



# The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review

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The research on entrepreneurship education–entrepreneurial intentions has yielded mixed results. We meta-analyzed 73 studies with a total sample size of 37,285 individuals and found a significant but a small correlation between entrepreneurship education and entrepreneurial intentions ( $\hat{\rho} = .143$ ). This correlation is also greater than that of business education and entrepreneurial intentions. However, after controlling for pre-education entrepreneurial intentions, the relationship between entrepreneurship education and post-education entrepreneurial intentions was not significant. We also analyzed moderators, such as the attributes of entrepreneurship education, students' differences, and cultural values. Our results have implications for entrepreneurship education scholars, program evaluators, and policy makers.

## Introduction

Evidence-based research is the systematic examination of a phenomena related to a particular research question. One of its most common forms is meta-analysis, which allows researchers to think about and to summarize the results of previous empirical

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analyses. In effect, meta-analysis as a form of evidence-based research generates a summary measure of the results of research findings across numerous studies of the same phenomenon. It does this by capturing evidence, which is essential to reduce biases inherent in individual studies as well as to fill in the gaps between scientific knowledge and practice (cf. Frese, Bausch, Schmidt, Strauch, & Kabst, 2012; Rauch & Frese, 2006). The current study follows in the tradition of evidence-based entrepreneurship research by examining the impact of entrepreneurship education across numerous studies on a student's entrepreneurial intentions. By *entrepreneurship education*, we are referring to education for entrepreneurial attitudes and skills. *Entrepreneurial intentions* are desires to own or start a business.

Many studies in this research stream have reported inconsistent and ambiguous findings (Lorz, Volery, & Müller, 2011). In response, several researchers have generated comprehensive qualitative and quantitative reviews including meta-analyses of the entrepreneurship education–entrepreneurial intentions relationship; however, these studies have yet to resolve the remaining ambiguities and questions (Bécharde & Grégoire, 2005; Dickson, Solomon, & Weaver, 2008; Martin, McNally, & Kay, 2013; Mwasalwiba, 2010; Pittaway & Cope, 2007). For example, Martin et al. conducted a well-designed meta-analysis from which they concluded that there was a small but positive relationship, which was a weighted correlation of .137; however, it provided little insight into the conditions under which entrepreneurship education is more or less likely to be associated with entrepreneurial intentions.<sup>1</sup>

By placing entrepreneurial intentions in the foreground, we not only examined the relationship between entrepreneurship education and entrepreneurial intentions, but also compared it with that of other types of education such as business education and entrepreneurial intentions. We also controlled for the effects of pre-education entrepreneurial intentions. In addition, we included other likely moderators, examples of which are: the specificity of education; the duration of education; as well as gender, family background, and culture. In summary, the inconsistent findings from previous studies, as well as the likely moderators that still remain to be tested, suggest that there is a need for a targeted meta-analytic review, which we undertake.

This research proceeds as follows. We review relevant theories and previous research on the entrepreneurship education–entrepreneurial intentions relationship, which leads to the generation of 12 hypotheses. Next, we describe the meta-analytic procedures as well as analyze possible publication bias. We then present the results, followed by an interpretation of the results. Finally, we discuss the implications and limitations of this study followed by possible future research directions.

## Theory and Hypotheses Development

### Entrepreneurial Intentions

As mentioned earlier, entrepreneurial intentions are usually defined as one's desire to own one's own business (Crant, 1996) or to start a business (Krueger, Reilly, & Carsrud,

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1. We credit Martin et al.'s (2013) study for acknowledging that the benefits of entrepreneurship education are contingent as they called for the future examination of moderators. Few known reviews for the relationship between entrepreneurship education and entrepreneurial intentions have so far used a contingency approach. In addition, Frese et al. (2012) suggested that searching moderators is highly recommended when a focal relationship varies across individual studies.

2000). Historically, intentions have been used to describe a self-prediction to engage in a behavior (Ajzen, 1991; Ajzen & Fishbein, 1977). That is, once the formation of intentions occurs, actual behavior is expected. Social-psychological studies assume that intention is the single best predictor of actual behavior (Bagozzi, Baumgartner, & Yi, 1989). Many studies have supported the predictive validity of intentions on actual behaviors. For example, according to Sheeran's (2002) meta-analysis covering 422 studies during its previous 10 years, the mean correlation between intentions and behavior was .53, accounting for 28% of the variance in behavior. In entrepreneurship, however, other scholars have cast doubt on whether intentions predict actual entrepreneurial behavior (Douglas & Shepherd, 2002).<sup>2</sup> Nonetheless, multiple studies still regard entrepreneurial intentions as one of the crucial antecedents of actual entrepreneurial actions (Krueger et al.; Lee, Wong, Foo, & Leung, 2011).

## **Entrepreneurship Education**

Entrepreneurship education consists of "any pedagogical [program] or process of education for entrepreneurial attitudes and skills" (Fayolle, Gailly, & Lassas-Clerc, 2006b, p. 702). It has a relatively long history and has developed into a widespread phenomenon (Katz, 2003; Kuratko, 2005). However, there are different types of entrepreneurship education targeted toward particular stages of development (Bridge, O'Neill, & Cromie, 1998; Gorman, Hanlon, & King, 1997; McMullan & Long, 1987). Scholars have enumerated various types of entrepreneurship education, which are targeted toward specific audiences (Jamieson, 1984; Liñán, 2004).<sup>3</sup> For example, education for awareness is for students who had no experience of starting a business. The purpose of the entrepreneurial awareness education is to allow students to develop entrepreneurial skills, and to assist them in choosing a career (Liñán). Most university-level programs are intended to increase entrepreneurial awareness and to prepare aspiring entrepreneurs (Garavan & O'Cinneide, 1994; cf. Weber, 2011). In this analysis, the arguments that we have developed are based on entrepreneurship education engendering greater awareness for students who had not already decided which career to pursue (e.g., employment versus entrepreneurship) or who had not experienced starting their own businesses prior to enrolling in entrepreneurship courses.

## **The Main Effects of Entrepreneurship Education on Entrepreneurial Intentions**

The literature has identified two theoretical perspectives that argue that entrepreneurship education is positively related to entrepreneurial intentions: (1) human capital theory (Becker, 1975) and (2) entrepreneurial self-efficacy (Chen, Greene, & Crick, 1998).

First, entrepreneurship scholars have viewed human capital as a determinant of entrepreneurial intentions (Davidsson & Honig, 2003). We define it as "the skills and knowledge that individuals acquire through investments in schooling, on-the-job training,

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2. For example, Douglas and Shepherd (2002) said that no actual entrepreneurship will occur without sufficient opportunities and required funding even if there are the strongest entrepreneurial intentions.

3. For example, Jamieson (1984) mentioned three types of entrepreneurship education: (1) education for awareness, (2) preparation for aspiring entrepreneurs, and (3) management training for existing entrepreneur. Similarly, Liñán (2004) identified four different types of entrepreneurship education: (1) education for awareness, (2) education for start-up, (3) entrepreneurial dynamism, and (4) continuing education for existing entrepreneurs.

and other types of experience” (Becker; Unger, Rauch, Frese, & Rosenbusch, 2011, p. 343). There may be a positive relationship between performance and human capital investment if it can be deployed to perform tasks (Becker). An entrepreneurship education may cultivate a student’s attitudes and intentions, as well as the founding of a new firm (Liñán, 2008). Martin et al. (2013) found a statistically significant relationship between entrepreneurship education and human capital outcomes, such as entrepreneurship-related knowledge and skills ( $r_w = .237$ ), a positive perception of entrepreneurship ( $r_w = .109$ ), and intentions ( $r_w = .137$ ).

Second, entrepreneurship education is associated with entrepreneurial self-efficacy, which may increase entrepreneurial intentions (Wilson, Kickul, & Marlino, 2007; Zhao, Seibert, & Hills, 2005). Entrepreneurial self-efficacy refers to a belief in one’s ability to successfully perform the various roles and tasks of entrepreneurship (Chen et al., 1998; De Noble, Jung, & Ehrlich, 1999; McGee, Peterson, Mueller, & Sequeira, 2009). It is well known as one of the triggers of entrepreneurial intentions (Chen et al.; De Noble et al.; Douglas, 2013; Fitzsimmons & Douglas, 2011; Krueger et al., 2000; Scott & Twomey, 1988; Segal, Schoenfeld, & Borgia, 2007; Wang, Wong, & Lu, 2002). Also, entrepreneurship education could enhance entrepreneurial self-efficacy because it is associated with four of its determinants, which are (1) enactive mastery, (2) vicarious experience, (3) verbal persuasion, and (4) emotional arousal (Bandura, 1982, 1986). As students enroll in entrepreneurship education, they are exposed to examples of successful business planning or proactive interaction with successful practitioners (e.g., Honig, 2004). These pedagogical elements facilitate coping strategies, which help maintain motivation and interest, leading to greater expectations of success (Stumpf, Brief, & Hartman, 1987) and increased entrepreneurial self-efficacy (Zhao et al.). Recently, Chen (2010) found that entrepreneurial self-efficacy was a positive mediator of the relationship between entrepreneurship education and entrepreneurial intentions, although mediation testing is beyond the scope of this study. The above arguments lead to the following hypothesis:

**Hypothesis 1a:** Entrepreneurship education is positively associated with entrepreneurial intentions.

### **The Business Education–Entrepreneurial Intentions Relationship**

An understanding of the entrepreneurship education–entrepreneurial intentions relationship requires an understanding of business education because it could be a more effective driver of entrepreneurial intentions. Entrepreneurship education is assumed to enhance an “awareness of entrepreneurship as an alternative career path to employment” (Slavtchev, Laspita, & Patzelt, 2012, p. 3), whereas business education assists students to work at established companies (Grey, 2002). It is reasonable that entrepreneurship education is more strongly related to entrepreneurial intentions than business education because the former is better adapted for the development of entrepreneurial skills and knowledge. For example, entrepreneurship education offers courses in new business development or business planning, which may promote a student’s employment prospects and propensity for risk taking. In addition, entrepreneurship education is particularly concerned with attitudes, intentions, and the firm creation process (Liñán, 2008). However, business education usually provides technical knowledge for business administration and does not emphasize the creation process of an organization (Liñán), all of which is consistent with entrepreneurship graduates being three times more likely than non-entrepreneurship graduates to start new business ventures (Charney & Libecap,

2000). Davidsson (1995) also demonstrated that although business education is associated with perceived know-how, it does not impact entrepreneurial intentions, which caused him to conclude that its purpose was to train students to be employed by large firms. In light of the different foci of entrepreneurship education and business education, we infer the following hypothesis:

**Hypothesis 1b:** The entrepreneurship education–entrepreneurial intentions relationship is stronger than the business education–entrepreneurial intentions relationship.

### **Selection Effect of Pre-Education Entrepreneurial Intentions**

There is one further possibility that could be considered in order to understand the entrepreneurship education–entrepreneurial intentions relationship, which is reverse causation. First, research on entrepreneurship education rests on the assumption that students enrolled in entrepreneurship courses are randomly selected. However, it is possible that a student who desires to be an entrepreneur would purposely enroll in entrepreneurship courses. For example, Kolvereid and Moen (1997) argued that students who want to be entrepreneurs would choose an entrepreneurship major. Many scholars have termed this choice a “self-selection bias” (Liñán, 2004; McMullan & Long, 1987; Noel, 2002). In this case, it is probable that the post-education entrepreneurial intentions are not the outcome of entrepreneurship education.

Second, the possibility of reverse causation is also informed by recent studies arguing that consideration of pre-education entrepreneurial intentions will help us understand the true relationship between entrepreneurship education and entrepreneurial intentions (Oosterbeek, Van Praag, & Ijsselstein, 2010; von Graevenitz, Harhoff, & Weber, 2010). Although entrepreneurship education in our study assumes that students do not have experience starting their own businesses, some scholars have redirected our attention to the role of beliefs prior to enrolling in entrepreneurship education (Oosterbeek et al.; von Graevenitz et al.). For example, von Graevenitz et al. demonstrate that there is a strong and positive correlation between *ex-ante* beliefs and *ex-post* intentions. In addition, changes in intentions during entrepreneurship education are less likely to occur if a student’s perceived, pre-course feasibility of launching a business is strong and consistent (e.g., negative or positive). These empirical findings show that students may not change their initial entrepreneurial intentions due to the entrepreneurship education they receive. They further imply that entrepreneurship education may simply play a selection role. Collectively, prior research implies that a student’s entrepreneurial intentions may not be determined by entrepreneurship education, but rather by prior beliefs before enrolling. Therefore, we expect that if we control for a student’s pre-education entrepreneurial intentions, the relationship between entrepreneurship education and entrepreneurial intentions will not remain. Thus, we propose following hypothesis:

**Hypothesis 1c:** When controlling for entrepreneurial intentions prior to enrolling in entrepreneurship education, the positive relationship between entrepreneurship education and post-education entrepreneurial intentions will not be different from zero.

### **Moderating Hypotheses**

Moderators can change the relationship between entrepreneurship education and entrepreneurial intentions. Therefore, investigating the effects of moderators is

also required in order to better understand why the entrepreneurship education–entrepreneurial intentions relationship is inconsistent and ambiguous. We will examine the following groups of potential moderators: (1) the attributes of the education itself, (2) an individual’s background, (3) contextual factors, and (4) operationalization of entrepreneurship education.

## **Different Aspects of Entrepreneurship Education as Moderators**

***Duration of Entrepreneurship Education.*** Schools usually offer entrepreneurship education in either a semester or a workshop format, which uses “teaching methods that divide students in groups for a short period of time” (Chiang & Tomimatsu, 2011, p. 47). Education in a semester format typically uses a fixed number of contact hours spread over more than 30 sessions. A workshop offering the same contact hours would need to meet more hours each day, for a number of days, to achieve the same coverage. The main difference is the absorption time between class meetings. Absorption time falls into two categories. First, distributed practice is “interrupting practice or study time with rest intervals of up to 24 hours or longer” (Bloom & Shuell, 1981, p. 245). Second, in massed practice, “a person may spend an hour studying some material, but this hour might occur all at one time or it might occur as three 20-minute study periods on each of three consecutive days” (Bloom & Shuell, p. 245). Entrepreneurship workshops tend to be massed practice, whereas entrepreneurship education in a semester format tends to be distributed practice. Previous research found that distributed practice could help students to remember and retain new materials, and affect learning (Bloom & Shuell; Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006). Thus, students who enroll in entrepreneurship education in a semester format, rather than in a workshop, will have more time between classes to understand and memorize materials. As such, we argue that when entrepreneurship education is taught in a semester format, students will be able to absorb more learning. Consequently, we propose:

**Hypothesis 2:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger in entrepreneurship education in a semester format than in an entrepreneurship education workshop.

***Specificity of Entrepreneurship Education.*** Several different pedagogical designs for entrepreneurship education have been used ranging from business plans to venture creation (cf. Kuratko, 2005). In general, business planning is the primary vehicle used by the majority of courses and programs (Honig, 2004). The process of learning how to draft a business plan is intended to instill the knowledge and skills to strengthen one’s entrepreneurial intentions (e.g., cf. Becker, 1964; Fayolle, Gailly, & Lassas-Clerc, 2006a; von Graevenitz et al., 2010; Youndt, Subramaniam, & Snell, 2004). In addition, many universities provide entrepreneurship education with a venture creation focus (Lee, Chang, & Lim, 2005). The venture creation courses teach students to take practical steps to create a venture, or a mini company in class (e.g., Rodrigues, Dinis, do Paço, Ferreira, & Raposo, 2012), as well as to develop student skills in a multi-functional implementation process (Liñán, 2007).

Some education scholars argue that formal training by abstraction is of little use unless there is apprenticeship training (Brown, Collins, & Duguid, 1989). David Birch, a business guru, also supports this argument. In his view, critical entrepreneurial skills such



as managing people are not learned through writing business plans.<sup>4</sup> In academia, Minniti and Bygrave (2001) also point out the importance of learning-by-doing, saying it involves “repetition and experimentation that increases [an] entrepreneur’s confidence in certain actions and improves the content of his stock of knowledge” (p. 7). Viewed as a learning-by-doing experience, entrepreneurship education emphasizing venture creation will provide students with a more practical experience, as well as skills in creating ventures than will one using business planning.<sup>5</sup> Thus, we hypothesize:

**Hypothesis 3:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger when entrepreneurship education focuses on venture creation than when it focuses on business planning.

## Individual Difference as Moderators

**Gender.** Men have higher entrepreneurial intentions than women (Chen et al., 1998; Scherer, Brodzinski, & Wiebe, 1990; Zhao et al., 2005); however, the impacts of entrepreneurship education on entrepreneurial intentions may not be as effective for men as for women. According to social role theory (Eagly, 1987), gender-based expectation leads both men and women to pursue gender-stereotype occupations, which is also consistent with the perspective that “women more likely limit their career aspirations due to the perceived lack of necessary skills” (Bandura, 1992; cf. Weber, 2011, p. 67). Therefore, it is possible that entrepreneurship education will be more helpful for women to strengthen their skills and increase their entrepreneurial intentions relative to men. Wilson et al. (2007) refer to entrepreneurship education as an “equalizer.”

On the other hand, because gender-based expectations attract men to male-typical professions including entrepreneurial careers, we expect that the perceived knowledge gap for entrepreneurship is narrower for men than for women (BarNir, Watson, & Hutchins, 2011; Williams & Subich, 2006).<sup>6</sup> Thus, entrepreneurship education is less likely to help men form their entrepreneurial intentions via lowering the constraints of knowledge for entrepreneurship. Although there are no universally accepted gender differences for the entrepreneurship education–entrepreneurial intentions relationship, pertinent research supports the above-mentioned arguments (Chowdhury & Endres, 2005; Cox, Mueller, & Moss, 2002; Wilson et al., 2007). In sum, we expect that there is “lower neediness of entrepreneurial education for men” (Haus, Steinmetz, Isidor, & Kabst, 2013). Thus, we offer the following hypothesis:

**Hypothesis 4:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be weaker in males than in females.

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4. He argued that entrepreneurs need to master three skills: (1) selling, (2) managing people, and (3) creating a new product or service.

5. According to Rasmussen and Sørheim (2006), there are many action-oriented programs, emphasizing learning by doing. They review five Swedish universities’ action-based entrepreneurship programs. For example, Chalmers University of Technology in Gothenburg facilitates a program in which students are highly involved in the start-up process, team composition, and venture formation.

6. Although some scholars argue that there is little gender differences in entrepreneurship, other scholars still suggest that substantial differences such as perspectives (Brush, 1992) and psychological traits (Sexton & Bowman-Upton, 1990) still exist. Wilson et al. (2007, p. 402) argue that “entrepreneurship may still be perceived as a ‘male’ field.”

**Entrepreneurial Family Background.** Entrepreneurial family background refers to those people whose parent(s) or family member(s) is (are) involved in self-employment. Parents, as business owners, can influence their children's entrepreneurial career choices by serving as role models (Aldrich, Renzulli, & Langton, 1998; Hout & Rosen, 1999), providing a chance for their children to acquire human capital (Lentz & Laband, 1990), sharing a similar preference for entrepreneurial activities (Fairlie, 2002), and transferring financial capital (Dunn & Holtz-Eakin, 2000).

Despite the motivational benefits of an entrepreneurial family background for forming a student's career path, Zellweger, Sieger, and Halter (2011) indicated that entrepreneurship education is less likely to enhance the entrepreneurial intentions of students who come from such backgrounds. First, students from an entrepreneurial family are more likely than those without a similar background to access the critical resources and social networks. Because they are more likely to be able to gain access to these valuable inputs, it reduces their necessities of additional inputs from entrepreneurship education. Second, it is possible that students from an entrepreneurial family background could interpret the materials offered by entrepreneurship education more critically than those from a non-entrepreneurial family. This is because early exposure to entrepreneurship provides people from an entrepreneurial family background with indirect experience about the difficulties of being an entrepreneur. Thus, entrepreneurship education may be less effective on entrepreneurial intentions for students from an entrepreneurial family than for students without an entrepreneurial family background. Therefore, we hypothesize:

**Hypothesis 5:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be weaker in people from an entrepreneurial family background than for those who do not come from one.

## Cultural Contexts as Moderators

Beyond educational attributes and individual differences as moderators, we are also interested in investigating the extent to which the relationship between entrepreneurship education and entrepreneurial intentions is influenced by culture, defined as "the values, beliefs and assumptions learned in early childhood that distinguish one group of people from another" (Newman & Nollen, 1996, p. 754). In this section, we examine the impact of four cultural dimensions on the entrepreneurship education–entrepreneurial intentions relationship. These dimensions are (1) power distance, (2) in-group collectivism, (3) gender egalitarianism, and (4) uncertainty avoidance, which are four out of nine dimensions in the GLOBE study (House, Hanges, Javidan, Dorfman, & Gupta, 2004).<sup>7</sup> We highlight these four cultural dimensions for several theoretical reasons. First, building on social learning theory (Bandura, 1977), we identified the two potential dimensions for entrepreneurship education: (1) the transmission of the information/value from teachers to students (Pekrun, 2000) and (2) the influences of peers (Falck, Heblich, & Luedemann, 2012). Based on this conceptualization, we believe that power distance and in-group collectivism will moderate the relationship between entrepreneurship education and entrepreneurial intentions. For example, differences of social hierarchy between teacher and student due to power distance culture can influence how students accept and incorporate

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7. The nine dimensions from the Global Leadership and Organizational Behavior Effectiveness (GLOBE) Research Project are assertiveness, institutional collectivism, in-group collectivism, future orientation, gender egalitarianism, humane orientation, performance orientation, power distance, and uncertainty avoidance.



new information about entrepreneurship. In addition, variations on peer relationship in accordance with the level of in-group collectivism also can affect the effects of entrepreneurship education on entrepreneurial intentions.

Second, we identified two social dimensions that may shape a student's views of entrepreneurship (Lüthje & Franke, 2003). These views may also determine a student's entrepreneurial intentions before and after enrolling in entrepreneurship courses. These social dimensions are: (1) perception of uncertainty (Campbell, 1992) and (2) societal gender inequality (Wilson, Kickul, Marlino, Barbosa, & Griffiths, 2009). The perception of uncertainty in a certain society serves as a barrier to entrepreneurship (De Noble et al., 1999) that can also generate the variation in entrepreneurship education and entrepreneurial intentions relationship. Similarly, gender inequality influences a person's expectations about his or her choice of self-employment, which suggests that students could hold different perceptions about entrepreneurship (Wilson et al.). Hence, we examine the interaction between entrepreneurship education and two cultural dimensions—uncertainty avoidance and gender egalitarianism—on entrepreneurial intentions. Collectively, we selected four cultural dimensions. Those are also similar to ones based on them, which were widely used to understand entrepreneurial intentions (e.g., Busenitz & Lau, 1996; Liñán & Chen, 2009; Mitchell, Smith, Seawright, & Morse, 2000; Shinnar, Giacomini, & Janssen, 2012).<sup>8</sup>

**Power Distance.** Power distance is the degree to which individuals accept power (House et al., 2004). For example, those with high power distance expect there to be a social hierarchy in relationships. Students in low power distance countries are more likely to engage in discussion and challenge a teacher's authority based on their own experience (Barmeyer, 2004; Holtbrügge & Mohr, 2010). On the other hand, students in a high power distance culture avoid trying to reduce the power distance between teachers and students. In a high power distance society, teachers are ranked higher than students, and lessons are less likely to be arguable because students tend to *avoid being critical of teachers* (Hofstede, 1986, 2001; Joy & Kolb, 2009). Consequently, we can expect that when students in high power distance countries enroll in entrepreneurship education, they will accept the authority of entrepreneurship educators. Thus, it is reasonable to hypothesize that the relationship between entrepreneurship education and entrepreneurial intentions is stronger when the individuals are in a society with a high power distance culture.

**Hypothesis 6a:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger in high power distance countries than in low power distance countries.

**In-Group Collectivism.** In-group collectivism refers to “the degree to which individuals express pride, loyalty and cohesiveness in their organizations or families” (House et al., 2004, p. 12). Brewer and Venaik (2011) interpreted in-group collectivism as “family collectivism” because it is correlated with the strength of family ties and respect for family and friends (p. 440). Building on this relationship perspective, we expect that students in a culture stressing higher in-group collectivism would likely show a higher

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8. According to prior research, high power distance (PDI+), high individualism (IDV+), high masculinity (MAS+), and low uncertainty avoidance (UAI-) will prime a favorable climate that leads to entrepreneurial intentions.

level of entrepreneurial intentions than those in a culture with lower in-group collectivism, when they enroll in entrepreneurship education. The main reason is that in-group collectivism can amplify the *consensus with their cohort* because of its association with an accepted social norm (Liñán & Chen, 2009), connectedness, and relationships with others in the cohort (cf. Cousins, 1989; Singelis, 1994). Thus, if entrepreneurship is taught in classrooms, we can expect greater entrepreneurial intentions, especially when a classroom is part of a culture with greater in-group collectivism. Students in a higher in-group collectivistic culture are unlikely to contradict a class consensus, whereas students in a lower in-group collectivistic culture will be more likely to agree with decisions based on their individual understandings (Auyeung & Sands, 1996; Manikuttu, Anuradha, & Hansen, 2007). Therefore, we hypothesize:

**Hypothesis 6b:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger in high in-group collectivistic countries than in low in-group collectivistic countries.

**Gender Egalitarianism.** Gender egalitarianism is the “degree to which an organization or a society minimizes gender role differences while promoting gender equality” (House et al., 2004, p. 12). Gender egalitarianism can influence the extent to which women are represented equally in the labor force (Emrich, Denmark, & Den Hartog, 2004). In countries with a high gender egalitarian culture, entrepreneurship offers essentially the same perceived career opportunities to both men and women. On the other hand, in countries with a low gender egalitarian culture, there would be socially constructed gender differences in entrepreneurship. We argue that a positive entrepreneurship education and entrepreneurial intentions relationship will become stronger in low gender egalitarianism countries than it will in high gender egalitarian countries. We draw this inference based on the supposition that entrepreneurship education can *mitigate students’ unequal perceptions* of entrepreneurship, which may be rooted in low gender egalitarian countries. This mitigation can be achieved by helping students to re-conceptualize entrepreneurship as a career choice that is equally available to both genders via entrepreneurship education, especially in low gender egalitarian cultures.

**Hypothesis 6c:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger in low gender egalitarianism countries than in high gender egalitarianism countries.

**Uncertainty Avoidance.** Uncertainty avoidance signifies a lack of tolerance for uncertainty. It is “the extent to which the members of an organization or a society strive to avoid uncertainty by relying on established social norms, rituals, and bureaucratic practices” (House et al., 2004, p. 11). Low uncertainty avoidance is associated with risk taking and pioneering achievement, whereas high uncertainty avoidance is more relevant to a higher fear of failure, lower levels of ambition, and less willingness to take risks (Hofstede, 1980). When students enroll in entrepreneurship education, they recognize the uncertain nature of entrepreneurship much more than before. Once students *recognize the uncertainty* in entrepreneurship, they could become less interested in entrepreneurship, particularly in high uncertainty avoidance cultures. In such cultures, breaking rules is viewed as dangerous (House et al.), and students are reluctant to perceive ambiguity. Thus, the entrepreneurship education–entrepreneurial intentions relationship becomes stronger in countries with low uncertainty avoidance than it does in those with high uncertainty avoidance. These arguments lead to the following hypothesis:

**Hypothesis 6d:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger in low uncertainty avoidance countries than in high uncertainty avoidance countries.

### **Operationalization of Entrepreneurship Education as a Moderator**

We use operationalization of entrepreneurship education as a methodological moderator. We noted that some of the primary studies operationalized entrepreneurship education as a binary variable (i.e., providing entrepreneurship education to participants versus not providing it to participants), whereas other primary studies measured it as a continuous variable that is an assessment of effectiveness of entrepreneurship education. For example, participants were asked to evaluate their perceived support of entrepreneurship education (e.g., Lanero, Vázquez, Gutiérrez, & García, 2011).

We anticipate that the entrepreneurship education–entrepreneurial intentions relationship would be higher when studies asked participants to self-report both entrepreneurship education and entrepreneurial intentions. We surmise that this would be due to common method variance, which refers to “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879). Scholars suggested that using self-reports to measure both a predictor and a criterion could inflate the correlations between them due to common method variance (Campbell & Fiske, 1959; Morgeson et al., 2007; Podsakoff, MacKenzie, & Podsakoff, 2012). All the primary studies that measured students’ perception on entrepreneurship education’s effectiveness in our meta-analysis used self-report evaluations of both entrepreneurship education and entrepreneurial intentions from the same individuals. This *common rater effect* could inflate the correlation between entrepreneurship education and entrepreneurial intentions. Thus:

**Hypothesis 7:** The positive relationship between entrepreneurship education and entrepreneurial intentions will be stronger when entrepreneurship education is an assessment variable than when entrepreneurship education is a binary variable.

## **Methods**

### **Identifying Samples for Testing**

To ensure that our search was exhaustive, we performed a comprehensive survey of the literature using the following approaches. First, we searched using electronic databases including EBSCO host Database (Academic Search Complete and Business Source Complete), JSTOR, ABI/Inform, ProQuest Dissertations and Theses, Social Science Index Citation, Science Direct, Web of Science, and Google searching. Second, we searched management and entrepreneurship journals, such as *Academy of Management Journal*, *Strategic Management Journal*, *Organization Science*, *Management Science*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, *Journal of Small Business Management*, *Journal of Applied Psychology*, and *Journal of Management*. Third, we searched major management and entrepreneurship conference proceedings, such as Frontiers of Entrepreneurship Research, Academy of Management Proceedings, United States Association for Small Business and Entrepreneurship, and Southern Management Association. Fourth, we identify unpublished papers and working papers. Fifth, we snowball sampled several key articles (e.g., Bird, 1988; Krueger & Brazeal,

1994; Krueger et al., 2000).<sup>9</sup> We found that almost all relevant articles searched via snowball sampling were captured by our primary search outlined in the first four steps, which assured us that our search was exhaustive.

### Selection and Exclusion Criteria

We specified the following inclusion criteria (Hunter & Schmidt, 2004). First, to understand the roles played by entrepreneurship education, we used key words, such as entrepreneurship training, entrepreneurship program, and entrepreneurship curriculum. Because we compared the impact of entrepreneurship education and business education on entrepreneurial intentions, we searched for articles about business education and entrepreneurial intentions. Business education only refers to general majors in business schools, such as economics, accounting, and finance. In addition, we used the same methods to search for key words, such as business training and program. We categorized studies using entrepreneurship education/training/program as entrepreneurship education. We coded business education separately.

Second, to locate articles on entrepreneurial intentions, we searched for ones using key words, such as entrepreneurial intention, or willingness to start a venture in the future. In addition, some articles examined the relationship between entrepreneurship education and perceived feasibility and desirability. Although perceived feasibility and desirability are highly correlated with entrepreneurial intentions (Krueger et al., 2000; Shapero, 1982), these two constructs were actually the antecedents of entrepreneurial intentions. Thus, we excluded studies only using perceived desirability and feasibility, which did not provide a direct correlation between entrepreneurship education and entrepreneurial intentions. In this study, we used a total of 73 studies with 74 samples, resulting in a sample size of 37,285 individuals (Table 1).

### Variable Coding Procedures

***Entrepreneurship Education Attributes.*** We differentiated between studies using a semester versus workshop format. In addition, we created two groups based on whether a primary study provided students with a venture creation course or a business planning course.

***Gender.*** We coded gender (the percentage of males) by employing 50% as a cutoff point to divide the studies into male-dominated or female-dominated studies.

***Entrepreneurial Family Background.*** Regarding entrepreneurial family background (the percentage of people who come from entrepreneurial family backgrounds), we used a median split to allocate high and low groups.<sup>10</sup>

***Cultural Values.*** We employed GLOBE's societal cultural practices because they measure how things were in a specific country (Hanges & Dickson, 2004). The items assessing the societal cultural practices were based on a 7-point Likert scale (Javidan,

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9. For snowball sampling, we reviewed the reference list of selected key articles as well as the papers or books that cited selected key articles in order to identify additional studies.

10. The median split for the percentage of people who have entrepreneurial family background was 38%.

Table 1

List of Studies Included in Meta-Analysis

Entrepreneurship Education										Business Education		
ID	Author(s) (year)	Sample size	$\alpha^{\dagger}$	$\alpha^{\ddagger}$	Duration	Specificity	Gender (% of male)	Family (% of subjects with an entrepreneurial family)	Country	Author(s) (year)	Sample size	$\alpha^{\S}$
1	Ahmed et al. (2010)	276			Semester	—	66%	—	Pakistan	Bhandari (2006)	100	
2	Almobaireek and Manolova (2012)	949			—	—	62.84%	—	Saudi	Grant (1996)	181	.930
3	Aslam, Awan, and Khan (2012)	197		.870	Semester	—	63.45%	—	Pakistan	Douglas and Shepherd (2002)	300	
4	Athayde (2009)	249			—	—	49%	40.16%	UK	Ertuna and Gurel (2011)	917	
5	Azhar, Javadi, Rehman, and Hyder (2011)	320	.880	.850	Semester	—	61.25%	—	Pakistan	Farrington, Venter, and Louw (2012)	439	
6	Basu (2010)	231		.740	—	—	64.40%	46%	Various countries	Franco, Haase, and Lautenschläger (2010)	980	
7	Brown, Bowlus, and Seibert (2011)	454		.860	Semester	—	—	—	US	Franke and Lüthje (2004)	850	
8	Byabashajja and Katono (2011)	167		.720	Semester	—	—	—	Uganda	Göksel and Aydinan (2011)	175	.923
9	Chen (2010)	327	.770	.840	—	—	46.48%	—	China	Hassan and Wafa (2012)	746	
10	De Clercq, Honig, and Martin (2013)	946		.880	Semester	—	38.40%	62.60%	Canada	De Jorge-Moreno, Castillo, and Triguero (2012)	426	
11	Dohse and Walter (2010)	1,949		.810	Semester	Business planning	100%	28%	Spain	Lans, Gulikers, and Batterink (2010)	102	
12	Ekpe and Mat (2012)	120	.630	.710	—	—	0%	—	Nigeria	Moi, Adeline, and Dyana (2011)	787	.725
13	Evans (2009)	111	.840	.770	—	—	23%	—	US	Schwarz, Wdowiak, Almer-Jarz, and Breitenecker (2009)	2,124	
14	Fayolle et al. (2006a)	144		.860	Workshop	Business planning	—	62.50%	France	Wang, Wong, and Lu (2001)	7,144	
15	Fayolle et al. (2006b)	20	.760		Workshop	—	—	—	France			
16	Florin, Karri, and Rossiter (2007)	220			Semester	Business planning	68.64%	—	US			
17	Gerba (2012)	156			Semester	—	58%	16%	Ethiopia			
18	von Graevenitz et al. (2010)	196			Semester	Business planning	44.90%	40.30%	German			

Table 1

Continued

Entrepreneurship Education										Business Education		
ID	Author(s) (year)	Sample size	$\alpha^{\dagger}$	$\alpha^{\ddagger}$	Duration	Specificity	Gender (% of male)	Family (% of subjects with an entrepreneurial family)	Country	Author(s) (year)	Sample size	$\alpha^{\S}$
19	Hamidi, Wennberg, and Berglund (2008)	78			Semester	—	54%	49%	Sweden			
20	Hanke, Kisenwether, and Warren (2005)	70			Semester	—	—	—	US			
21	Huber, Sloof, and Van Praag (2012)	2,360			Semester	—	49.70%	22.70%	Dutch			
22	Ismail et al. (2009)	123			Semester	—	22%	28.46%	Malaysia			
23	Karimi, Biemans, Lans, Mulder, and Chizari (2012)	205		.850	Semester	—	42%	—	Iran			
24	Keat, Selvarajah, and Meyer (2011)	417	.811	.802	—	—	32.90%	35.50%	Various countries			
25	Kolvereid and Moen (1997)	278		.750	Semester	Venture creation	62%	—	Norway			
26	Lanero et al. (2011)	800	.732	.713	Semester	—	33.80%	—	Spain			
27	Lee et al. (2005)	160			Semester	Venture creation	—	—	US			
28		217			Semester	Venture creation	—	—	Korea			
29	Lee, Lim, Pathak, Chang, and Li (2006)	392			Semester	—	—	—	Various countries			
30	Lee, Lim, Lim, Ng, and Wong (2012)	200	.854	.904	—	—	37.50%	43%	Malaysia			
31	Liñán (2004)	166			Semester	—	56.60%	—	Spain			
32	Lorz et al. (2011)	272		.943	Semester	—	35.80%	—	German South			
33	Malebana (2012)	355		.903	Semester	—	32.20%	—	Africa			
34	Marques, Ferreira, Gomes, and Rodrigues (2012)	202			Semester	—	—	—	Portugal			
35	McStay (2008)	429		.800	Semester	—	—	—	Australia			
36	Miller, Bell, Palmer, and Gonzalez (2009)	232		.660	Semester	Business planning	61.15%	—	US			
37	Mo (2011)	110			Semester	—	—	—	China			



38	Moberg (2012)	724		Semester	—	46.96%	25%	Denmark
39	Mohamed, Reza, Shamsudin, and Mahmud (2012)	410		Semester	—	—	46.70%	Malaysia
40	Muofhe and du Toit (2011)	269	.810	Semester	—	—	—	South Africa
41	Noel (2002)	39		Semester	—	55%	—	US
42	Olomi and Sinyamule (2009)	508		Semester	—	59.45%	—	Tanzania
43	Oosterbeek et al. (2010)	250		—	—	55.20%	33.20%	Dutch
44	do Paço, Ferreira, Raposo, Rodrigues, and Dinis (2011)	74	.790	—	—	52.70%	—	Portugal
45	Pruett (2012)	105		Workshop	—	—	55%	US
46	Radu and Loué (2008)	44		Workshop	—	—	—	France
47	Raposo, Ferreira, do Paço, and Rodrigues (2008)	316		Semester	—	47.50%	—	Portugal
48	Rodrigues et al. (2012)	48		Workshop	Venture creation	—	—	Portugal
49	Romero, Petrescu, and Balala (2011)	191		Semester	Venture creation	32.98%	—	Various countries
50	Sánchez (2011)	864	.750	Semester	Business planning	35.80%	23%	US
51	Sandhu, Jain, and Yusof (2010)	234		—	—	32.50%	—	Malaysia
52	Shariff et al. (2010)	22	.928	Semester	Business planning	—	—	Malaysia
53	Soutaris, Zerbiniati, and Al-Laham (2007)	250	.750	Semester	Business planning	—	—	Various countries
54	Turker and Selcuk (2009)	300		—	—	51%	40%	Turkey
55	Uddin and Bose (2012)	520	.886	—	—	—	—	Bangladesh
56	Varamäki, Tornikoski, Viljanmaa, and Ristimäki (n.d.)	1,204	.870	—	—	—	36%	Finland
57	Wilson et al. (2007)	933		Semester	—	56.06%	—	US
58	Wu and Wu (2008)	146	.831	—	—	63.70%	—	China
59	Zhang, Cheng, Fan, and Chu (2012)	200	.827	Semester	—	50%	28%	China
60	Zhao et al. (2005)	265	.790	Semester	—	66%	—	US

Note: 59 studies (60 independent samples) are entrepreneurship education and 14 studies are business education. Regarding reliability of entrepreneurship education as 1, we do not report it in the table.

<sup>†</sup> Reliability for entrepreneurship education.

16 studies assessed effectiveness of entrepreneurship education. Among them, 12 studies reported the reliability for entrepreneurship education. Regarding samples missing reliability of entrepreneurship education (i.e., Lee et al., 2005; Moberg, 2012; Turker & Selcuk, 2009), we imputed it by using the mean reliability of other studies providing reliabilities of entrepreneurship education. Imputed missing reliability = .813.

<sup>\*</sup> Reliability for entrepreneurial intentions.

29 studies reported reliability for entrepreneurial intentions. Regarding missing reliabilities of entrepreneurial intentions, we imputed it by using the mean reliability of other studies providing reliabilities of entrepreneurial intentions. Imputed missing reliability = .813.

<sup>‡</sup> Reliability for entrepreneurial intentions in the business education studies. Regarding missing reliabilities of entrepreneurial intentions, we imputed it by using the mean reliability of other studies providing reliabilities of entrepreneurial intentions. Imputed missing reliability = .859.

House, & Dorfman, 2004). We coded the primary studies using a median split to divide the studies into two groups.<sup>11</sup> Those above the median were the high-level group and those below median were the low-level group.<sup>12</sup>

**Operationalization of Entrepreneurship Education.** We found that some primary studies used entrepreneurship education as a binary variable, whereas other primary studies assessed the effectiveness of entrepreneurship education. Consequently, we divided the studies into these two groups.

**Study Quality.** We used two other moderators for study quality.<sup>13</sup> The first was *study design*. In general, the primary studies of entrepreneurial intentions used either a longitudinal<sup>14</sup> or a cross-sectional approach.<sup>15</sup> Thus, we divided the studies into two groups, a longitudinal group and a cross-sectional group. Second, we suspected that the *measurement of entrepreneurial intentions* could influence the quality of the entrepreneurship education–entrepreneurial intentions relationship. We found that two measures were commonly used for primary studies: one was Kolvereid (1996a, 1996b), and the other was Liñán and Chen’s (2006, 2009) entrepreneurial intention questionnaire.<sup>16</sup> We coded studies using either the Kolvereid scale group or the Liñán and Chen scale group.

**Publication Bias.**<sup>17</sup> We investigated whether the entrepreneurship education–entrepreneurial intentions relationship differs for published studies and unpublished studies. The difference between the published and unpublished studies could be due to a publication bias. We coded those published in journals as the published group. We coded conference papers, working paper, and dissertations as the unpublished group.

## Meta-Analytic Procedures

**Primary Analysis.** We performed a primary analysis following Hunter and Schmidt’s (2004) approach to meta-analysis. Meta-analysis provides two possible options for the calculation of effect sizes: the *correlation coefficient effect size* (i.e., *r*) and the *standardized mean difference effect size* (i.e., *d*) (Lipsey & Wilson, 2001). We found that most of

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11. Power distance: median split = 5.02. In-group collectivism: median split = 4.66. Gender egalitarianism: median split = 3.36. Uncertainty avoidance: median split = 4.35.

12. This approach is consistent with previous research. “This approach appears appropriate since our comparison focuses on relative differences between countries rather than absolute levels of uncertainty avoidance” (Brinckmann, Grichnik, & Kapsa, 2010, p. 32).

13. We computed intraclass correlation coefficient (ICC) (2) for inter-rater reliability for coding the articles (McGraw & Wong, 1996; Shrout & Fleiss, 1979). The reason why we chose to report ICC (2) is that we had two consistent raters code all the articles. In addition, we have a sample of raters rather than a population of raters. Two raters had perfect agreement in coding the articles and the ICC (2) statistic equaled 1.00 across all study quality variables.

14. Measuring entrepreneurial intentions before and after participants enrolled in entrepreneurship education.

15. Measuring entrepreneurial intentions once and only after participants enrolled in entrepreneurship education.

16. Kolvereid (1996a, 1996b) introduced three items to measure entrepreneurial intentions, whereas the entrepreneurial intentions questionnaire consists of six items to measure entrepreneurial intentions.

17. Publication bias refers to “the possibility that not all completed studies on a topic are published in the literature and that [those that are not published] are systematically different from published studies” (McDaniel, Rothstein, & Whetzel, 2006, p. 927). It will lead to an overestimation of effect sizes, posing a great challenge to the validity of meta-analytic reviews (Banks, Kepes, & McDaniel, 2012; Banks & McDaniel, 2011; Dickersin, 2005; McDaniel et al.; Rothstein, Sutton, & Borenstein, 2005).

the studies to be meta-analyzed used continuous entrepreneurial intentions measures and dichotomous or ordinal entrepreneurship education and business education measures. However, many recent studies conceptualized both entrepreneurship education and business education as constructs along a continuum (e.g., Azhar et al., 2011; Chen, 2010; Douglas & Shepherd, 2002; Shariff et al., 2010; Turker & Selcuk, 2009; Zhao et al., 2005). We chose  $r$  rather than  $d$  (Lipsey & Wilson). We used the effect size and the  $r$  correlation coefficient interchangeably. We converted  $d$  to  $r$  by following the procedures developed by Lipsey and Wilson.

Psychometric meta-analysis allows for the correction of artifacts that can lead to attenuation in the effect sizes (Hunter & Schmidt, 2004). One of the artifacts is measurement error. We corrected for measurement errors in both the independent and the dependent variables for each correlation. However, not all of the primary studies we located provided a reliability estimate (i.e., coefficient alpha) that would permit us to correct for measurement errors. Therefore, consistent with the approaches suggested by Hunter and Schmidt, we imputed the missing reliability for both independent and dependent variables by using the mean of the reliabilities in other studies included in our meta-analysis that reported reliabilities.<sup>18</sup> This allowed us to correct for measurement errors for each primary correlation and to calculate the corrected sample size-weighted mean correlation ( $\hat{\rho}$ ) as our estimate of the population correlation. With regard to the statistical significance of the effect sizes for the overall relationship and each subgroup, we computed a corrected 95% confidence interval for the statistical significance. The effect sizes were statistically significant when the corrected 95% confidence intervals did not include a zero.

To gauge the presence of moderators, we reported both the  $I^2$  and the credibility intervals. This approach is consistent with Geyskens, Krishnan, Steenkamp, and Cunha's (2009) recommendations, which suggested that it is desirable to adopt multiple approaches to test for heterogeneity. The  $I^2$  (Higgins, Thompson, Deeks, & Altman, 2003), which ranges from zero to one, is the percent of the variance that is not due to statistical artifacts. Once the  $I^2$  is large, we can speculate about the reasons for the variance and conduct subgroup analysis to search for moderators (Borenstein, Hedges, Higgins, & Rothstein, 2009).<sup>19</sup> If the  $I^2$  exceeds the threshold value .25 (25%), it justifies the search for moderators (Higgins et al.). We also computed a corrected 80% credibility interval to justify the presence of moderators. Whitener (1990) pointed out that a wide 80% credibility interval suggests the possible presence of moderating effects. We performed subgroup analysis<sup>20</sup> to test the moderator effects.

Some researchers have suggested that pre-education entrepreneurial intentions may account for some of the variance in post-education entrepreneurial intentions (Sánchez,

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18. Regarding the use of entrepreneurship education as a binary variable in primary studies, we keep reliability at 1.00. However, for those studies which assessed effectiveness of entrepreneurship education and did not provide reliability, we imputed a missing reliability by using the mean of the reliabilities in other studies that also assessed effectiveness of entrepreneurship education.

19. Subgroup analysis is synonymous with moderator analysis. It is used for testing the statistical significance of differences in effect sizes.

20. Subgroup analysis tests the between-group significance of the differences in effect sizes (Borenstein et al., 2009). We employed Hunter and Schmidt's (1990) approach (i.e.,  $z$ -test) to evaluate the statistical significance of the categorical and dichotomized moderator variables (i.e., the statistical significance of the between-group uncorrected effect size difference). Utilizing subgroup analysis to test moderator effects requires a sample to be divided into subsamples, which means that continuous moderator variables must be dichotomized so that we can test for the moderator effects by examining the significance of the differences in effect sizes between the subsamples (Hunter & Schmidt). We used a median split method to dichotomize the continuous moderator variables (Hunter & Schmidt; Steel & Kammeyer-Mueller, 2002).

2011; Zhao et al., 2005). To address this concern, we chose the following approaches. First, we constructed a meta-analytically derived correlation matrix. Second, in view of the fact that sample sizes differ across the cells in the correlation matrix, we calculated the harmonic mean sample size (Viswesvaran & Ones, 1995). Usage of a harmonic mean sample size yields more conservative estimates because less weight is given to large samples (Colquitt, Scott, & LePine, 2007). Third, we performed hierarchical multiple regression analyses based on the statistical information attained in the first two steps to investigate how entrepreneurship education influences post-education entrepreneurial intentions after partialing out the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions.

## Results

### Primary Analyses

**Overall Relationship.** We tabulated the results in Table 2. They were based on 73 studies, 74 samples, and a sample size of 37,285 respondents.<sup>21</sup> The overall analysis found that entrepreneurship education is positively associated with entrepreneurial intentions. The correlation after correction for measurement error was .143. Moreover, it was statistically significant as the corrected 95% confidence interval did not include zero. Thus, this result supports hypothesis 1a. We note that two of the sampled studies had large sample sizes and could have biased our meta-analytic results. Thus, we excluded these two outliers.<sup>22</sup>

To examine hypothesis 1b, our results indicated a corrected correlation of .051 between business education and entrepreneurial intentions. We performed a z-test to compare the effect size difference between the entrepreneurship education–entrepreneurial intentions relationship and the business education–entrepreneurial intentions relationship. The difference in effect sizes was statistically significant ( $p < .05$ ). Therefore, hypothesis 1b was supported.

Hypothesis 1c investigated whether the relationship between entrepreneurship education and post-education entrepreneurial intentions would not be different from zero after partialing out the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions. Table 3 displays the corrected correlation matrix. Table 4 contains the results of the hierarchical multiple regression. Entrepreneurship education was not a significant predictor of post-entrepreneurial intentions ( $\beta = .043$ ) after controlling the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions. To be specific, after pre-education entrepreneurial intentions were controlled, the part correlation (i.e., semipartial correlation) between entrepreneurship education and post-education entrepreneurial intentions became .042. Overall, this analysis shows that accounting for the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions reduces the relationship between entrepreneurship

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21. For the entrepreneurship education–entrepreneurial intentions relationship, we used 59 studies, 60 samples, and a sample size of 22,014 individuals. On the other hand, 14 studies, 14 samples, and a sample size of 15,271 individuals were used for the business education–entrepreneurial intentions relationship.

22. Albornoz, Amorós, and Pérez-Carrón (2011) had 22,165 samples, and Laspita, Breugst, Heblich, and Patzelt (2012) had 43,764 samples. We performed a series of analyses to examine whether the inclusion or exclusion of these two outliers influenced the results of our meta-analysis and publication bias analyses. We found that outliers significantly altered the effect sizes of some subgroups, influenced moderator analysis, and affected the results of the publication bias analyses. In light of the undue impact caused by the outliers, we decided to remove them from our analysis.

Table 2

Psychometric Meta-Analysis Results<sup>†</sup>

	<i>K</i>	<i>N</i>	$\bar{r}_c$	<i>SD<sub>r</sub></i>	$\hat{\rho}$	<i>SD<sub>ρ</sub></i>	<i>I</i> <sup>2</sup>	Corrected 95% CI	Corrected 80% CR	Sig. test for between group difference
Education–entrepreneurial intentions										
Entrepreneurship education	60	22,014	.129	.147	.143	.159	88.09	.101 to .186	-.060 to .346	<i>p</i> < .05
Business education	14	15,271	.047	.147	.051	.156	95.78	-.032 to .135	-.149 to .251	
Entrepreneurship education duration										
Workshop	5	361	.089	.129	.097	.058	16.58	-.028 to .221	.023 to .171	<i>p</i> < .05
Semester	40	16,321	.123	.156	.136	.170	90.39	.081 to .191	-.081 to .353	
Entrepreneurship education specificity										
Venture creation	5	894	.234	.129	.269	.137	73.02	.159 to .380	.094 to .444	<i>p</i> < .05
Business planning	8	3,877	.138	.095	.153	.098	79.02	.132 to .174	.027 to .278	
Gender (% of male) <sup>‡</sup>										
Male dominated	20	7,567	.139	.131	.154	.139	85.63	.089 to .220	-.023 to .332	<i>p</i> < .05
Female dominated	19	9,010	.079	.135	.085	.149	89.03	.013 to .156	-.106 to .275	
Entrepreneurial family (% of subjects with an entrepreneurial family) <sup>§</sup>										
High	10	2,859	.081	.181	.084	.193	89.71	-.042 to .210	-.163 to .331	<i>p</i> < .05
Low	10	8,247	.069	.111	.077	.120	90.36	-.001 to .155	-.077 to .230	
Culture (GLOBE dimensions)										
Power distance <sup>  </sup>										
High	22	7,310	.140	.095	.155	.094	70.12	.108 to .202	.035 to .275	<i>p</i> < .05
Low	19	8,864	.087	.161	.094	.175	91.96	.012 to .176	-.130 to .318	
In-group collectivism <sup>††</sup>										
High	21	6,588	.152	.107	.173	.111	75.03	.118 to .228	.031 to .316	<i>p</i> < .05
Low	21	10,161	.087	.145	.094	.155	90.41	.024 to .164	-.104 to .293	
Gender egalitarianism <sup>‡‡</sup>										
High	17	7,712	.048	.144	.053	.151	89.31	-.023 to .129	-.140 to .245	<i>p</i> < .05
Low	17	5,792	.143	.098	.162	.102	73.08	.105 to .218	.031 to .292	
Uncertainty avoidance <sup>§§</sup>										
High	22	8,688	.057	.138	.063	.143	86.73	-.001 to .127	-.120 to .246	<i>p</i> < .01
Low	21	7,645	.162	.102	.184	.110	77.34	.130 to .237	.044 to .324	

Table 2

Continued

	<i>K</i>	<i>N</i>	$\bar{r}_o$	<i>SD<sub>r</sub></i>	$\hat{\rho}$	<i>SD<sub>ρ</sub></i>	<i>I</i> <sup>2</sup>	Corrected 95% CI	Corrected 80% CR	Sig. test for between group difference
Operationalization of entrepreneurship education <sup>¶¶</sup>										
Binary	44	17,042	.105	.143	.115	.149	87.72	.068 to .162	-.076 to .306	<i>p</i> < .01
Assessment	16	4,972	.212	.130	.264	.141	81.42	.188 to .341	.084 to .445	
Study design										
Longitudinal design	18	7,434	.095	.132	.104	.138	86.55	.035 to .173	-.073 to .281	<i>p</i> < .01
Cross-sectional design	42	14,580	.147	.151	.165	.165	88.23	.112 to .218	-.046 to .375	
Entrepreneurial intentions measurement										
Liñán and Chen scale	8	1,423	.218	.145	.240	.146	76.81	.125 to .355	.054 to .426	<i>p</i> < .01
Kolvereid scale	10	4,213	.142	.110	.158	.115	81.81	.079 to .236	.011 to .305	
Publication bias										
Published	46	13,154	.167	.161	.187	.177	87.72	.146 to .227	-.039 to .413	<i>p</i> < .01
Unpublished	14	8,860	.074	.100	.083	.102	84.33	.026 to .139	-.048 to .214	

Note: *K* = number of samples; *N* = sample size;  $\bar{r}_o$  = uncorrected sample-size-weighted mean correlation; *SD<sub>r</sub>* = sample-size-weighted standard deviation of uncorrected correlations;  $\hat{\rho}$  = sample-size-weighted mean correlation; *SD<sub>ρ</sub>* = sample-size-weighted standard deviation of corrected mean correlations; *I*<sup>2</sup> = indicator of moderation; Corrected 95% CI = corrected 95% confidence interval; Corrected 80% CR = corrected 80% credibility interval; Sig. Test for Between Group Difference = the z-test for the statistical significance of moderating effect.

† All of the meta-analytic distributions of effect sizes for subgroups and the results of moderator analysis in Table 2 refer to the relationship between entrepreneurship education and entrepreneurial intentions.

Cutoff point:

‡ The percentage of male above 50% is male-dominated, and below 50% is female dominated.

§ % of subjects with an entrepreneurial family: median split = 38%.

¶ Power distance: median split = 5.02.

¶¶ In-group collectivism: median split = 4.66.

‡‡ Gender egalitarianism: median split = 3.36.

§§ Uncertainty avoidance: median split = 4.35.

¶¶ Binary means education versus no-education; assessment means entrepreneurship education is evaluated by respondents in primary studies.



Table 3

Corrected Meta-Analytic Correlation Matrix

	Pre-education entrepreneurial intentions	Entrepreneurship education	Post-education entrepreneurial intentions
Pre-education entrepreneurial intentions	—		
Entrepreneurship education	.175 (2, 515)	—	
Post-education entrepreneurial intentions	.579 (7, 2,228)	.143 (60, 22,014)	—

Note: *N* (harmonic mean sample size) = 1,232; the number of independent samples (*k*) and sample size (*N*) are shown in parentheses.

Table 4

Hierarchical Multiple Regression Analyses

	Post-education entrepreneurial intentions	
	Step 1	Step 2
	$\beta$	$\beta$
Pre-education entrepreneurial intentions	.579***	.571***
Entrepreneurship education		.043
$R^2$	.335***	.337***
$\Delta R^2$		.002

Note: *N* (harmonic mean sample size) = 1,232;  $\beta$  = standardized regression weights;  $R^2$  = coefficient of determination;  $\Delta R^2$  = incremental change in  $R^2$ ; \*\*\*  $p < .001$ .

education and post-education entrepreneurial intentions. Moreover, this relationship was not significantly different from zero. Therefore, hypothesis 1c was supported.

The  $F^2$  for the overall relationship between entrepreneurship education and entrepreneurial intentions was 88.09%. The  $F^2$  values were large and far exceeded the threshold value of 25%, which means that we were justified in conducting a moderator analysis. The corrected 80% credibility interval for the overall relationship between entrepreneurship education and entrepreneurial intentions was wide, which further confirms the need to conduct the moderator analysis.

**Moderator Analyses.** We investigated 12 potential moderators in our study. The far right column in Table 2 displays the statistical significance of the moderating effects based on z-tests. In Table 5, we tabulated all the hypotheses based on their main effects, moderator effects, methods to test the hypotheses, and whether there was supportive evidence.

Table 5

Summary of Results

Entrepreneurship education–entrepreneurial intentions	Hypotheses	Methods used	Results
Main effect:			
Overall positive	Hypothesis 1a	Meta-analysis	Support
Stronger than business education–entrepreneurial intentions relationship	Hypothesis 1b	z-test comparison	Support
Zero after controlling for pre-intentions	Hypothesis 1c	Hierarchical multiple regression	Support
Moderator: attributes of education			
Semester > workshop	Hypothesis 2	Subgroup (Category)	No support
Venture creation > business planning	Hypothesis 3	Subgroup (Category)	No support
Moderator: individual differences			
Male < female	Hypothesis 4	Subgroup (50% split)	No support
Family background < nonfamily background	Hypothesis 5	Subgroup (Median split)	No support
Moderator: cultural contexts			
High power distance > low power distance	Hypothesis 6a	Subgroup (Median split)	No support
High in-group collectivism > low in-group collectivism	Hypothesis 6b	Subgroup (Median split)	Support
Low gender egalitarianism > high gender egalitarianism	Hypothesis 6c	Subgroup (Median split)	Support
Low uncertainty avoidance > high uncertainty avoidance	Hypothesis 6d	Subgroup (Median split)	Support
Moderator: operationalization of entrepreneurship education			
Assessment > binary	Hypothesis 7	Subgroup (Category)	Support
Un-hypothesized moderators			
Study design		Subgroup (Category)	n.s.
Entrepreneurial intentions measurement		Subgroup (Category)	n.s.
Publication bias		Subgroup (Category)	sig.

n.s., not statistically significant; sig., statistically significant.

Discussion

We investigated whether entrepreneurship education promotes entrepreneurial intentions.

Overall, entrepreneurship education has a statistically significant but small positive relationship with entrepreneurial intentions. The meta-analysis indicated that the correlation between entrepreneurship education and entrepreneurial intentions was  $\hat{\rho} = .143$ . In addition, we conducted another analysis to confirm that the entrepreneurship education–entrepreneurial intentions relationship ( $\hat{\rho} = .143$ ) was greater than the business education–entrepreneurial intentions relationship ( $\hat{\rho} = .051$ ). The difference was statistically significant. Thus, we concluded that entrepreneurship education was related more positively to a participant’s entrepreneurial intentions than was business education.

To examine the possibility of reversed causal influence of entrepreneurial intention on entrepreneurship education, we hypothesized that if pre-education entrepreneurial intentions are controlled, we are not able to find the significant relationship between entrepreneurship education and entrepreneurial intentions. Based on this result, we can infer that reverse causation can explain why the effects of entrepreneurship education on entrepreneurial intentions are not strong. Although one cannot prove a null hypothesis to be true from a statistical point of view, it is important to know that the often-referenced relationship between entrepreneurship education and entrepreneurial intention is most likely due

to a selection effect from a theoretical and a practical perspective. Hence, the null hypothesis (our Hypothesis 1c) has a theoretical meaning in this case.

We tested a total of 12 potential moderators of the entrepreneurship education–entrepreneurial intentions relationship based on five categories: (1) attributes of entrepreneurship education, (2) individual differences, (3) the cultural context, (4) operationalization of entrepreneurship education, and (5) the quality of the study (un-hypothesized). The first set of moderators, possible attributes of entrepreneurship education (i.e., the duration of entrepreneurship education and the specificity of entrepreneurship education), had no significant impact on the entrepreneurship education–entrepreneurial intentions relationship. We inferred that the educational format, whether it was delivered in a semester format or in a workshop format, or whether its focus was business planning or venture creation, had little impact on changing the entrepreneurship education–entrepreneurial intentions relationship. Nor did individual student differences have significant effects on the entrepreneurship education–entrepreneurial intentions relationship. Regarding cultural context, however, the entrepreneurship education–entrepreneurial intentions relationship becomes more positively associated in (1) high in-group collectivistic countries, (2) low gender egalitarianism countries, and (3) low uncertainty avoidance countries. Last, the entrepreneurship education–entrepreneurial intentions relationship was stronger when entrepreneurship education was assessed than when it was a binary variable. It was also stronger in published papers compared with unpublished papers.

## Implications

We have conducted a meta-analysis as one form of evidence-based entrepreneurship in order to produce *good evidence* about whether entrepreneurship education was positively related to entrepreneurial intentions and under what conditions the focal relationship would be more or less effective. Evidence generated from this study not only plays a role in summarizing and highlighting the results of studying the relationship between entrepreneurship education and entrepreneurial intentions across different research projects, but it also magnifies the power of the findings by creating massive databases with multiples of statistical power that researchers can use to tease out previously undetected relationships.

**Theoretical Implications.** Despite the prolific amount of research on the entrepreneurship education–entrepreneurial intentions relationship, theoretical and empirical disagreements still remain (Honig, 2004). By conducting a meta-analytic review, we provided support for the conventional wisdom that there is a *small but positive* entrepreneurship education–entrepreneurial intentions relationship. The main finding of this study is largely consistent with Martin et al.’s (2013) meta-analysis.<sup>23</sup>

However, we extended the findings from Martin et al.’s (2013) in three ways. First, we have highlighted evidence that entrepreneurship education is a comparatively more effective pedagogical tool for enhancing a student’s entrepreneurial intentions than is business education. Second, our research demonstrated that entrepreneurship education was not

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23. Martin et al.’s (2013) meta-analysis produced a correlation of .137 between entrepreneurship education and training and entrepreneurial intention based on 19 samples. Our meta-analysis, which was based on 60 samples, yielded an uncorrected correlation of .129 and a corrected correlation of .143. The correction for measurement errors does not substantially improve the effect size, which is only enhanced by .014. In fact, regardless of this correction, the effect sizes remain nearly identical between the Martin et al.’s study and ours.

significantly associated with post-course entrepreneurial intentions if we considered a student's pre-course entrepreneurial intentions. This result was important and consistent with prior research that has suggested that pre-education entrepreneurial intentions might account for some of the variance in post-education entrepreneurial intentions (Sánchez, 2011; Zhao et al., 2005). It also indicated that pre-course entrepreneurial intentions appeared to be a major source of inconsistent results in previous research. This result also allowed us to offer *selection-based explanations*. Although *treatment-based explanations* argued that some features of entrepreneurship education could change a student's entrepreneurial intentions, selection-based explanations suggested that post-course entrepreneurial intentions could result from the process of sorting students by pre-course entrepreneurial intentions.

Third, both Martin et al.'s (2013) study and ours indicated that after accounting for sampling error and statistical artifacts, a residual variance still remains.<sup>24</sup> This indicates that there is a substantial variation across effect sizes, which may be attributed to moderators. Consequently, we examined further the moderators of the relationship between entrepreneurship education and entrepreneurial intention.

We tested two modes of entrepreneurship education: (1) a semester versus workshop format and (2) a business planning versus venture creation format, which we considered as possible moderators; however, we did not find significant moderating effects from these two educational attributes of the entrepreneurship education–entrepreneurial intentions relationship. We also found non-significant effects for two individual differences: (1) gender and (2) entrepreneurial family background. In our study, the format of entrepreneurship education and individual demographic differences neither enhanced nor diminished a student's entrepreneurial intentions, perhaps due to the complex nature of the entrepreneurial intentions construct (Douglas, 2013).

In contrast, we found that three cultural dimensions played a significantly positive role in the entrepreneurship education–entrepreneurial intentions relationship. A high in-group collectivistic culture, a low gender egalitarianism, and a low uncertainty avoidance culture reinforced the effects of entrepreneurship education on entrepreneurial intentions. These findings demonstrated that the effects of entrepreneurship education on entrepreneurial intentions could vary across national cultures. It also lent support to the idea that the inconsistent effects of entrepreneurship education on entrepreneurial intentions across the individual studies might have come from the moderators.

Regarding the significant subgroup effect size difference, which was due to differences in the operationalization of entrepreneurship education, we found that the increased correlation between entrepreneurship education (the assessment of entrepreneurship education's effectiveness) and entrepreneurial intentions was likely due to common method variance. The correlation between entrepreneurship education and entrepreneurial intentions was inflated by a *common rater effect*.

We also found that the publication bias in the meta-analysis was due to a significant effect size difference between the published studies and the unpublished studies, with a stronger entrepreneurship education–entrepreneurial intentions relationship reported in the published studies than the unpublished studies. These results suggested that some scholars might not have wanted to publish their results, especially (1) if they were statistically insignificant and/or they had a small effect size; (2) if they were contrary to theory and/or the trend of past research (Banks & McDaniel, 2011); and (3) if they went

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24. Martin et al.'s (2013) study only accounted for sampling error and ours considered both sampling error and measurement error.

against the common biases of professors from business schools who wanted to maintain their place in entrepreneurship education. Publication bias was cited as an “antagonist of effective policymaking” (Banks, Kepes, & Banks, 2012) and the “kryptonite of evidence-based practice” (Banks & McDaniel). It has required substantial effort and collaboration from the scientific community to deal with it. Recent literature has proposed a number of recommendations to address the issue of publication bias (Banks & McDaniel; Kepes, Banks, McDaniel, & Whetzel, 2012).

**Practical Implications.** The evidence-informed knowledge in this study also had important practical implications. Despite the overall *small but positive* effects of entrepreneurship education on entrepreneurial intentions, educators, policy makers, and program evaluators should pay attention to the fact that we found no significant effects for entrepreneurship education on entrepreneurial intentions when we controlled for pre-course entrepreneurial intentions. Our finding suggested the importance of carefully controlling the influence of any variable that could impact the effectiveness of entrepreneurship education prior to testing its effect. Otherwise, these factors could condition the result to suggest greater variance in the effectiveness of entrepreneurship education than actually exists.

Pre-education entrepreneurial intentions also have important implications for a student’s post-education entrepreneurial intentions. From our results, intentions may be much more stable than previously thought. According to Table 4, there is high correlation between pre- and post-education entrepreneurial intentions. This relationship does not change much with the addition of entrepreneurship education. This suggests that entrepreneurship education needs to be improved and much more targeted if the goal is to change entrepreneurial intentions.

From an evaluation standpoint (Mark, Donaldson, & Campbell, 2011; Scriven, 1991), entrepreneurial intentions might not be a valid construct to evaluate the true merit, worth, or significance of entrepreneurship education programs.<sup>25</sup> We found that there was little effect of entrepreneurship education on entrepreneurial intentions. Except for cultural contexts, many other moderators did not account for the problem of a very small relationship between entrepreneurship education and entrepreneurial intentions, which suggest that policy makers or program evaluators ought to identify other criteria for evaluating the effects of entrepreneurship education. For example, entrepreneurial knowledge and skills, real behavior, or performance would be better constructs rather than entrepreneurial intentions.

## Limitations

The primary limitation of this research was that unlike the Martin et al.’s (2013) study, it did not examine a dependent variable related to venture performance. It would have been preferable to study venture performance or the actual number of start-ups as the dependent variable. This would have been a truer measure of the effectiveness of entrepreneurship education. Using such variables was outside the scope of this research. Instead, we used entrepreneurial intentions.

Second, we focused exclusively on entrepreneurial intentions. However, entrepreneurial intentions are also influenced by other antecedents. For example, many studies

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25. Evaluation is defined as “the systematic determination of the merit, worth, or significance of something” (Mark et al., 2011, p. 7; Scriven, 1991).

investigating the relationship between entrepreneurship education and entrepreneurial intentions have adopted the theory of planned behavior (Ajzen, 1985; Ajzen & Fishbein, 1980) or Krueger et al.'s (2000) two-factor model, which postulates that entrepreneurial intentions are influenced by a combination of three major factors: (1) attitude toward outcomes, (2) perceived social norms, and (3) perceived behavioral control (Ajzen; Ajzen & Fishbein), or two factors: perceived feasibility and desirability (Krueger et al.). The differential impacts of entrepreneurship education on entrepreneurial intentions arise through (i.e., can be mediated by) those factors.

A third limitation was the insufficient number of samples in a few subgroups, such as the workshop and venture creation subgroups. An inadequate number of samples in the subgroups reduced the power of the analysis resulting in second-order sampling error (Hunter & Schmidt, 2004). This limitation also addresses the partialing out of the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions. It is obvious that we had an insufficient number of samples to test the relationship between pre-education entrepreneurial intentions and entrepreneurship education as well as the relationship between pre-education entrepreneurial intentions and post-entrepreneurial intentions. Thus, we call for more primary studies to contribute to these research areas so that more accurate conclusions can be drawn.

## Future Research

This study raises possibilities for future research to advance our knowledge of the entrepreneurship education–entrepreneurial intentions relationship. First, research could extend current efforts to sort through and identify those perspectives that can be the most informative. For example, future studies could measure entrepreneurial intentions by specifically investigating growth- and independence-oriented intentions, as suggested by Douglas (2013).

Second, future research could carefully investigate the “selection hypothesis” of entrepreneurship education for entrepreneurial intentions as a reverse causation explanation. Elfenbein, Hamilton, and Zenger (2010) suggested that there are two types of selection mechanisms in entrepreneurship: (1) a preference selection and (2) an ability selection. Either students whose preference toward entrepreneurship is high or those whose ability is high could deliberately enroll in entrepreneurship education. However, these types of hypotheses have so far not received rigorous analysis.

Third, future evidence-based entrepreneurship can extend our knowledge about the effects of entrepreneurship education on entrepreneurial intentions by investigating mediation effects. As mentioned in the limitation section, we suggest that future meta-analysis can include the possible predictors of entrepreneurial intentions such as perceived desirability and feasibility that can mediate the entrepreneurship education–entrepreneurial intentions relationship.

Fourth, the large  $F^2$  value signals the potential presence of moderators. In the present study, the  $F^2$  value remains large in all except the workshop subgroup, which means that our results may be from distributions with substantial variation. Also, there could be other moderators in addition to those identified in the present study. These possibilities provide avenues for researchers to conduct studies on subgroups with large  $F^2$  values, as shown in Table 2.

Last, related to the previous suggestion, future research could identify new types of moderators that prior research has not addressed. For example, we were not able to find any studies examining the differences among entrepreneurship teachers. Future research could investigate whether an instructor's attributes such as passion, enthusiasm, or



emotion (Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009) could moderate the relationship between entrepreneurship education and entrepreneurial intentions. Furthermore, scholars have recently become interested in the effects of peers in the classroom as well as the competitions between schools on entrepreneurial intentions (Falck et al., 2012; Falck & Woessmann, 2013). Thus, future research could use these factors as potential moderators on the entrepreneurship education–entrepreneurial intentions relationship.

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