

Moderators of the effect of entrepreneurship education on entrepreneurial action

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Abstract

Purpose – The role of entrepreneurship education in promoting entrepreneurial actions remains unclear. The purpose of this paper is to investigate the logic of different types of entrepreneurship education and the effect of learning characteristics in promoting entrepreneurial actions among student entrepreneurs in the higher education setting.

Design/methodology/approach – The study employs a quantitative approach involving the use of survey data collected via an Internet tool. The constructs of variables are measured using previously tested scales. The data were analysed using partial least squares modelling because it can handle formative and reflective constructs in the same model and is capable of testing for moderation.

Findings – The findings illustrate that voluntary entrepreneurship education generates learning outcomes in terms of students' entrepreneurial actions, which is important because without action, a venture will never be launched. This is especially so if students show a deep learning orientation, while mastery motivation showed a significant and negative moderating effect. This is not the case for compulsory entrepreneurship education.

Originality/value – Embedded in construal level theory, this paper offers knowledge that can help to advance entrepreneurship education research (1) by uncovering the role of different types of entrepreneurship education interventions, (2) by considering students' entrepreneurial actions as the dependent variable and (3) by unravelling the role of students' learning characteristics in the efficacy of entrepreneurship education interventions. By doing this, the study addresses recent repeated calls for more fine-grained research focused on how university students learn in entrepreneurship in higher education and its effects.

Keywords Motivation, Entrepreneurial intention, Learning, Entrepreneurship education

Paper type Research paper

1. Introduction

Entrepreneurship education (EE) is gaining more and more interest among entrepreneurship researchers and a number of voices are calling insistently for its academic legitimacy (Neck and Corbett, 2018; Fayolle and Gailly, 2008), and more so if the focus is on higher education and on the “student entrepreneur” (Nabi *et al.*, 2017). Student entrepreneur is a term recently coined by Hägg and Kurczewska (2019) to refer to “the emerging adult who we on average meet in higher EE and who has a shortage of biologically secondary knowledge in entrepreneurship and most often lacks relevant business experiences” (p. 135).

Based mainly on agency theory (Bandura, 2001), the theory of planned behaviour (Ajzen, 1991) and the theory of human capital (Bae *et al.*, 2014; Unger *et al.*, 2011), existing research

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has referred to EE as a route for student entrepreneurs to cultivate their knowledge of entrepreneurship and their entrepreneurial skills and competences, to change their psychological motivation and attitude towards entrepreneurship, to stimulate their entrepreneurial inspiration, to promote their perception of feasibility and to increase their entrepreneurial intention. However, in terms of EE impact indicators, entrepreneurial intention has dominated past research. For example, [Bae *et al.*'s \(2014\)](#) meta-analysis reported a small but significantly positive EE–entrepreneurial intentions relationship, with the moderation of cultural values such that a high collectivistic culture or a low uncertainty avoidance culture reinforces the impact of EE. [Nabi *et al.* \(2017\)](#) found that most articles in their review claimed that an EE programme on subjective or objective impact indicators had a positive effect, entrepreneurial intentions being by far the most common indicator. Recently, [Zhang *et al.* \(2022\)](#) used a meta-analysis to investigate the impact of entrepreneurship education on university students' entrepreneurial intention. From their meta-analysis they concluded that entrepreneurship education has a positive effect in promoting entrepreneurial intention but the national context has a significant moderating effect. [Shabbir *et al.* \(2022\)](#) conducted a systematic literature review and observed that the most popular topic among researchers and the one with the greatest number of papers published is entrepreneurial intentions, which is closely related to practice, innovation and entrepreneurial learning. In addition, it has been surmised that once intentions are formed, student entrepreneurship occurs ([Kuratko *et al.*, 2021](#)). According to [Sheeran's \(2002\)](#) meta-analysis, the correlation between intentions and behaviour was high, accounting for 28% of the variance in behaviour. [Kautonen *et al.* \(2015\)](#) also demonstrated the robustness of the TPB to explain the relationship between start-up intentions and subsequent entrepreneurial behaviour based on data from a longitudinal questionnaire. In the same vein, [Hanage *et al.* \(2022\)](#) have shown entrepreneurial intentions to be linked with entrepreneurial action that has been carried out.

Besides these positive effects, the existence of ambiguous effects has also been recognized, as some scholars have noticed non-significant, negative or even curvilinear effects between EE and other entrepreneurial outcomes ([Nabi *et al.*, 2017](#)) and also entrepreneurial intention ([Pérez-Macías *et al.*, 2022](#)). The conflicting results of past research have led scholars to explore the reasons for such heterogeneity in the impact of EE ([Cui and Bell, 2022](#)). In fact, previous EE research has been recognized as facing substantial tensions associated with (1) the predominantly individual-centric research focus ([Cui and Bell, 2022](#); [Thrane *et al.*, 2016](#)), which proposes over-generalizing claims, such as the direct link between entrepreneurial assets and behaviour ([Fayolle *et al.*, 2016](#); [Shirokova *et al.*, 2016](#)); (2) the consideration of EE as an entity, when different types of university-based EE interventions can be identified ([Padilla-Angulo *et al.*, 2021](#); [Debarliev *et al.*, 2020](#)); and (3) the fact that scholars tend to share the idea that EE can, by and large, be perceived as a 'one-size-fits-all' activity ([Blenker *et al.*, 2012](#), p. 418), without taking the "who" of each pedagogical intervention into account ([Hahn *et al.*, 2020](#)). These issues have the potential to influence learning and results from university-based EE, although extant literature still lacks evidence, which has spurred scholars to recognize the need to specifically address them in order to contribute to the academic progress and legitimacy of EE ([Padilla-Angulo *et al.*, 2021](#); [Debarliev *et al.*, 2020](#); [Hahn *et al.*, 2020](#)). Details of how these tensions are addressed in this paper are presented below.

Past research has stressed individual characteristics as the main variables to be explained by EE, while the effect of EE on students' entrepreneurial behaviour is still an under-researched area ([Tingting *et al.*, 2022](#); [Cui and Bell, 2022](#); [Nabi *et al.*, 2017](#)). This is very surprising if it is assumed that the field of entrepreneurship revolves around the "nexus" among entrepreneurial opportunities, enterprising individuals and stakeholders ([Kuratko *et al.*, 2021](#); [Shane and Venkataraman, 2000](#)). This logic therefore highlights the need to study the influence of university-based EE on student entrepreneurs' actions ([Ilonen *et al.*, 2018](#);

Rauch and Hulsink, 2015); moreover, without action, they would never create a venture (Cui and Bell, 2022). As a “nexus” perspective is embraced, there is room for new theories that direct their attention to the explanatory mechanisms located at the microlevel underlying individual action and social interaction, as well as appropriate incentives to support student entrepreneurs’ actions (Thrane *et al.*, 2016). Accordingly, this paper states the importance of Construal Level Theory (CLT) (Trope and Liberman, 2010) to explain how EE promotes student entrepreneurs’ actions (Chen *et al.*, 2018). In fact, it has been suggested that perception of psychological distance is affected by education (Bar-Anan *et al.*, 2006).

A distinction should be made between different university-based EE interventions, such as compulsory EE and voluntary EE, as each of them possesses its own distinct educational characteristics and methods (Debarliev *et al.*, 2020). In general, compulsory EE forms part of a formal programme provided in an academic setting by a university, whereas voluntary EE is free to be chosen by participants and is part of a non-formal academic offer or is just self-directed (Debarliev *et al.*, 2020). Scholars have recently proved that different influences on student entrepreneurs’ behaviour can be associated with different teaching activities (Padilla-Angulo *et al.*, 2021; Debarliev *et al.*, 2020; Lyons and Zhang, 2018). This paper builds on this research and extends it by distinguishing between voluntary and compulsory EE rather than considering EE as a single entity. Accordingly, this paper elaborates on the basic premise that voluntary and compulsory EE influence student entrepreneurs’ actions in different ways.

Scholars have provided empirical evidence of the moderating effect of different individual characteristics such as whether students have founded a venture before (Hahn *et al.*, 2020), if they have attended entrepreneurial courses in the past (Lyons and Zhang, 2018), if they have a family business background (Bae *et al.*, 2014), if they have been previously exposed to entrepreneurship (Tingting *et al.*, 2022; Fayolle and Gailly, 2008), if they have an entrepreneurial behavioural mindset (Cui and Bell, 2022) or their initial level of entrepreneurial intention (Tingting *et al.*, 2022). In spite of this research, scholars have assumed the student entrepreneur to be a homogenous entity in terms of learning characteristics. According to the Scholarship of Learning and Training (SoLT), this claim cannot be upheld anymore as there are learning asymmetries among student entrepreneurs (Corbett, 2005). Aware of the importance of students’ learning characteristics (Vettori *et al.*, 2021), in this paper the authors explore two boundary conditions: learning orientations and learning motivations, which, if taken together, describe the profile of EE participants and their predisposition to learn from educational interventions.

Bearing in mind the above considerations, the aims of this paper are threefold: (1) to consider students’ entrepreneurial action as the variable to be explained by EE, (2) to uncover the role of different types of university-based EE interventions and (3) to reveal the role of students’ learning characteristics in the efficacy of EE interventions.

Lastly, as regards empirical inaccuracies, Naia *et al.* (2014) reported that “measurement tools are not fully explained, particularly in case studies, and vary considerably in their degree of sophistication, which limits comparison of the results” (p. 91). Blenker *et al.* (2014) also suggested the need to adopt more powerful statistical tools to examine the role of EE. Accordingly, in this paper the relationships suggested are analysed using PLS with a sample of 150 Spanish university students.

The rest of the paper begins by establishing the theoretical fundamentals of the proposed model of relationships. Specifically, the differences between compulsory and voluntary EE are established, and students’ entrepreneurial action, learning orientations and learning motivations are defined. The theoretical model of relationships is defined based on CLT. Next, the results of testing the model on a sample of Spanish university students are presented and discussed in light of existing literature in order to show how the results contribute to a better

understanding of the workings of EE in student entrepreneurs. Finally, the conclusions are presented together with the limitations, implications and future developments of the research.

2. Theoretical development

The following subsections define the constructs that make up the proposed model of relationships between EE and entrepreneurial action. First, EE is defined and a distinction is drawn between compulsory and voluntary EE in terms of educational goals and teaching methods. Second, entrepreneurial actions and their range of abstractness are described. Finally, learning orientations and motivations are presented in accordance with SoLT definitions. Additionally, the theoretical model is displayed according to the basics of the CLT. Consequently, the hypotheses regarding the influence of compulsory and voluntary entrepreneurship education on students' entrepreneurial actions as well as the moderating role of learning orientations and learning motivations are established.

2.1 *Compulsory vs voluntary entrepreneurship education*

In general, EE is considered to be any educational intervention intended to prepare students for an entrepreneurial career (Rauch and Hulsink, 2015). As mentioned above, a distinction can be made between compulsory and voluntary EE (Debarliev *et al.*, 2020). Compulsory EE comprises regular courses, workshops, sessions with entrepreneurs or experiential in-class learning activities (UNESCO Institute for Statistics, 2012) and is part of a formal programme provided in an academic setting. Participants enter the programme by enrolling for academic studies and taking part in it is a mandatory academic requirement (Lyons and Zhang, 2018; Hahn *et al.*, 2020). Voluntary EE, on the other hand, is free to be chosen by the participants and could be part of an extra-curricular academic course or is just self-directed (Debarliev *et al.*, 2020). Voluntary EE is usually designed with the collaboration of other agents such as incubators, technology parks, mentors or venture capitalists (Debarliev *et al.*, 2020).

The commonality across all types of EE interventions is learning through action (Gabrielsson *et al.*, 2020), which involves students' developing their own knowledge by practising different aspects of entrepreneurship (Neck and Corbett, 2018). However, compulsory and voluntary EE differ in terms of their aims and teaching methods (Neck and Corbett, 2018). Compulsory EE is designed to stimulate entrepreneurial thinking as well as to nurture student entrepreneurs with entrepreneurial knowledge, whereas voluntary EE is directed towards stimulating entrepreneurial *doing*. Compulsory EE methods usually highlight learning by doing through the use of problem-solving exercises, simulation exercises, interviews with real entrepreneurs, library use or interactive searches (Hägg and Kurczewska, 2019). It therefore focuses on experiences previously discussed in the classroom and is supported by teaching methods that are typically secondary information-based and teacher-centred, with subject-matter content at their core (Hägg and Kurczewska, 2019). They use mental representations of the environment to plan how a firm's solutions address unsatisfied market needs (Leatherbee and Katila, 2020).

Voluntary EE interventions, on the other hand, are envisaged as constituting an element of practicality, which highlights how real entrepreneurs learn (Debarliev *et al.*, 2020; Rasmussen and Sorheim, 2006). In voluntary EE, students actively engage in entrepreneurship and there is a self-driving aspect as students prioritize what knowledge they need to advance their entrepreneurial project. Learning is primarily student-centred rather than teacher-led (Haneberg *et al.*, 2022) and occurs from the students' experiences and their own reflective understanding of their experiences (Hägg, 2021). To create this learning context, voluntary EE teaching methods are devised to engage students with concrete entrepreneurial experiences (Smith *et al.*, 2022), to stimulate reflective experiential thinking (Hägg, 2021) and to facilitate social interaction (Haneberg *et al.*, 2022). In Neck and Corbett's (2018) words, voluntary EE

pedagogy “requires educators to [. . .] use experiential techniques in real-life environments on real problems; connect the subject matter to student needs, goals, and aspirations; and treat courses as learning experiences not learning silos” (p. 14). Voluntary EE thereby combines different teaching methods, such as teamwork, real-world learning, problem-solving and social collaboration (Smith *et al.*, 2022; Lackéus, 2020; Bauman and Lucy, 2021). In addition, voluntary EE promotes a social learning culture that encourages students to share what they know and to learn from their peers (Pocek *et al.*, 2022).

2.2 Students’ entrepreneurial action

Although the debate about which actions best capture nascent entrepreneurship has raged for years (McMullen and Dimov, 2013), consensus seemed to exist in the past about the following sequence of discrete actions. Gartner (1985) summarized them as follows: “(1) the entrepreneur locates a business opportunity (. . .); (2) the entrepreneur accumulates resources (. . .); (3) the entrepreneur markets products and services (. . .); (4) the entrepreneur produces the product (. . .); (5) the entrepreneur builds an organization (. . .)” (pp. 699–700). However, over the last few decades this sequence has been called into question. It has been argued that such partitioning is based on the formal conception of entrepreneurship and invokes the logical framework of rational means-ends choice. In contrast, alternative approaches to entrepreneurship have emerged based on experimentation, adaptability and exploration of contingencies (Scazziotto *et al.*, 2020), two of the soundest being effectuation (Saravathy, 2001) and bricolage (Baker and Nelson, 2005).

Whereas in effectuation, entrepreneurs create a controlled environment to face uncertainty, in bricolage they challenge resource constraints that come from the environment (Scazziotto *et al.*, 2020). Both logics suggest that student entrepreneurship should be conceived as an enactment and iterative process involving goal-oriented activities aimed at generating and designing an idea for market validation (Prince *et al.*, 2021), to deliver it to the market in the form of a minimum viable product or service, to modify it according to the feedback from the market and to launch a new venture (Ilonen *et al.*, 2018). By doing this, both logics address issues related to building legitimacy and capabilities to overcome significant liabilities of newness in early stages of new venture creation (Pocek *et al.*, 2022). In this tradition, students’ entrepreneurial actions comprise the following: generating new ideas, developing the concept of customer, experimenting and pivoting, negotiating with network agents for knowledge and resources, pitching ideas, prototyping, creating a minimum viable product or developing, testing and crafting business models, and launching a new venture (McMullen and Dimov, 2013). These students’ entrepreneurial actions represent different levels of students’ engagement with entrepreneurship and venture creation (Cui and Bell, 2022; Kuratko *et al.*, 2021) ranging from more abstract entrepreneurial actions (mostly thinking-type action) to more concrete ones (mostly doing-type action) (Chen *et al.*, 2018).

2.3 Students’ learning orientations and motivations

Research in the SoLT tradition has convincingly shown that a cohort of students is not a homogeneous population (Vermunt and Donche, 2017), even if only differences in their learning orientations and motivations were considered (Vanhounout *et al.*, 2013). Learning orientations and motivations represent the cognitive-motivational component in the students’ learning process (Vermunt and Donche, 2017). In addition, different learning orientations and motivations influence not only students’ learning activities and processing strategies but also the efficacy of different educational interventions (Vettori *et al.*, 2021; Vermunt and Donche, 2017).

Learning orientations represent the students’ usage of knowledge (Soltani and Askarizadeh, 2021; Biggs, 1987) and are considered to range from a deep to a superficial usage of knowledge (Hailikari *et al.*, 2022; Vettori *et al.*, 2021). A deep usage of knowledge

involves personal construction of meaning (understanding), whereas a superficial usage of knowledge involves the acquisition, storage, reproduction and a linear usage of knowledge (Purdie and Hattie, 2002; Biggs, 1987; Säljö, 1987).

Learning motivations, on the other hand, refer to the students' personal goals and intentions with regard to their learning (Vermunt and Donche, 2017). Learning motivations are said to range from being performance-oriented to mastery-oriented (De Clercq *et al.*, 2013). Performance-oriented students are mainly focused on the way they are going to be evaluated against their peers, on certifying their competence and on obtaining recognition for good performance (De Clercq *et al.*, 2013). In contrast, mastery-oriented students are characterized by a desire to develop their professional competences (Vermunt and Donche, 2017).

In this paper, learning orientations and motivations are not considered a dichotomous model, but it does recognize the existence of mixed learning orientations and motivations that may fall somewhere in between (Hailikari *et al.*, 2022; De Clercq *et al.*, 2013).

2.4 Hypothesis development

2.4.1 Compulsory entrepreneurship education, voluntary entrepreneurship education and students' entrepreneurial actions. In uncertain environments, such as new venture creation, "CLT can be useful in constructing explanations for how individuals' subjective perception surrounding creating a new venture – as a far or near target – can influence how they construe the demands of the environment and subsequently act in ways ranging from [abstract to concrete]" entrepreneurial actions (Chen *et al.*, 2018, p. 299). The basic premise of CLT is that distance from an event (new venture creation) is linked to the level of the individual's (student entrepreneur's) mental construals –personal observations, comprehensions and interpretation evaluations – and that its perceived psychological distance even influences construals, such that the greater the psychological distance to an event is, the higher the construal level of mental abstractness and the lower the individual's engagement with that event will be (Trope and Liberman, 2010). In the abstract–concrete prioritized structure identified by CLT, abstract actions reflect the desired outcome through thinking that is focused on why a target should be pursued. In contrast, concrete actions reflect the feasible means of accomplishment, the actual concrete performance of how a target can be reached (Trope and Liberman, 2010). While related, perception of psychological distance and construal levels are not the same. "Perception of psychological distance refers to the perception of when an event occurs, where it occurs, to whom it occurs, and whether it occurs. Construal levels refer to the perception of what will occur: the processes that give rise to the representation of the event itself" (Trope and Liberman, 2010, p. 8). Within the field of entrepreneurship, perceived psychological distance can guide nascent entrepreneurship (Chen *et al.*, 2018), because the characteristics of a new venture are almost impossible to perceive accurately *ex ante* and entrepreneurs act under uncertainty and guided by subjective perceptions (McMullen and Dimov, 2013).

Extending CLT to entrepreneurship, Chen *et al.* (2018) argued that would-be entrepreneurs' perception of their goals as being near or far from themselves may influence how they cognitively construe the creation of a new venture. This, in turn, guides the extent of entrepreneurial action bringing the would-be entrepreneur pragmatically closer to or further away from the goal of setting up a new venture. In this regard, Chen *et al.* (2018) demonstrated that perception of psychological distance influences construals and the abstract–concrete continuum in nascent entrepreneurial action, through social distance and hypotheticality. As suggested by Chen *et al.* (2018), social distance is understood here as the perceived degree of social isolation of a student entrepreneur from important parties (e.g. other entrepreneurial agents) in the new venture social space (Chen *et al.*, 2018). Consequently, according to CLT, student entrepreneurs will act in a more abstract manner

when an event is perceived to be performed by socially distant and dissimilar agents (Trope and Liberman, 2010). Regarding hypotheticality, Chen *et al.* (2018) defined it “as the perceived unlikelihood a new venture will emerge (. . .)” (p. 303), and it is understood as having doubts about an event. Again, extending CLT to entrepreneurship, student entrepreneurs who perceive ventures as more hypothetical (i.e. less likely to materialize) will act more abstractly (e.g. engage in extensive justification), while student entrepreneurs who perceive ventures as less hypothetical (i.e. more likely to materialize) will act more concretely (e.g. engage in more entrepreneurial actions).

Perception of psychological distance is a subjective and malleable perception (Chen *et al.*, 2018), which can be affected by education and how it is delivered (Bar-Anan *et al.*, 2006). Therefore, different types of education could have different effects. In compulsory EE, student entrepreneurs usually learn about different aspects of entrepreneurship through active teaching methods, but they do not have any real experience to allow them to advance in the design of their own entrepreneurial offer rather than simply thinking about it as a possible professional career in the future (Leatherbee and Katila, 2020). This focus of compulsory EE on stimulating entrepreneurial thinking in a simulated scenario and less on facilitating the development of student entrepreneurs’ own projects (Debarliev *et al.*, 2020) suggests that student entrepreneurs will perceive new venture creation as involving more hypotheticality, and as a result they are more likely to refrain from actively engaging in concrete actions to create a new venture.

That is, hypotheticality separates would-be entrepreneurs from ventures that are unlikely to be materialized (Chen *et al.*, 2018). Compulsory EE places student entrepreneurs on higher levels of abstractness since it provides less concrete details about the specific type of entrepreneurial action to be performed, the objects involved and the immediate context (Semin and Fiedler, 1989; Trope, 1986, 1989). Consequently, the lack of knowledge regarding these aspects will prevent students from accomplishing more concrete entrepreneurial actions.

Chen *et al.* (2018) reasoned that entrepreneurs may perceive some actions in the creation of a new venture as socially distant if nobody in their social networks is involved in such actions. This distant perception, commonly aligned with compulsory EE, might give rise to the rejection of carrying out concrete behaviours leading to the creation of a new venture. In addition, distance may affect not only the inferences individuals draw about others but also the inferences they draw about themselves (Trope and Liberman, 2010). Through compulsory EE, students can learn about the importance of being networked to succeed in new venturing but they will have hardly any opportunities to contact network partners in order to discuss their entrepreneurial offer with them. Therefore, the students’ perception of social distance will be barely reduced and they will have less interest in undertaking concrete entrepreneurial actions.

Several studies have proved that in compulsory EE university students neither take advantage of entrepreneurial opportunities nor plan to start a business in the short term, which can be explained by the fact that the influence of compulsory EE is not enough to reduce the perceived psychological distance to accomplish concrete entrepreneurial actions (Betáková *et al.*, 2020). A recent review of the literature on factors that influence entrepreneurial intentions carried out by Pérez-Macías *et al.* (2022) concluded that although EE seems to develop greater self-efficacy, perceived behavioural control, attitude towards the behaviour or perceived desirability, there is no consensus regarding its influence on entrepreneurial intention. In fact, some studies have found a negative influence, which these authors attributed to the perception that barriers increase with the new knowledge from EE. Thus, it seems reasonable to assume that student entrepreneurs’ doubts about acting entrepreneurially will be higher and their involvement in concrete entrepreneurial actions will be lower as the perception of hypotheticality and social distance in compulsory EE increases.

H1. Compulsory entrepreneurship education contributes negatively to students' entrepreneurial action.

Voluntary EE emphasizes a real practice- and action-oriented learning approach (Debarliev *et al.*, 2020; Leatherbee and Katila, 2020; Neck and Corbett, 2018). Voluntary EE interventions are characterized by learning through acting as real entrepreneurs (Debarliev *et al.*, 2020). As a consequence, student entrepreneurs should accrue more real personalized and idiosyncratic meaning about the why, the what, and the how of being an entrepreneur. This in turn should contribute to diminishing the student entrepreneurs' perception of psychological distance in terms of hypotheticality and increase their engagement with concrete entrepreneurial actions. Voluntary EE interventions are also expected to affect psychological distance by way of social distance, as the participation of different entrepreneurial agents is a key element highlighted in any voluntary EE intervention (Debarliev *et al.*, 2020; Leatherbee and Katila, 2020). In voluntary EE, students are taught to make decisions in a collective manner through the intertwined web of self-selected stakeholders (Pocek *et al.*, 2022; Ghezzi, 2019); thus, in terms of CLT, the perceived degree of social isolation should diminish. Consequently, in this paper the following hypothesis is suggested:

H2. Voluntary entrepreneurship education contributes positively to students' entrepreneurial action.

2.4.2 Unravelling the moderating role of learning orientations and learning motivations. So far, various overlapping theories of cognitive learning processes have been developed, making it difficult to have access to a consistent and rigorous theoretical framework (De Clercq *et al.*, 2013). However, following De Clercq *et al.* (2013), this paper will refer to the approaches most commonly used in SoLT to study the influence of students' learning orientations and motivations in their entrepreneurial learning process.

Learning orientations emerge as pertinent because they influence how students aim to use their knowledge, and good learning habits normally predict better results (Liu *et al.*, 2014). Past research has led to the commonly accepted view that there exists a hierarchical set of conceptions of learning orientations showing that a deep usage of knowledge reflects a constructivist view of learning as opposed to one in which learning is just acquired, stored and reproduced – a view related to a surface learning orientation (Hailikari *et al.*, 2022). Deep usage of knowledge reflects an intention to learn and students show great interest in achieving an in-depth understanding of content. It implies not only the storage but also the abstraction of knowledge, as well as the interpretation of that knowledge (Säljö, 1987). Students with a deep learning orientation are usually behaviourally active participants in their own learning process (Hailikari *et al.*, 2022; Liu *et al.*, 2014), implementing self-regulated learning activities such as searching, relating, concretizing and critical processing (Purdie and Hattie, 2002). Consequently, according to SoLT, student entrepreneurs with deep usage of knowledge will be more likely to have a better contextualized entrepreneurial knowledge, which in turn will contribute to reducing hypotheticality and their perception of social distance.

Conversely, a shallower learning orientation leads to the learning of the surface features of an educational intervention and students are not eager to get involved voluntarily in activities to expand the apprenticeship associated with training (Hailikari *et al.*, 2022). The translation of this orientation to EE is that student entrepreneurs' interest in expanding the knowledge gathered from EE interventions will be diminished, which in turn will contribute to increasing hypotheticality and their perception of social distance. Thus,

H3. The deeper the students' learning orientation is, (a) the weaker the inverse relationship between compulsory entrepreneurship education and entrepreneurial

action will be and (b) the stronger the direct relationship between voluntary entrepreneurship education and entrepreneurial action will be.

Mastery-oriented learning motivations are also of paramount relevance because they make it possible to set up a favourable learning process that influences the students' ability to get the most out of any educational programme (De Clercq *et al.*, 2013). In this regard, mastery-oriented students are actively engaged in their learning with a clear view to self-improvement (De Clercq *et al.*, 2013) and to increasing their ability to succeed in their future professional career (Bandura, 2001). Therefore, mastery-motivated student entrepreneurs are expected to apply their learning to improve their professional career. For them, exploring how knowledge from EE can be applied in their real entrepreneurial projects and with real partners is an important learning motivation. It is thus expected that, through mastery-oriented learning motivations, student entrepreneurs will obtain a more contextualized understanding of what it means to act entrepreneurially and with whom, which helps reduce hypotheticality and their perception of social distance.

Conversely, performance-oriented students are more interested in the way they are evaluated against their peers, in attempting to surpass others and in obtaining recognition for good performance (De Clercq *et al.*, 2013). Performance-oriented students are motivated to keep a record of their superior knowledge relative to others or a high standard, but not to apply this knowledge to their real lives (De Clercq *et al.*, 2013). Thus, in the case of student entrepreneurs, their interest will not be in understanding what it means to be involved in an EE programme for their entrepreneurial career, but in documenting the fact that they have passed the programme requirements.

Because mastery-oriented students are interested in applying the knowledge gathered from EE interventions to develop their entrepreneurial career, it is proposed that the relationship between voluntary EE and entrepreneurial actions will be positively moderated by mastery-oriented learning motivation. The contrary can easily be posited for the relationship between compulsory EE and entrepreneurial action. Therefore,

- H4.* The greater students' motivation to engage in mastery-oriented learning is, (a) the weaker the inverse relationship between compulsory entrepreneurship education and entrepreneurial action will be, and (b) the stronger the direct relationship between voluntary entrepreneurship education and entrepreneurial action will be.

Figure 1 presents the theoretical model shape by the hypotheses proposed above.

3. Methods

3.1 Sample characteristics

This study uses student entrepreneurs' investment in EE as a variable for predicting entrepreneurial action in the context of a Spanish university in order to test for cross-country differences (Blenker *et al.*, 2014). The sample was to be made up of students that had participated in compulsory or voluntary EE courses during their master or degree studies. Those who had not taken part in any EE course were excluded from the sample. An online questionnaire was distributed to master's and third- and fourth-year bachelor's degree students (a total of 6,699). The fieldwork took place from 10 December 2020 to 20 January 2021 and the final sample size was 150 responses, which represents 2.24% of the students consulted.

Figure 2 shows the descriptive statistics of the sample in bar charts. The majority of the participants (67.3%) were of the usual age for being at university, i.e. 18–24 years old. The second highest age group was 25–30 years old, which accounted for 16.7%. The sample contained more males than females (66 vs 34%, respectively). Regarding their studies, most of

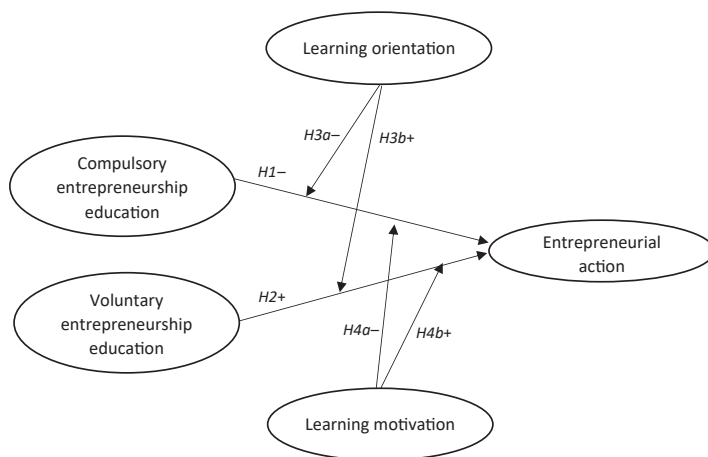


Figure 1. Moderation of learning orientations and motivation of the effects of entrepreneurship education on entrepreneurial action

the participants in the sample were studying degrees related to the faculties of law and economics (40%) and the humanities and social sciences (30%). Moreover, 39.3% of them were 4th-year students, followed by master’s degree students (36%).

3.2 Measurement instruments

Investment in EE was measured using three items: one for compulsory EE and two for voluntary EE. Compulsory EE was measured through the number of hours of entrepreneurial training received in the degree course. Voluntary EE was measured through the time devoted to extracurricular learning activities related to EE (Debarliev *et al.*, 2020) and that spent on self-learning entrepreneurship. The respondents answered using a five-point scale, where 1 means no time devoted, 2 = 1–25 h, 3 = 26 to 100, 4 = 101 to 500 and 5 = more than 500 h invested.

Entrepreneurial action was measured by adapting the dimensions “thinking about doing” and “doing to inform thinking” from Chen *et al.’s* (2018) index of entrepreneurial abstractness. Although the scale was built to create a composite variable, the items selected reflect actions undertaken by students that can be accomplished with different levels of involvement. The items were adapted to be answered on a five-point Likert scale in order to consider the respondent’s level of involvement in each activity. Since entrepreneurial actions are undertaken in pursuing new venture creation, Chen *et al.* (2018) divided the degrees of abstractness into four: thinking, thinking about doing, doing to inform thinking and actual doing. The items measuring “thinking” were not included in the scale because, since they were the highest degree of abstractness, they did not really measure nascent entrepreneurship activity. Regarding “actual doing”, as the sample was composed of students, respondents were not expected to be focused on setting up a new venture, since their main occupation was studying for their degree. Additionally, as the items called “doing to inform thinking” represent a higher degree of entrepreneurial action than the ones under the label “thinking about doing”, the 1 to 5 Likert scale was weighted by 2, which made it possible to distinguish between different degrees of concreteness of entrepreneurial action.

To measure the moderator variables, items from the Inventory of Learning Styles (ILS) scale (Vermunt and Donche, 2017) that collect deep-surface learning orientations and mastery-performance motivations were selected. The deep-surface learning orientation scale stresses the personal usage of knowledge coming from an educational intervention;

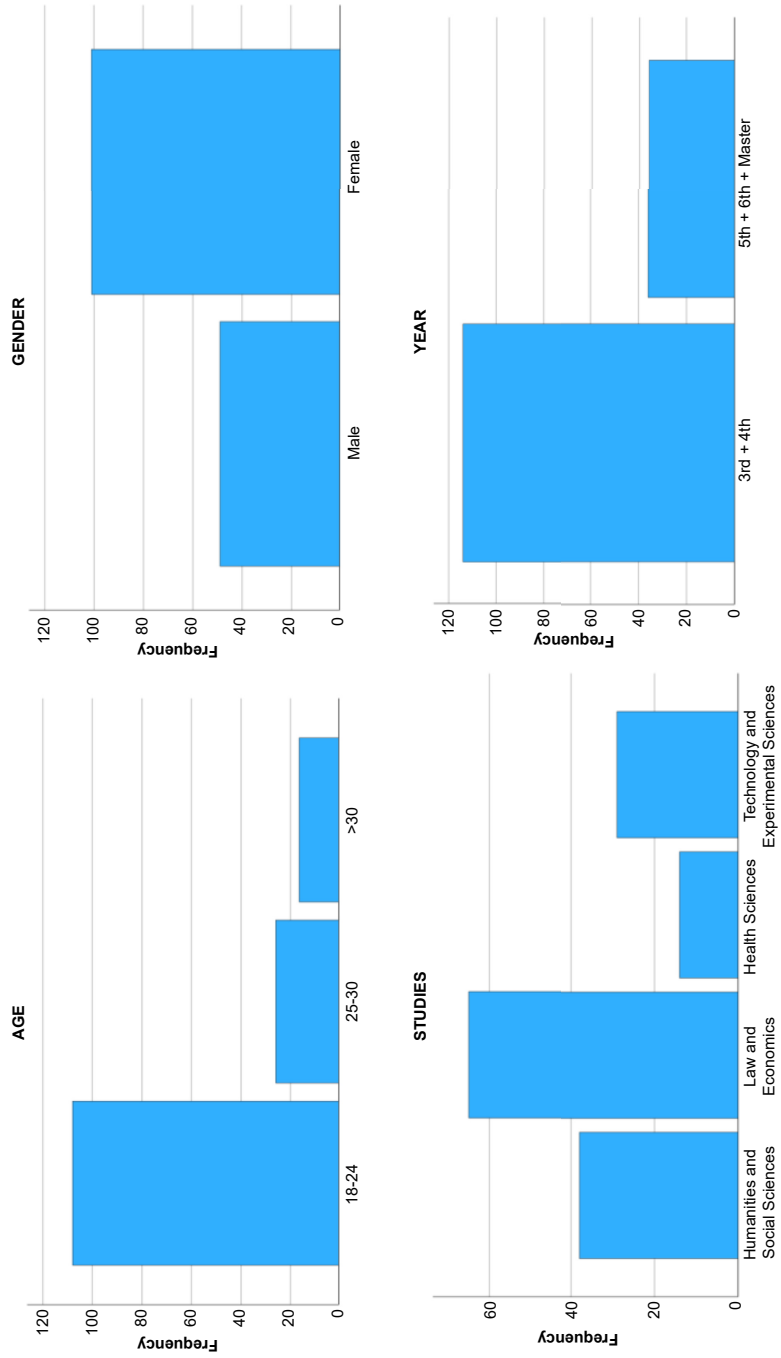


Figure 2.
Sample characteristics

accordingly, the ILS items from the learning component “use of knowledge” were used. The mastery-performance learning motivations scale measures student entrepreneurs’ learning motivation to develop an entrepreneurial career. Consequently, the ILS items from the “vocation-oriented” learning orientation were used to measure the students’ mastery motivation.

Experts and academics in the field of EE and learning patterns were asked to check the content validity of the items selected. The items were validated and minor modifications were suggested. The questionnaire was also contextually adapted as the result of a pilot study conducted with 17 students. Partial least squares (PLS) modelling was used to analyse the data in order to check the conceptual model because this technique can handle formative and reflective constructs in the same model as well as being capable of testing for moderation (Ringle *et al.*, 2012).

Reliability values of the reflective scales are indicated in Table 1. Cronbach’s alpha, composite and average variance extracted reliability methods were applied to ensure the trustworthiness of the research. The results show acceptable values for Cronbach’s alpha (0.70 or above), composite reliability (above 0.70) and average variance extracted (0.50 or above) in accordance with the thresholds generally accepted in the literature.

Regarding the indicator loadings, only the items above 0.50 were kept in the scale, which meant leaving out five items from the entrepreneurial action scale (“I believe serving those missed by others is important for venturing”, “The business plan is unwritten – it is in my head”, “Product/service development is still in the idea stage (no work has been done)”, “Market opportunities are being defined by talking to potential customers or getting information about competitors” and “I talk to my friends and family, potential or existing customers, existing suppliers or distributors, or potential or existing investors or lenders to get ideas for the new venture”), two items from the deep learning orientation scale (“I should try to apply the theories dealt with in a course to practical situations by myself” and “To me, learning is providing myself with information that I can use immediately or in the longer term”) and one from the mastery learning motivation scale (“For the kind of work I would like to do, I need higher education qualifications”).

Examining the cross-loadings provides initial support for the discriminant validity of the reflective constructs, as each reflective indicator loaded higher in the construct it was linked to (Table 2). Additionally, according to the Fornell-Larcker (1981) criterion, a variable should share more variance with its indicators than with other variables in the model. The AVE between each pair of factors was compared with the square of the estimated correlation between those factors. The variables considered in the study met the Fornell-Larcker criterion (Table 3). Henseler *et al.* (2015) argued that the heterotrait-monotrait ratio must be less than 0.85 to confirm the discriminant validity, which is the case in the analysis because the highest ratio between variables was 0.332.

To evaluate the formative measurement models (compulsory EE and voluntary EE), the Variance Inflation Factor (VIF) values of the formative indicators were examined to check for collinearity of indicators. According to the results, the highest indicators had a VIF value of 1.771 and, hence, were below the threshold value of 5 (Hair *et al.*, 2017). Collinearity therefore does not reach critical levels in the formative construct. Next, the outer weights were analysed for their significance and relevance. First, the significance of the outer weights was

Variables	Cronbach’s alpha	Reliability composite	Average extracted variance (AVE)
Entrepreneurial action	0.773	0.847	0.526
Deep-Surface	0.802	0.871	0.628
Mastery-Performance	0.726	0.830	0.552

Table 1.
Reliability

Table 2.
Cross-loadings of
reflective scales

Item	Entrepreneurial actions	Deep-surface	Mastery-performance
THIDO2	0.725	0.148	-0.052
THIDO3	0.625	0.200	-0.143
DOTHI2	0.769	0.201	-0.264
DOTHI3	0.789	0.175	-0.233
DOTHI5	0.707	0.181	-0.210
ACL1	0.187	0.749	0.050
ACL3	0.174	0.815	-0.133
ACL4	0.241	0.854	-0.236
ACL6	0.173	0.745	-0.001
ALO1	-0.192	-0.026	0.681
ALO2	-0.201	-0.112	0.770
ALO4	-0.174	-0.091	0.680
ALO5	-0.178	-0.113	0.831

Table 3.
Fornell-Larcker
criterion

	Entrepreneurial action	Deep-surface	Mastery-performance
Entrepreneurial actions	0.725		
Deep-Surface	0.248	0.792	
Mastery-Performance	-0.252	-0.115	0.743

considered by means of bootstrapping. Looking at the significance levels, both formative indicators were significant at a 5% level. The outer loadings of the voluntary EE indicators were 0.958 (extracurricular learning) and 0.819 (self-learning). Furthermore, the *p* values of the two indicator loadings were clearly below 0.01, suggesting that all loadings are significant at a level of 1%.

4. Results

Before looking at the path coefficients, the structural model was checked for collinearity issues by examining the VIF values of all the sets of predictor constructs in the structural model. As predictors of entrepreneurial action, both VIF values (Compulsory EE and Voluntary EE) were clearly below the threshold of 5 (1.292). Therefore, collinearity among the predictor constructs was not a critical issue in the structural model.

Generally, the R^2 of 0.10 is accepted (Falk and Miller, 1992). Nevertheless, the values of the endogenous latent variable can be considered weak (0.309). Regarding the effect sizes f^2 , compulsory EE has no effect on entrepreneurial action whereas voluntary EE shows a strong effect size of 0.355. This result is consistent and seems to pinpoint additional factors to be considered when studying the relationship between EE and its results on student entrepreneurs. Drawing on CLT, this paper has suggested that EE could have an impact on the degree of abstractness of entrepreneurial action through hypotheticality and social distance (Chen *et al.*, 2018), which has not been proved to be the case of compulsory EE. Ruiz-Palomino and Martínez-Cañas (2021) recently suggested the capital role that social networks could have, especially when family-based, in favour of more concrete entrepreneurial activity, once the entrepreneurial intention has been formed. In terms of CLT, personal family-based networks could affect both hypotheticality and social distance and, therefore, could have something to say in explaining the relationship between EE and entrepreneurial activity in student entrepreneurs. The same could be said if student entrepreneurs' entrepreneurial orientation is considered, as insinuated by the paper by Kusa *et al.* (2021). In this case,

entrepreneurial orientation could affect hypotheticality and, therefore, could also influence EE and entrepreneurial actions.

According to the results obtained (Table 4), since the 95% confidence intervals include zero in the relationship between compulsory EE and entrepreneurial action, the hypothesis that this path equals zero cannot be rejected, assuming that there is no significant effect (Hair *et al.*, 2017). Consequently, in contrast to H1, compulsory EE does not show any significant relationship with the degree of entrepreneurial action, while the direct relationship from voluntary EE is positive, since the relationship between this kind of EE and entrepreneurial action is positive and significant. These results confirm hypothesis H2. By also taking the construct's indicator weights into consideration, self-learning EE can be identified as having a higher weight than extracurricular EE (0.958 and 0.819, respectively) in the construct, thereby signalling the importance of self-learning training to transform entrepreneurial ideas into entrepreneurial actions.

Additionally, the technique of reusing the sample proposed by Stone (1974) and Geisser (1975) was applied. These authors suggested using a blindfolding process. The omission distance used was 7, a prime number between 5 and 10, following Wold's (1982) suggestion. Table 5 shows the results of testing the cross-validated redundancy (Hair *et al.*, 2017). The Q² statistic is a measure of how well the observed values are reconstructed from the estimated parameters. Values of Q² above 0 show that the model has predictive validity for the variables considered.

The final assessment addresses the Q² effect sizes. According to Hair *et al.*'s (2017) rules of thumb, the Q² effect size for the relationship confirmed can be considered small (0.144).

Since only voluntary EE showed a significant influence on the degree of concreteness of entrepreneurial action (H2) in the path analysis, the moderation analysis was focused on this relationship. Consequently, only the moderation effect of deep learning orientation and mastery-oriented learning motivation on the relationship between voluntary EE and entrepreneurial action were tested (see Figure 3).

Chin *et al.* (2013) proposed the two-stage approach as the best way to run a moderation analysis when both the exogenous construct and the moderator or only one of them are measured formatively. As voluntary EE has been measured formatively, this was the approach that was adopted. The effects of the interaction terms on the endogenous construct were both significant. Table 6 shows that the deep learning orientation had a significant and

Relationship	Total effects	Standard deviation	t statistics	p values	95% confidence intervals	Significance (p < 0.05)?
Compulsory EE → entrepreneurial action	-0.016	0.079	0.198	0.843	[-0.169; 0.146]	No
Voluntary EE → entrepreneurial action	0.563	0.070	8.031	0.000	[0.398; 0.681]	Yes

Table 4. Hypothesis test

Variables	SSO	SSE	Q ² (=1-SSE/SSO)
Entrepreneurial action	750.000	635.886	0.152
Compulsory EE	150.000	150.000	
Voluntary EE	300.000	300.000	

Table 5. Predictive relevance

Figure 3.
Final model

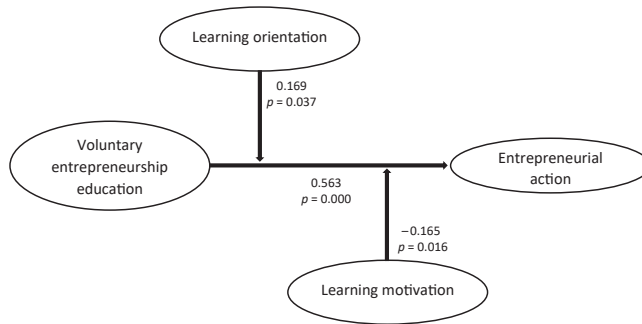


Table 6.
Moderation test

Relationship	Total effects	Standard deviation	t statistics	p values	95% confidence intervals	Significance (p < 0.05)?	f ²
Moderation of deep learning orientation on voluntary EE → Entrepreneurial action	0.169	0.081	2.082	0.037	[0.011; 0.327]	Yes	0.040
Moderation of mastery learning motivations on voluntary EE → Entrepreneurial action	-0.165	0.069	2.411	0.016	[-0.316; -0.046]	Yes	0.049

positive moderating effect on the relationship between voluntary EE and entrepreneurial action (0.169, $p = 0.037$), while mastery-oriented learning motivation showed a significant and negative moderating effect (-0.165 , $p = 0.016$). Finally, the f^2 of the interaction term, which addresses the size of the moderator effect, had large values according to [Kenny \(2018\)](#).

These results confirm hypothesis [H3b](#), which proposed a positive effect of deep learning orientation on the relationship between EE and entrepreneurial action, such that when deep learning orientation increases, the results of voluntary EE on entrepreneurial action are higher ([H3b](#)). Therefore, [H3](#) can only be partially confirmed. On the other hand, contrary to [H4b](#), mastery-oriented learning motivations not only have no positive effect on the relationship with voluntary EE, but in fact the effect is negative. Consequently, when the students' mastery-oriented learning motivation increases, the effects of voluntary EE on entrepreneurial action decrease. This is a very similar result to those of several authors (see for example [Nabi et al., 2017](#)) who found that when students delved deeper into EE, their entrepreneurial intention diminished. An explanation could be that as students get closer to the applicability of EE, they realize the difficulties that nascent entrepreneurship involves and, consequently, they reduce their proactivity towards implementing actions to create their business.

[Figure 2](#) shows a graphic representation of the final model with the effects of voluntary entrepreneurship education on entrepreneurial action and the moderation effects of learning orientations and motivation.

5. Discussion

This research is focused mainly on the effect of entrepreneurial education on students' entrepreneurial actions. The results presented extend previous research addressing above all entrepreneurial intention as the main EE impact indicator (Zhang *et al.*, 2022; Shabbir *et al.*, 2022; Kuratko *et al.*, 2021; Nabi *et al.*, 2017; Bae *et al.*, 2014). In line with Chen *et al.*'s (2018) proposal, students' entrepreneurial actions have been conceptualized through the abstract-concrete continuum, which is an original conceptualization matching the effectuation and bricolage logics. Additionally, a fresh theoretical perspective to study the influence of EE has been given from the CLT perspective. The CLT makes it possible to differentiate between compulsory and voluntary EE if the aim is to activate student entrepreneurship. By doing this, a more fine-grained analysis of EE effects on student entrepreneurs has been given. In particular, the results point to the existence of a direct relationship between voluntary EE and concrete entrepreneurial actions, especially if self-learning EE is considered. However, the effect of compulsory EE has not been demonstrated here or in more abstract entrepreneurial actions.

Another important theoretical contribution of the study is that to disentangle the mechanisms through which exposure to EE works, students' learning characteristics need to be considered as a moderating factor. It has been claimed that student entrepreneurs' learning characteristics have a say in explaining the voluntary EE–entrepreneurial action relationship. Although results confirm that the relationship between voluntary EE and concrete entrepreneurial actions is stronger for students with deeper learning orientations, they also indicate that this relationship decreases when student entrepreneurs show a predominantly mastery-oriented motivation. In general, these results are both encouraging and disturbing at the same time as they raise several important implications for the academia, and more specifically for entrepreneurship educators, as well as for the role that universities should play in promoting university-based entrepreneurship. Specifically, it can be claimed that SoLT has something to say when explaining and designing EE programmes aimed at promoting entrepreneurial action. Moreover, to the authors' knowledge, this is one of the first studies to consider SoLT as variables influencing the relationship between EE and entrepreneurial action.

5.1 Voluntary and compulsory university-based entrepreneurship education

Theoretical evidence of the workings of voluntary EE already exists (Smith *et al.*, 2022; Lackéus, 2020; Bauman and Lucy, 2021; Neck and Corbett, 2018) and empirical research also confirms its influence on student entrepreneurs' intention, mainly through its effect on nurturing their human capital (Debarliev *et al.*, 2020), although there is limited empirical support for its influence on their behaviour (Cui and Bell, 2022; Nabi *et al.*, 2017). Based on traditional theoretical approaches, it is said that through voluntary EE student entrepreneurs develop their entrepreneurial competences, which increases their perception of feasibility and desirability associated to entrepreneurial careers. This paper adds to previous research by arguing in terms of CLT and by suggesting hypotheticality and perception of social isolation as other important mechanisms through which voluntary EE contributes to mobilizing students towards concrete entrepreneurial actions. From a pedagogical point of view, the effectiveness of an educational intervention depends on a number of factors that affect both the design of the intervention and its implementation (Fayolle, 2013). This paper, however, has focused on types of university-based EE (Debarliev *et al.*, 2020; Neck and Corbett, 2018) and their relationship with hypotheticality and the perception of social distance from entrepreneurship. In this regard, the results of the research show that, through voluntary EE, student entrepreneurs develop a more accurate sense of what it means to be an entrepreneur and with whom, which, in terms of CLT, can explain the relationships between voluntary EE and concrete entrepreneurial actions.

As educators, the fact that the relationship between compulsory EE and the development of abstract entrepreneurial actions has not been demonstrated is of great interest. Yet, this result comes as no surprise, as it is in line with research that questions the relationship between EE compliance and entrepreneurial intention (Pérez-Macías *et al.*, 2022; Debarliev *et al.*, 2020). In this study it has been argued that teaching methods have an influence on the relationship between compulsory EE and abstract entrepreneurial actions (Cui and Bell, 2022). The results obtained in the research suggest that the didactic methodologies used in formal training, despite being designed according to the principles of active learning, partially contribute to diminishing the perception of psychological distance to entrepreneurship. Teaching methods in compulsory EE do not emphasize the acquisition of real market knowledge or attempt to inspire and increase the perception about available resources and interesting partners (Smith *et al.*, 2022; Debarliev *et al.*, 2020). They are not developed with the purpose of helping student entrepreneurs deal with the perception of psychological distance, and the results suggest that they have no influence on enhancing entrepreneurial actions even through more abstract entrepreneurial actions. The need “to reflect upon our (educational) practices (in compulsory EE) and take a more critical stance, breaking away from the far too common taken for granted position” (Fayolle, 2013 p. 693) also emerges from the research (Smith *et al.*, 2022; Haneberg *et al.*, 2022). To advance in this direction, academics and teachers have to come to terms with the tensions existing between formal academic requirements and experiential pedagogical approaches in the university context (Ratten and Usmanij, 2021). They also have to propose new ways of delivering in-curricular experiential entrepreneurship education, such as full curriculum-based venture creation programmes (Smith *et al.*, 2022; Haneberg *et al.*, 2022).

5.2 Students’ learning patterns

A general consensus derived from SoLT suggests that different teaching methods work better for certain populations, with learning patterns as an important intervening factor (Vermunt and Donche, 2017). Moreover, researchers have shown learning patterns and their influence on academic performance to be highly context-dependent (Vettori *et al.*, 2021; Umaphathy *et al.*, 2020), which suggests the relevance of their analysis in the EE context. In fact, Rideout and Gray (2013) concluded that different EE interventions work better for certain populations, but this is just speculation and more quantitative research is needed to prove their claim. The results of this research clearly indicate that voluntary EE works better for student entrepreneurs with deeper learning orientations, thereby extending previous SoLT research that has confirmed the relationship between deeper learning orientations and academic results at different educational levels (Vermunt and Donche, 2017; Vettori *et al.*, 2021). Voluntary EE works by promoting entrepreneurial action, but this relationship is stronger when students’ deep learning orientation is higher. Students with deeper learning orientations perceive voluntary EE interventions to be very much aligned with the way they would like to learn, so that their learning outcomes are increased.

For the authors, the fact that the positive moderating role of mastery-oriented motivation in the voluntary EE–entrepreneurial action relationship has not been proved is a very surprising finding. It seems that, when students’ primary learning motivation is to develop professional competences, their engagement in learning activities allows them to view occasional drawbacks that prevent them from advancing in their entrepreneurial project. Although research on EE and EE training programmes has largely insisted on the need to show failure to be part of the learning process, during their learning process it is not rare for students to be aware of the risks to be assumed when creating a new venture and, consequently, to reduce their involvement in entrepreneurship (Chang and Rieple, 2013).

6. Conclusions, research limitation and future research

Unlike previous studies that have not looked at the differences in the effects of EE interventions on entrepreneurial action, the question that has guided this paper has been: What type of EE is more effective for promoting entrepreneurial actions and for whom? By doing so, the research has addressed puzzling anomalies in entrepreneurial education, such as why EE sometimes has such an effect on entrepreneurial action or the fact that EE is considered a “medicine for every student entrepreneur”. The research clearly highlights the relevance of adopting a nuanced appraisal to study the effect of the different types of university-based EE on students’ entrepreneurial actions, as well as on contemplating the boundary conditions under which university-based EE and learning processes occur, with a dominant focus on the audience of EE. Specifically, the utility of SoLT in describing the profile of student entrepreneurs and their inclination to learn from educational interventions has been demonstrated. The immediate implications of these results are, on the one hand, that students’ learning patterns should be kept in mind when analysing the effects of EE on student entrepreneurship, especially in voluntary EE. On the other hand, these learning patterns also need to be considered when designing EE programmes, so as to be able to get the maximum benefit from them. Finally, this research also contributes to the existing literature by considering the perception of psychological distance and its influence on construals regarding entrepreneurship as a factor explaining how EE influences student entrepreneurs’ action. To do so, the study has elaborated on CLT, which has proved to be useful to distinguish among levels of entrepreneurial commitment.

As to the consequences for student entrepreneurs, the findings suggest that they could improve the results of their EE training programmes with regard to the creation of new ventures. If they are interested in creating a new firm, a deep-learning orientation is said to be advisable. That is, from the research, student entrepreneurs know that to be active participants in their own learning process is a decisive factor. It is advisable for them to implement self-regulated learning activities such as searching, relating, concretizing and critical processing (Purdie and Hattie, 2002). Student entrepreneurs could start by conducting a self-diagnosis of their learning patterns, which can help them to reflect on how to tackle their learning.

From the research, a concluding series of related research challenges can be proposed for entrepreneurship educators and policymakers. Entrepreneurship educators are considered to be among the most innovative and among the first to adopt active learning practices in business schools, and now is the time to take a step forward and adopt practices that facilitate student entrepreneurs’ real experimentation in compulsory education. Now is also the time for educators to propose how to structure the components of compulsory EE interventions – objective, content, method and assessment (Fayolle, 2013) – under the principles of experimentation (Neck and Corbett, 2018) and action-based entrepreneurial learning (Rasmussen and Sørheim, 2006). In line with Frederiksen and Brem (2017), future research is undoubtedly needed to explore how compulsory EE logic can be transferred through the practice of teaching methods used in voluntary EE. The recent work by Smith *et al.* (2022) and by Haneberg *et al.* (2022) can be considered a good starting point. Educators will then rigorously test their interventions, specifically in terms of change in students’ entrepreneurial behaviour, in order to diminish the distance between theory and practice (Wu and Gu, 2017). The authors are aware of the potential challenges associated with this research regarding the concentration on single-institution studies that may lead to issues when it comes to meeting the academic rigour required for journal publication (Smith *et al.*, 2022). In addition, adopting experimentation learning principles in compulsory interventions indicates a change in the teacher’s capability to teach in this new situation and advises universities to develop an educational model that educates teaching staff to change from a conventional approach to an experiential approach (Koopman *et al.*, 2013). Regarding voluntary EE, the results are very illustrative as they provide information on the would-be student entrepreneurs’ recruitment

process and how educators should work with them. In fact, admission to voluntary programmes usually signals students' motivation to learn as an important element. This tradition is based on classic principles of recruitment and hiring (Barron *et al.*, 1985; Gatewood and Feild, 1987) and on ideas from Human Capital Theory in which mastery-oriented motivation is considered as a factor encouraging voluntary EE (Marvel *et al.*, 2016). The results suggest that, as learning motivations have a negative influence on the relationship between voluntary EE and entrepreneurial actions, it would be advisable to rethink the recruitment protocols in voluntary EE in order to consider students' learning orientation, which does have a positive influence on the relationship between voluntary EE and entrepreneurial actions. This would help to increase the success rates associated with voluntary EE as regards the number of firms created.

Several contextual factors have been recognized as exerting an influence on the learning approach students adopt, such as action-based learning activities (Hailikari *et al.*, 2022). This means that students with a surface-learning orientation can speed up their learning orientation by being enrolled in experiential pedagogies. In consequence, an interesting idea arises suggesting that not all individuals might require the same length or duration of entrepreneurship education in order to act in an entrepreneurial manner and a different entrepreneurship educational journey could be drawn (Smith *et al.*, 2022). For entrepreneurship educators it is interesting to explore how different teaching methods influence student entrepreneurs' learning styles and the different entrepreneurship educational journey that could emerge. By doing this, the effects of EE in terms of the characteristics of students' learning will be uncovered, which is something that has often been neglected in past literature. Finally, the results indicate that the role of learning motivations needs to be studied from another angle and not only considering it as a moderating role. This relationship does not seem to be linear, as has previously been posited. For example, from Gollwitzer (1993) it can be gathered that learning motivations should work in two phases: in the deliberative stage, individuals think about what their learning goal will be, and in the implemental stage, they plan when, where and how to act in line with the learning goal. Based on the same study, we speculate that future research is also needed to explore the complex relationships between EE, entrepreneurial actions, learning motivations and more general learning patterns.

Like other studies, this work is subject to a few research limitations. The first limitation is the selection of the sample. The study used a convenience sample by selecting students from the researchers' university. Although this procedure is common in studies on entrepreneurial education (Smith *et al.*, 2022; Soohyun and Duval-Couetil, 2021), it makes it difficult to generalize the results. Another limitation is related to the quasi-experimental design of the research. Although popular in EE research (Soohyun and Duval-Couetil, 2021), initial differences between the two groups could not be controlled (Rauch and Hulsink, 2015). Additionally, surveys that rely on respondents' perceptions could have a problem with self-report and biases in answers. Students might give more desirable responses because of their career ambitions, their own perceptions about entrepreneurship or biases (Debarliev *et al.*, 2020). Moreover, compulsory and voluntary EE were measured by single items. Although they collect the construct to be measured properly, research that uses detailed scales may produce a finer approach to each kind of EE.

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