-Ethics and bias | 7-Results | 8-Generalization | 9-Implications and utilities | Average per article |
|------------------------|------------------|---------------------------|----------------|------------|----------------|------------------|------------|------------------|-------------------------------|-------------------|
| Sánchez (2013)         | 40               | 40                        | 30             | 30         | 40             | 20               | 30         | 30               | 40                            | 33.3              |
| Rauch and Hulsink (2015)| 40               | 40                        | 30             | 30         | 40             | 10               | 30         | 20               | 40                            | 31.1              |
| Dyer et al. (2016)     | 40               | 40                        | 40             | 40         | 40             | 10               | 40         | 30               | 40                            | 35.6              |
| Gielnik et al. (2016)  | 40               | 40                        | 40             | 20         | 40             | 10               | 40         | 30               | 40                            | 33.3              |
| Saukkonen et al. (2016)| 40               | 40                        | 30             | 20         | 40             | 30               | 30         | 20               | 40                            | 32.2              |
| Lindberg et al. (2017) | 40               | 40                        | 40             | 20         | 40             | 10               | 40         | 20               | 30                            | 31.1              |
| Lyons and Zhang (2018) | 30               | 40                        | 40             | 30         | 40             | 10               | 40         | 30               | 30                            | 32.2              |
| Ferrandiz et al. (2018)| 40               | 40                        | 30             | 30         | 40             | 10               | 40         | 40               | 40                            | 34.4              |
| Lafortune et al. (2018)| 30               | 40                        | 40             | 30         | 30             | 30               | 30         | 20               | 30                            | 32.2              |
| Martínez et al. (2018) | 40               | 40                        | 30             | 30         | 40             | 20               | 40         | 40               | 40                            | 36.7              |
| Sendouw (2019)         | 30               | 20                        | 20             | 20         | 20             | 10               | 30         | 10               | 20                            | 20.0              |
| Jamaluddin et al. (2019)| 40              | 40                        | 30             | 30         | 30             | 10               | 30         | 20               | 30                            | 28.9              |
| Nayak et al. (2019)    | 30               | 40                        | 40             | 30         | 30             | 30               | 30         | 20               | 40                            | 32.2              |
Table 4 (continued)

| Identification                  | 1-Abstract title | 30-Introduction objective | 3-Methods data | 4-Sampling | 5-Data analysis | 6-Ethics and bias | 7-Results | 8-Generalization | 9-Implications and utilities | Average per article |
|--------------------------------|------------------|---------------------------|----------------|------------|----------------|-------------------|------------|------------------|--------------------------|---------------------|
| Laguna-Sánchez et al. (2020)   | 40               | 40                        | 40             | 40         | 20             | 40                | 30         | 40               | 40                       | 36.7                 |
| Cohen et al. (2020)            | 30               | 40                        | 40             | 40         | 10             | 40                | 40         | 40               | 40                       | 35.6                 |
| Galvão et al. (2020)           | 40               | 40                        | 40             | 40         | 10             | 40                | 30         | 30               | 30                       | 34.4                 |
| Spinuzzi et al. (2020)         | 30               | 30                        | 20             | 40         | 10             | 30                | 20         | 40               | 20                       | 27.8                 |
| Abetti and Savoy (1991)        | 37.10            | 36.45                     | 34.52          | 28.39      | 33.55          | 13.55             | 34.19      | 26.77            | 32.58                    |                     |

*The model proposed by Hawker et al. (2002) has nine analysis criteria and four possible classifications (“good” = 40 points; “fair” = 30 points; “bad” = 20 points; and “very bad” = 10 spots)*
Trends in Psychology (2007) in the “Women Entrepreneurship Programme” (WEP). The program presented alternative solutions to women’s challenges in entrepreneurship. A tailored program was necessary because women seem to be more disadvantaged than men in terms of entrepreneurial options (e.g., occupational choices) and available resources (e.g., sources of capital and training) (Smith-Hunter & Boyd, 2004). Another example of a population that demanded interventions with specific characteristics was refugees. Nayak et al. (2019) implemented the “Tibetan Entrepreneurship Development” (TED) program, whose main objective was to help expand livelihood strategies for people living in conflict areas. Although rare, entrepreneurship education programs with this population group are relevant because refugees in conflict areas encounter significant barriers to re-establishing their livelihoods, such as lack of physical protection, mobility restrictions, limited property and employment rights, and the psychological effects of trauma and violence (Jacobsen, 2002).

Other populations (older adults, incarcerated people, children, etc.) will have unique needs for entrepreneurship education and can benefit from programs developed from specific guidelines, just as women and refugees. The fact that the studies are still limited to some groups demonstrates a significant constraint relative to the potential impacts. It also indicates a lack of understanding of the unique characteristics of different populations that must be considered in the entrepreneurial environment. In a scenario where entrepreneurship and entrepreneurship education are presented as alternatives to address current social challenges (Azim, 2013; Markovitch & Saes, 2020; Ribeiro et al., 2020), it seems contradictory that these education programs are limited to only a few demographics.

As reported by Martin et al. (2013), our analysis of the selected papers also allowed us to verify that most entrepreneurship education programs presented the following main objectives: the development of (i) entrepreneurial intention, (ii) entrepreneurial skills, and (iii) management knowledge. However, concerning the content and pedagogical strategies used to achieve these objectives, most (70.9%) of the programs presented only topics related to developing management knowledge. As for entrepreneurial skills, a sizable portion of the studies did not even elaborate or test hypotheses on how the content of training programs should impact such skills. Moreover, studies that applied pre-and post-intervention measures or comparisons between experimental and control groups (for exceptions, see Lorz et al., 2013; Martin et al., 2013) to describe any variation related to this aspect were infrequent. The absence of control groups in these studies certainly hinders the analysis of the programs’ effects, even when pre-and post-intervention measures are collected. The rise in post-intervention scores to pre-intervention scores, without a comparative group, does not necessarily mean that the program produced gains. Variables extraneous to the planned experimental design could explain the findings, such as the practical effects on applied measures, social desirability, and expectations. Therefore, a significant limitation in this aspect was notable. Although entrepreneurial skills are often listed as one of the main objectives of training programs, changes related to entrepreneurial skills were not detailed or effectively measured in most studies.

Nevertheless, some studies have investigated the relationship between entrepreneurial intention and entrepreneurship education, believing that the emergence of such intentions would be a natural effect of entrepreneurship education.
programs (Bae et al., 2014; Jamaluddin et al., 2019). In this perspective, the programs’ activities would develop entrepreneurial intention even if they had no content or actions aimed toward this specific objective. However, the few results presented are contradictory. While some studies highlight how entrepreneurship education positively affected the perceived attractiveness to start a new venture (e.g., Martin et al., 2013), other studies seem to point in the opposite direction (e.g., Oosterbeek et al., 2010).

To construct efficient behavioral technology, Baer et al. (1968) indicate the necessity of a learning process with a detailed description and clarity about desired behaviors, the manipulations required to obtain them, and quantitative information about the types of effects generated. Furthermore, coherence between what one wants to develop and the strategies presented, based on favorable conditions relative to time and these behaviors’ effects, is necessary (Skinner, 1965). The studies analyzed in this review did not present favorable methodological characteristics to strategies for developing entrepreneurial skills and/or entrepreneurial intention. The discrepancy between the outlined objectives and proposed content may justify the challenges reported in previous studies. Regarding the development of entrepreneurial skills and intention (Cohen et al., 2020; Laguna-Sánchez et al., 2020; Lyons & Zhang, 2017; Oosterbeek et al., 2010; Unger et al., 2013), it may also explain the divergent and inconsistent results to some extent. In this context, it seems unlikely that there will be major advances in understanding the effects of training on skill development and entrepreneurial intention. Future studies need to elaborate specific strategies for developing entrepreneurial skills and intention, and their methods must test hypotheses directly related to these variables.

As for the format of the programs, we observed that most of the programs described were based on in-person activities. A minority (9.7%) were organized in a hybrid format, alternating between distance education and in-person activities (Henry et al., 1998; Morris et al., 2013; Nayak et al., 2019). This result reveals that entrepreneurship education is limited to the in-person model. Nevertheless, the current scenario of technological innovation characterized by global expansion and integrated communication favors the expansion of distance education in an educational process that enables interactivity between teachers and students who are separated by time and/or space (Castells, 2003; Landim, 1997; Moore & Kearsley, 1996). Henry et al. (1998), in Ireland, and Morris et al. (2013), with American and South African students, exemplify how the distance education model can enable activities between people who are not physically present. Both studies used the distance education model to facilitate activities between people in different places and investigate aspects related to cultural differences between participants from different countries. As entrepreneurship is a global phenomenon and entrepreneurship education lacks greater reach (Marcovitch & Saes, 2020; Morris et al., 2013), the new possibilities offered by distance education should be evaluated as interesting alternatives for future studies. This could expand its scalability in terms of the populations reached, the regions served, and consequently, the possibility of conducting new studies with multicultural designs. Moreover, the transformations and expanded use of digital technologies and distance education driven by the COVID-19 pandemic have drawn attention to the need to be prepared for new models of education and
They also reinforced the value of remote activities in ensuring democratization and the general population’s access to various resources in global crises.

Based on the results described, few (9.7%) studies used personalized instruction and mentoring, aligned with the specific demands of the participants and their ventures (Nayak et al., 2019; Sendouw, 2019; Spinuzzi et al., 2020). For example, Spinuzzi et al. (2020) investigated results arising from the “Student Entrepreneurship Acceleration and Launch” (SEAL) program at the University of Texas, which focuses on offering individual mentorships to teams of entrepreneurs that will ultimately be evaluated to determine whether they can receive investments. Among the results described, the authors also presented the main problems reported by the participants and highlighted the variability in mentoring. For the study participants, the program’s quality was negatively affected by the inconsistency of some mentorships that did not address the companies’ precise needs. Asykin et al. (2019), in turn, examined the implications of some educational strategies in entrepreneurship education and set out to identify the most effective ones. The study highlighted the need to make informed choices based on application context and the relationship between appropriate choices and more meaningful results. The authors concluded that the issues related to educational strategies for entrepreneurship education must be considered so as not to have a negative impact on the efforts made by various institutions and governments in seeking ways to create more entrepreneurs.

As many of the entrepreneurship education programs contemplated participants at various stages of development and with different business challenges, there is a need to construct more rational processes and interactions that are better adapted to the specificities of each venture and entrepreneur. How much entrepreneurship education programs should contemplate entrepreneurs and projects that present so much diversity merits reflection, in addition to how efficient these training programs are to more personalized strategies that meet the specific needs of each population (Kakouris & Liargovas, 2020; Nayak et al., 2019; Sendouw, 2019; Spinuzzi et al., 2020). Although it is no easy feat to create entrepreneurship education programs that can be widely replicated, the progress in entrepreneurship education may not be tied to the widespread replication of programs and may instead speak to the ability to design programs with methods that are adaptable to more specific needs.

Additionally, aspects of the facilitators in the studies analyzed herein merit discussion. We found considerable diversity among the people who participated in these programs, and only three (9.7%) studies reported a prior training process for instructors (Azim, 2013; Saukkonen et al., 2016; Stumpf et al., 1991). The primary objective of Stumpf et al. (1991) was to explore behavioral simulation techniques and evaluate the effects on gains in entrepreneurial behaviors. At the end of the program, the instructors reported their observations, which counted as a part of each participant’s performance outcomes. To ensure that the instructors would accurately report these observations, it was important to train them so that they were aware of what would happen to the participants throughout the simulation in detail. Because the study addresses a specific competence (i.e., behavioral description and observation), the authors noted that prior training was needed to prepare the instructors for tasks related to behavioral simulations. Two other studies (Azim, 2013; Saukkonen et al., 2016) also provided prior training to their instructors and made specific
evaluations about the quality of the interactions between the trained instructors and the participants at the end of their programs. In the three studies in question, the participants praised the facilitators’ preparation and previous training, affirming that they were precise and effective in their interventions.

Garavan and O’Cinneide (1994) argue that there is some complexity in the roles played by facilitators in the process of entrepreneurship education, regardless of its format, and they emphasize that facilitators need formal preparation to exercise these roles. For Ribeiro et al. (2020), different education styles generate different types of results in entrepreneurship, but few studies have focused on this relationship in a scientific investigation. The three studies in the review where the facilitators had undergone formal preparation reported positive results relative to this aspect, although under different conditions and with varying research objectives. Nevertheless, it is important to highlight that the other studies did not present analyses related to this aspect or analyze the educator’s (with no previous training) impact on the results of the programs. These points demonstrate that the entrepreneurship education process still needs to understand that the facilitator is one of the most important aspects contributing to an efficient result. Furthermore, they need to be trained in specific skills to perform this function and further research on these aspects.

The studies in this review also presented significant variability between the types of effects reported and the strategies and designs used to measure them. In this sense, we identified the following: qualitative interviews used to measure entrepreneurial intention (e.g., Otto, 1999); quasi-experimental designs and self-reporting questionnaires used to assess the effects of entrepreneurial choice and gains in skills (e.g., Sánchez, 2013); pre-test, post-test, and post-post-test collections used to evaluate gains in management knowledge and entrepreneurial skills (e.g., Botha et al., 2007); and observational methodological designs used to compare data on gains in participants’ monthly income after participation in the program (e.g., Dyer et al., 2016). The studies exemplify the heterogeneity relative to the effects under investigation and the strategies used to measure and analyze these effects. On the one hand, this heterogeneity evidences the academic legitimacy attained by the subject of entrepreneurship education and a growing interest in the various variables involved in this field of research (Fayolle & Gailly, 2015; Kuratko, 2005; Nabi et al., 2017; Ribeiro et al., 2020). On the other hand, these aspects point to some major challenges to advances made on the subject, such as a lack of methodological rigor and difficulties in comparing the effects of entrepreneurship education programs, as the significant diversity of effects and methods hinder comparative analyses between programs and between the studies conducted (Curtis et al., 2020; Lorz et al., 2013; Martin et al., 2013; Ribeiro et al., 2020). Therefore, future studies need to consider designs that do not replicate these problems, such as longitudinal studies, more experimental studies, or developed studies, to compare their results with those of previous studies.

Finally, another relevant aspect in this review concerns our analysis of the methodological quality of the studies. Among the factors we examined, “Ethics and Bias” obtained an average score below 20 points ($M=13.55$), which could be classified as low quality (Hawker et al., 2002). Even though the studies included in the review demonstrated sufficient levels of methodological quality in all other aspects, the “Ethics and Bias” category presented critical limitations. Out of the criteria
considered for the classification, the most recurrent refer to the authors’ lack of reflection over potential biases and the absence of statements regarding their attention to confidentiality, safety, and the participants’ consent. Future studies should exercise more caution to these criteria so as not to affect the quality of their studies by neglecting such relevant aspects. The difficulties in the replicability of findings in some studies could be minimized in the following ways: through a clear, precise description of the research methods; by overcoming the biases related to the non-publication of negative results; and through the practice of initially recording a hypothesis and a data analysis plan.

In general, the studies in this review evidenced diversity in all the aspects analyzed and showed that entrepreneurship education programs are heterogeneous compared to each other. Moreover, they demonstrated that many of the aspects that make up the field of entrepreneurship research, analyzed herein, still require further investigation and more methodological rigor. These findings seem to corroborate those reported in other reviews (Bae et al., 2014; Ceresia, 2018; Lorz et al., 2013; Martin et al., 2013; Ribeiro et al., 2020; Unger et al., 2011; Zheng, 2018), particularly, the difficulties in comparing the results, methods, samples, or even the proposed interventions. Meanwhile, when examining ways to create more efficient programs, the greatest challenge may not be the diversity of programs and the impossibility of comparisons. This is due to the possibility of developing specific interventions that consider the demands of target populations, the moment of maturity of entrepreneurs, the time dedicated to the process, and the specific objectives sought, among other considerations. Therefore, the most important aspect would not be in an analysis between programs but in a better understanding of the relationship between what one wants to develop and what has proven effective in accomplishing these objectives and the appropriate way to measure the effects.

Despite the rigorous search and analysis criteria adopted, this study also presents some limitations. By choosing not to include theses, book chapters, and dissertations and including only peer-reviewed studies, we do not know the extent to which the results found herein indicate a complete or partial reality of the production in the area. In addition, the inclusion criteria eliminated studies that did not present descriptions of the interventions, which may have significantly restricted the sample and impact, such as a more detailed analysis of the effects of these programs. Future systematic reviews that aim to analyze aspects of entrepreneurship education programs should include such studies.

Notwithstanding the abovementioned limitations, this study offers relevant contributions to entrepreneurship education by highlighting significant aspects related to interventions for training entrepreneurs. We may point out the need to create more systematized programs in which there is greater correspondence between what one intends to develop, and the specific strategies required. This is a widespread occurrence in the development of management knowledge, and the same should apply to the intention to become an entrepreneur and develop entrepreneurial skills. Furthermore, there seems to be a need for programs that offer more personalized education with formally trained educators. Mentoring and activities are based on the particularities of each venture and/or each entrepreneur. Finally, we noted little diversity to vulnerable populations, who, like university students and entrepreneurs, could...
benefit from the opportunities offered in the programs. When we consider creating new programs for entrepreneurial development, previous reviews and studies seem to have explored and investigated these aspects little, yet they appear to be fundamental.

**Declarations** The authors have no competing interests to declare that are relevant to the content of this article.

The authors declare that they are available to provide additional data if necessary.

The authors declare that informed consent is not applicable.

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