



**Erasmus University of Rotterdam
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**The Impact of entrepreneurship education
programs on entrepreneurial intentions:
An application of the theory of planned behavior**

Master Thesis

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Abstract

Though many researchers have focused on entrepreneurship education, little research has been conducted on the precise effects and overall effectiveness of the entrepreneurship education programs. Drawing on the theory of planned behavior, this study investigates the impact of entrepreneurship programs on the entrepreneurial intention of students in higher education in the Netherlands. Data for this study is drawn from GUESSS (an international project investigating the entrepreneurial spirit of students worldwide). The results show that participants of entrepreneurship education programs are more likely to have higher intention (right or five years after their studies have been completed) to found their own businesses compared to non-participants. Furthermore, attitude toward entrepreneurship, subjective norm, and perceived behavioral control mediate the aforementioned relationship. The findings of this report contribute both to the Theory of Planned Behavior and to the field of entrepreneurship education.

Contents

Acknowledgements	3
1. Introduction	4
2. Literature Review & hypotheses	6
2.1 Entrepreneurship as intentionally planned behavior	6
2.1.1 Intention models	7
2.2 Theory of Planned Behaviour (TPB)	8
2.2.1 The theory of planned behavior (TPB) and its application to the field of entrepreneurship	11
2.2.2 Empirical evidence of application of TPB	11
2.3 Entrepreneurship Education Programs	12
2.3.1 Content	14
2.3.2 Pedagogy	15
2.4 Entrepreneurship education programs in the Netherlands	16
2.5 The impact of entrepreneurship education programs on entrepreneurial intentions	18
2.6 Conceptual Model and Hypothesis	20
3. Data description & Methodology	22
3.1 Data	22
3.2 Sample	23
3.3 Measures	26
3.3.1 Entrepreneurial Intention	26
3.3.2 Mediators	29
3.3.2.1 Attitude towards entrepreneurship	29
3.3.2.2 Subjective norm	29
3.3.2.3 Perceived Behavioral Control	30
3.3.3 Participation in an entrepreneurship education program	30
3.3.4 Control Variables	30
3.4 Methodology	31
3.4.1 Multiple mediator model	32
3.4.2 The causal steps approach	33
3.4.3 Bootstrapping method	34
4. Results	34
4.1 Entrepreneurial intention right after studies	34
4.2 Entrepreneurial intention five years after studies	40
4.3 Robustness test	46
5. Conclusion & discussion	47
References	
Appendices	

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1. Introduction

The last 25 years has seen a significant change in the economic landscape of the Netherlands. The revival of entrepreneurship in the country has contributed to job creation, flexibility and competitiveness, innovativeness and job satisfaction (EIM, 2011). According to Hartog et al. (2011), entrepreneurs in the country have increased from a low point of about 0.5 million in 1983 to almost 1.1 million in 2010.

In the same period, comparable growth has emerged in the field of entrepreneurship education and particularly in entrepreneurship and new-firm creation curricula and programs (Kuratko, 2005). This growth has been partly fueled by the increasing number of students in both secondary and tertiary education, considering self-employment as a significant occupational choice and the increasing cognition from policy makers about the entrepreneurship as a policy tool for economic growth.

Nevertheless, little research has been conducted on the precise effects and overall effectiveness of entrepreneurship education programs. The question of whether entrepreneurship education can influence entrepreneurial intention is still relatively uninvestigated (Peterman & Kennedy, 2003), and poorly understood (Von Graevenitz et al., 2010). Gorman et al. (1997) reviewed ten years of entrepreneurship education literature and highlighted that the impact of the entrepreneurship education on entrepreneurial attitudes and intentions requires further investigation.

Part of previous empirical research on this subject highlighted a positive impact of these programs at universities on perceived attractiveness and feasibility of new firm initiation (Peterman & Kennedy, 2003; Fayolle et al., 2006; Souitaris et al., 2007). On the contrary, Oosterbeek et al. (2010) and Von Graevenitz et al. (2010) demonstrate evidence that the effects are negative. In addition, many of the existing studies tend to have methodological limitations. For instance, few papers include in their analysis a control group, large samples and, long-term studies. Lastly, there is also no consensus regarding the conceptual model for the analysis of the impact of entrepreneurship education.

The research question addressed in this report is: Do students, who attended an entrepreneurship education program, have higher entrepreneurial intention than those who did not attend? The purpose of this paper is to examine the impact of entrepreneurship education programs on entrepreneurial intentions concerning higher education and to address some of the aforementioned issues of methodological limitations.

In order to gain further insight into the impact of entrepreneurship education programs on entrepreneurial intentions, the current research draws on the theory of planned behavior (Ajzen, 1991, 2002). Ajzen (1991, 2002) proposed a model of intention that has already been extensively used to analyze entrepreneurial intentions. In psychology literature, intention is demonstrated to be the best predictor of planned behavior, especially when the latter is unusual, difficult to distinguish, or involves unpredictable time lags. Entrepreneurship is a classic example of such planned, intentional behavior (Bird, 1988; Katz & Gartner, 1988; Krueger & Brazeal, 1994). Moreover, secondary data for this study are drawn from the “Global University Entrepreneurial Spirit Students’ Survey” (GUESSS).

The results from this report show that participants in entrepreneurship education program (EEP) are more likely to intend to start their own business, either directly or five years after their studies, compared to non-participants. Participation in entrepreneurship education exerts an effect on entrepreneurial intention either directly or five years after studies through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Therefore, attitude toward entrepreneurship, subjective norm and perceived behavioral control partially mediates the latter relationship. Students, who participated in entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, and greater perceived behavioral control than non-participants. Furthermore, attitude towards entrepreneurship and perceived behavioral control, show a positive and significant effect on entrepreneurial intention of students right after their studies, while subjective norm shows a negative but also significant effect. Finally, attitude towards entrepreneurship, subjective norm and perceived behavioral control, show a positive and significant effect on entrepreneurial intention of students five years after studies.

The aim of the present paper is to contribute both to Theory of Planned Behavior (by empirically linking entrepreneurship education programs with intention towards entrepreneurship) and to the field of entrepreneurship education (by evaluating the entrepreneurship education programs in influencing entrepreneurial intentions of students). In addition, the results of this study may help policy makers determine the degree up to which entrepreneurship education is effective while achieving its goals and qualifying the resources allocated to it. The current research may also provide valuable feedback to Dutch Universities, in order to offer more sophisticated and well-structured educational programs to students.

The remainder of this paper is organized as follows. In the next section, previous re

search regarding entrepreneurial intentions, intention models, theory of planned behavior, entrepreneurship education programs, as well as the investigated relationship is presented. In the third section, the methodology and data description are analyzed. Subsequently, in the fourth-section, the empirical results are depicted and discussed. In the last section, the conclusion, summary of the major findings, limitations and implications are presented.

2. Literature Review & hypotheses

2.1 Entrepreneurship as intentionally planned behavior

This section discusses the question: Why should entrepreneurial intention be studied? Then, arguments are developed for selecting the intention model that better applies to the study of entrepreneurial intentions.

Past researchers have used various methodologies in order to investigate the decision of an individual to found a company. Previously, many researchers focused on personality traits that would influence this decision. However, an obstacle to the trait approach was the research focus on situations after the entrepreneurial event. Researchers hypothesized that an entrepreneur's traits, attitude and beliefs do not change because of the entrepreneurial experience itself (Gartner, 1988; Autio et al., 2001). Later, studies focused on demographic variables including characteristics such as age, gender, and level of studies. Both lines of research (trait and demographic) showed significant relationships between traits or demographic characteristics and the decision to become a founder (Liñán, 2004). Nevertheless, these lines of research have been criticized for the methodological and conceptual problems and their low explanatory capacity. Consequently, researchers focused on the pre-decision stage of entrepreneurship, developing more intergrade explanatory models (see Bird, 1993; Shapero & Sokol, 1982; Ajzen, 1988, 1991).

Researchers have underlined the importance of the pre-decision stage regarding the decision to start a new firm. Firm creation is considered as a planned and thus an intentional behavior (Katz & Gartner 1988; Bird, 1989; Bagozzi et al., 1989; Krueger & Carsrud, 1993; Tkachev & Kolvereid, 1999; Krueger et al., 2000). According to Bagozzi et al. (1989), intentions are an unbiased predictor of action even where time lags exist. By exploring the characteristics of emerging organizations, Katz & Gartner (1988) suggest that intentionality is one of the four properties of emerging firms. A more recent study by Krueger et al. (2000) points out that there

are indications of a long term interest to start a business before the actual entrepreneurial behavior.

In this respect, by understanding the intention towards planned behavior, we can better predict behavior. In psychology literature, intention is proved to be the best predictor of planned behavior, especially when the latter is unusual, difficult to distinguish, or involves unpredictable time lags. Entrepreneurship is a classic example of such planned, intentional behavior (Bird, 1988; Katz & Gartner, 1988; Krueger & Brazeal, 1994).

Therefore, intention seems to better predict behavior than attitudes, beliefs or other psychological variables. Thus, attitudes and beliefs predict intentions, which in turn predict behavior (Ajzen & Fishbein, 1980). Consequently, intentions are used as a mediator or catalyst for action. Hence, the fault of identifying as determinants of entrepreneurial behavior, those that actually are the consequence of running an own business is averted. For instance, it can be argued if an internal locus-of-control leads to the decision of founding their own business, or if the nature of the actual situation of self-employed is such that they feel more powerful and ready to control their destiny (Davidsson, 1995).

2.1.1 Intention models

Understanding entrepreneurial intention requires the application of a coherent and robust theoretical framework that sufficiently reflects new business intentionality. In the literature, many intention models have been developed. However, Shook et al. suggest that ‘Future work on entrepreneurial intentions should attempt to integrate and reduce the number of alternative intention models’ (Shook et al., 2003, p. 386).

Researchers have proposed various intention models. Among them, Bird’s (1988) model which was further developed by Boyd & Vozikis (1994), the Shapero model (Shapero & Sokol, 1982) tested by Krueger (1993), Ajzen’s model (1988, 1991) and Davidson’s (1995) model, which was developed and tested by Autio et al. (1997).

However, two dominant intention models identified in the literature (see Shook et al., 2003, Fayolle et al., 2006 and Gelderen et al., 2008) had been increasingly used since 1990’s (Autio et al., 2001). The first is Ajzen’s theory of planned behavior (TPB), which defines intention on the basis of attitude towards that behavior, subjective norm, and perceived behavioral control. The second is Shapero’s model of the entrepreneurial event. The latter model derives entrepreneurial intention from perceived desirability, perceived feasibility and the propensity

to act upon opportunities. Krueger et al. (2000) support that both models are mutually compatible. Two constructs of Shapero model, perceived desirability and perceived feasibility, are similar to the theory of planned behavior's attitude toward behavior and perceived behavioral control (Autio et al., 2001). The major difference between the two models is that Ajzen uses subjective norm instead of Shapero's propensity to act. Both models have been tested and applied, receiving empirical support. By comparing the two models, Krueger et al. (2000) concludes that both models provide a valuable tool for understanding the process of entrepreneurial emergence.

It is highlighted that Shapero's model focuses primarily on new firm creation rather than the adoption of the entrepreneurial behavior in general. This model can also be assigned as an application of Ajzen's model (Fayolle et al., 2006). According to Gelderen et al. (2008), the theoretical specification of TPB compared to that of Shapero, is more detailed and consistent.

In this paper, the theory of planned behavior is applied, so as to test how participation in entrepreneurship education program could influence the antecedents of intention. TPB has been repeatedly applied and tested, providing a valid research framework. Likewise, it can be applied to almost all voluntary behaviors and gives satisfied results in diverse fields, including the choice of professional career (Ajzen, 2001; Kolvereid, 1996).

2.2 Theory of Planned Behavior (TPB)

In the previous section, entrepreneurial intention and intention models were discussed. This section of the report analyses the theory of planned behavior, its application to the field of entrepreneurship and empirical evidence of its application.

The theory of planned behavior (TPB) (Ajzen, 1988, 1991) has emerged as one of the most dominant and popular conceptual frameworks for the study of human action (Ajzen, 2001) and in particular the individual's intentions to engage in various activities. TPB belongs to the large family of intention models and has repeatedly been applied in the field of entrepreneurship, providing validated research results (Krueger et al., 2000; Fayolle et al., 2006).

The central construct of the TPB is the individual's intention to perform a given behavior (Ajzen, 1991). Accordingly, intention is best predicted by attitude towards the behavior, subjective norms and perceived behavioral control. Therefore, exogenous factors (such as traits, demographics, skills and social, cultural and financial support) indirectly influence intention and behavior.

The theory of planned behavior postulates the following three predictors of intention:

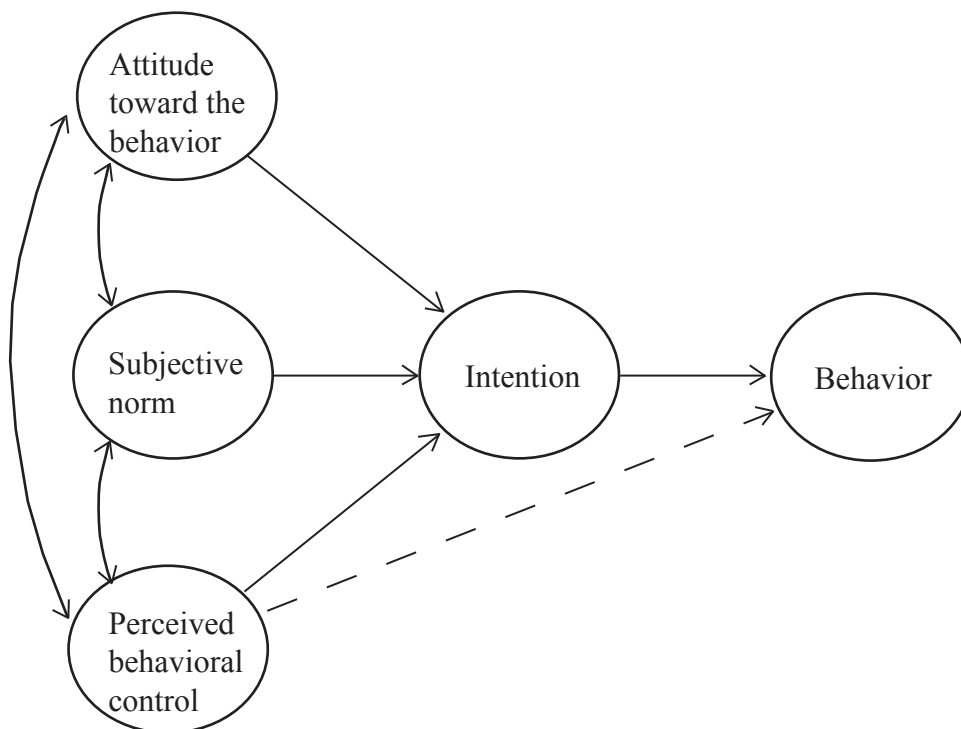
Attitude toward the behavior: responds to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question.

Subjective norm: a social factor that refers to the perceived social pressure to perform or not to perform the behavior. Krueger et al. (2000) suggest that the most important social influences such as parents, significant persons, and friends including role model or mentor must be empirically identified.

Perceived behavioral control: refers to the perceived ease or difficulty of performing the behavior and is assumed to reflect past experience as well as anticipated impediments and obstacles.

Figure 1

Theory of Planned Behavior



Source: Ajzen (1991), p. 182

According to Ajzen (1991), the more favorable the attitude and subjective norm and the greater the perceived behavioral control is, the stronger should be the intention of an individual to perform the behavior under consideration (Ajzen, 1991, p. 188). However, it might be found that the significance of attitude, subjective norm, and perceived behavioral control vary, depending on the different behaviors. Hence, it may be revealed that only the attitude has a

significant impact on entrepreneurial intention or that attitude and perceived behavioral control are significant or still all three predictors are sufficient to account for entrepreneurial intentions.

The TPB is actually an extension of the theory of reasoned action (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). It differs from the latter in its addition of perceived behavioral control (PBC). Perceived behavioral control plays a pivotal part in the theory of planned behavior; along with the intention towards the behavior, it can be used directly to predict behavioral achievement. While subjective norm and attitude toward the behavior influence the intention, the role of PBC is expected to be more decisive for action (Autio et al., 2001). However, to the extent that PBC is realistic, it can be used to predict the possibility of a successful behavioral attempt (Ajzen, 1985).

Perceived behavioral control actually differs from Rotter's (1966) concept of perceived locus of control. PBC can usually vary depending on the situation. However, locus of control is an expectancy that stays stable across situations. Hence people may believe that their actions are determined by their own behavior (internal locus of control). They might also believe that their chances -for instance- of becoming a commercial airplane pilot, are very low (low perceived behavioral control (Ajzen, 1991, p.183). Perceived behavioral control is most in accordance with Bandura's (1977, 1982) concept of perceived self-efficacy which "is concerned with judgments of how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p. 122). Notwithstanding, in order to avoid misunderstandings in the interpretation, Ajzen (2002) redefines the concept of perceived behavioral control. He suggests that this term should be read as "perceived control over performance of a behavior" (Ajzen, 2002, p.668).

Ajzen (2002) denotes five studies that were explicitly designed to investigate the factorial structure of perceived behavioral control, in the context of the theory of planned behavior, provided consequent support for a distinction between self-efficacy and controllability. Therefore, the empirical research provides significant evidence of the distinction between measures of self-efficacy (ease or difficulty of performing a behavior) and measures of controllability (belief of having a control over the behavior or about the extent to which performing the behavior is up to the actor) (Ajzen, 2002). The five studies used questions that concerned controllability or self-efficacy alone, as well as a mixture of self-efficacy and controllability items. It is noted that perceived self-efficacy improves prediction of intentions, and only in two cases the prediction of behaviors. On the contrary, perceived controllability has no significant effects on

intentions and only in one case significantly improves the prediction of behavior. The combination of perceived self-efficacy and perceived controllability appears to improve the prediction of intentions. However, regarding the purpose of the research, researchers can either treat perceived behavioral control as a unitary factor, or make distinction between self-efficacy and controllability by entering discrete indices into the prediction equation (Ajzen, 2002).

2.2.1 The theory of planned behavior (TPB) and its application to the field of entrepreneurship

In considering entrepreneurship, the intention to perform a given behavior is the intention towards entrepreneurship (entrepreneurial intention). Furthermore, the three predictors of intentions are defined as follows:

‘**Attitude towards entrepreneurship**’ is the degree to which the respondent has a favorable or unfavorable evaluation of being an entrepreneur¹. Hence, high attitude towards entrepreneurship indicates that the respondent is more in favor of entrepreneurship than other occupational options. ‘**Subjective norm**’ refers to perceptions of what important people² in respondents’ lives think about their decision to become an entrepreneur. Finally, ‘**perceived behavioral control**’ indicates the perceived ability to become an entrepreneur (Kolvereid, 1996a) and more specifically, it refers to the perceived ease or difficulty of becoming an entrepreneur and the confidence in their ability to succeed.

2.2.2 Empirical evidence of application of TPB

The TPB has been successfully applied to predict a broad range of types of behaviors such as voting decisions, problem drinking and losing weight (see Ajzen, 1991). Meta-analyses (Kim & Hunter 1993) empirically show that intentions successfully predict behavior, and attitudes successfully predict intentions (Kolvereid, 1996a; Krueger et al., 2000). In particular, it appears that attitudes explain over 50% of the variance in intentions, while intentions explain approximately 30% of the variance in behavior. Explaining 30% of variance in behavior compares favorably with trait measures, which explain around 10% of the variance of behavior (Ajzen, 1987; Kim & Hunter, 1993; Krueger et al., 2000; Autio et al., 2001).

¹ Entrepreneurship here refers to founding a company.

² Important people are parents, friends/ fellow student, or other important people.

In the case of entrepreneurship, while a growing number of researchers have used the TPB in order to predict individual's intention to involve in entrepreneurial activities (Krueger & Carsrud 1993; Kolvereid, 1996a; Krueger et al., 2000; Souitaris et al. 2007; Davidsson, 1995; Kolvereid, 1997), this research is still in its inception stage (Autio et al., 2001).

Kolvereid (1997), drawing on the TPB, investigates the choice between becoming an entrepreneur and becoming an employee in a sample of 143 Norwegians. He found that attitude towards entrepreneurship, subjective norm and perceived behavioral control appeared as more significant influences on self-employment intentions compared to self-employment experience, gender, or family background. Krueger et al. (2000) fail to find a link between subjective norm and intention towards self-employment and suggest for more research. Souitaris et al. 2007 confirm the link between attitudes, subjective norm, perceived behavioral control and entrepreneurial intention.

Krueger & Carsrud (1993) applied the theory of planned behavior to the study of entrepreneurial intention. Based on their study, other researchers deployed models designed to understand the development of entrepreneurial intention between students (Kolvereid, 1996; Autio et al., 1997; Tkachev & Kolvereid, 1999). Tkachev & Kolvereid (1999), testing a sample of 512 Russian students from three different universities in St. Petersburg, show that attitude, subjective norm and perceived behavioral control can better explain and predict employment status choice intentions than tracking or demographics.

By examining factors influencing entrepreneurial intention among university students and using international comparisons (Finland, Sweden, UK), Autio et al. (2001) amplifies a robustness of an application of TPB model. Their empirical analysis shows a weak influence of subjective norm on entrepreneurial intention with perceived behavioral control emerging as the most important predictor of entrepreneurial intention.

2.3 Entrepreneurship Education Programs

This section presents the literature review on entrepreneurship education programs, which is in line mainly with the studies of Gorman et al. (1997), Katz (2003), Kurtako (2005) and Solomon (2007).

“The younger generation of the 21st century is becoming the most entrepreneurial generation since the Industrial Revolution.” (Kuratko 2005, p. 578). According to Kuratko (2005) around 5.6 million people in America, under the age of 34, are actively trying to begin their

own firm. Similarly, in the Netherlands people trying to start a business have increased from a low point of about 0.5 million in 1983 to almost 1.1 million in 2010 (Hartog et al., 2011). Along with these growing numbers, an increase has also occurred in the field of entrepreneurship education. Over the past several years, there has been a tremendous growth in entrepreneurship curricula and programs. Entrepreneurship course offerings at higher education have increased from a handful in the 1970s to many different courses available at more than 1,500 educational institutions in higher education across the world (Charney & Libecap, 2000; Solomon, 2007). Courses in small business management or entrepreneurship have increased from 253 in 1985 to 441 in 1993 (Gartner & Vesper, 1994; Solomon). Later, Foote (1999) points out an increase of 74% in the number of entrepreneurship courses at five American business schools from 1996 to 1999 (Solomon, 2007). Recently, Solomon et al. (2002) estimate that entrepreneurship courses are offered in as many as 1,200 post secondary institutions in United States alone. Katz, who developed one of the most concise chronologies of entrepreneurship education, observes a similar pattern of growth of entrepreneurship courses in Europe and Asia, though characterized as ‘largely untracked’ (Katz, 2003, p. 290).

Before exploring the literature on entrepreneurship education, it is essential to define what is considered to be entrepreneurship education and entrepreneurship programs. This paper accepts the definition for entrepreneurship education used by Solomon (2007) and firstly proposed by Shepherd & Douglas (1997):

“The essence of entrepreneurship is the ability to envision and chart a course for a new business venture by combining information from the functional disciplines and from the external environment in the context of the extraordinary uncertainty and ambiguity, which faces a new business venture. It manifests itself in creative strategies, innovative tactics, uncanny perception of trends and market mood changes, courageous leadership when the way forward is not obvious and so on. What we teach in our entrepreneurship classes should serve to instill and enhance these abilities” (Solomon, 2007, p. 169).

As far as entrepreneurship education programs are concerned, despite their remarkable increase, there are still different views between academics about what constitutes these courses and programs (Vesper & Gartner, 1997). As a result, the definition of what composes entrepreneurship education programs remains a challenge. Gorman et al. identified that ‘... although there has certainly been an increase in entrepreneurship education programs, there is little uniformity in the programs offered, especially if one considers the relatively similarity of

other business programs' (Gorman et al., 1997, p70). It is often argued entrepreneurship should focus on organization creation, growing firms, innovation, value creation, and ownership (Vesper & Gartner, 1997). Plaschka & Welsch (1990) proposed that entrepreneurship education is moving towards integrative, comprehensive, and holistic programs; that is towards the vision of business education offered in Porter & McKibbin (1988).

Most of empirical studies surveyed by Gorman et al. showed that entrepreneurship could be taught or at least encouraged, by entrepreneurship education (Gorman et al., 1997, p. 70). Kurtatko (2005) reports that the question of whether entrepreneurship can be taught is obsolete. Ronstadt (1987) stated that the most relevant question about entrepreneurship education is: What should be taught and how should it be taught? In a similar vein, Solomon (2007) supports that entrepreneurship can be taught, but there is little consensus on what exactly entrepreneurship students should be taught. The empirical research on entrepreneurship education is 'still in the explanatory stage' (Gorman et al., 1997).

2.3.1 Content

Likewise, as the field of entrepreneurship education evolves, particular interest is being focused on the exact content and pedagogy of entrepreneurship programs. Gartner and Vesper (1994), suggested that business entry is a fundamentally diverse activity than managing a business and this lead to the realization that entrepreneurship education should include the ambiguous nature of business entry (Gartner et al., 1992). Past theoretical studies, while discussing the emergence of entrepreneurship as an independent academic discipline highlighted that the curricula of entrepreneurship programs has to be distinguished from the traditional management education programs (McMullan & Long, 1987; Vesper & McMullan, 1988; Plaschka & Welsh, 1990). McMullan & Long (1987) suggested that programs should consist of skill-building courses such as negotiation, leadership and creative thinking and exposure to technological innovation and new product development (Gorman et al. 1997, p. 60). Vesper & McMullan (1988) argued about skill-building courses, but they also distinguished two crucial differences concerning the entrepreneurship programs and the traditional management programs. These differences are the capacity quickly to exploit a business opportunity and the capacity to plan in greater detail and schedule further in the future. In a similar vein, Plaschka & Welsh provided support for the differentiation between entrepreneurship programs and the traditional management

programs, and also suggested that programs have to get ‘... geared towards creativity, multi-disciplinary and process-oriented approaches, and theory-based practical applications’ (Plaschka & Welsh, 1990, p. 61).

Solomon (2007) provides an analytical overview of the current state of entrepreneurship education in USA for the years 2004-2005. In this review he states: “Ideally, students should create multiple venture plans, practice identification of opportunities and have extensive exposure to entrepreneur role models. Student interaction with these role models may occur in several important ways including having entrepreneurs serve as coaches and mentors (Hills & Welsch, 1986; Mitchell & Chesteen, 1995); classroom speakers (Hills, 1988); and interview subjects (Hills, 1988; Solomon et al., 1994; Truell et al., 1998). Effective entrepreneurial education requires students to have substantial hands-on experience working with community ventures so that they can learn to add value to real ventures and thus be prepared to add value to their own ventures (McMullan & Long, 1987)” (Solomon, 2007, p. 172).

Additionally, McMullan & Gillin (1998) mentioned the support activities for the participants to begin their own business as an important element of entrepreneurship education projects.

2.3.2 Pedagogy

If an entrepreneurship education program aims to be effective, entrepreneurship educators have to design effective learning styles for students. Kurtatko (2005) contends that one of the main obstacles regarding the development of the field of entrepreneurship education is the rarity of “... solid theoretical bases upon which to build pedagogical models and methods.” (p. 583). Solomon (2007) suggests that entrepreneurship education pedagogies should reflect the chaotic and ambiguous character of entrepreneurial experience. Sexton & Upton (1984) also contended that entrepreneurship programs should support individual over group activities, be quite unstructured, and give a novel solution to problems under unstable conditions and risk. In a similar vein, Ronstadt (1990) proposed that the preparation of students has to be in the unstructured and uncertain nature of entrepreneurial environments.

Furthermore, the new findings of Solomon’s (2007) study support that the traditional teaching method of requiring students to write a business plan is still used and is popular. The results of his study also denote that entrepreneurship educators are using guest speakers and class discussions, more often than the traditional teaching method of class lectures. Ultimately,

Plaschka and Welsch (1990) emphasized that entrepreneurship programs are usually emerging on a trial and error basis, relying upon the current entrepreneurial trends and on the feedback of students confronting gaps and difficulties in their courses.

2.4 Entrepreneurship education programs in the Netherlands

This section presents the Dutch higher education system³ as well as the development of the entrepreneurship education program, based on the results from GUESSS survey and empirical paper of Souitaris et al. (2007).

In the Netherlands, the Tertiary or higher education system is a binary system, consisted of: university education (wetenschappelijk onderwijs = WO), offered by universities; and Universities of Applied Sciences, offered by HBO institutions (hogescholen: universities of professional education). Both types of higher education offer study programs at the Bachelor level, while universities offer Master programs in addition⁴.

In this study, it is assumed that students who participated in an entrepreneurship education program, have attended at least one of the offerings of each of the following three categories in the higher education in the Netherlands: lectures and seminars about entrepreneurship, networking and coaching offerings and provision of resources for founders. This categorization is in line with GUESSS (Global University Entrepreneurial Spirit Students' Survey) and Souitaris et al.' (2007) definition of entrepreneurship education program.

³ Since September 2002, the higher education system in the Netherlands has been organized around a three-cycle degree system consisting of bachelor, master and PhD degrees.

⁴ The Universities of Applied Sciences (HBO) Bachelor program, which can be completed in three years time, gives an opportunity for a Master degree program of two years at the university. However, after completion of a university Bachelor program this same Master program can be acquired through a program of one year. HBOs provide more practically oriented programs than Universities (WO). Moreover, the Bachelor degree they offer is not comparable to a WO Bachelor degree.

According to latter authors, a “balanced, good practice program”, consists of four components: (1) a ‘taught’ component, with one or more modules, (2) a ’business-planning’ component; including, for instance, a business plan competition and counsel on building a specific business idea. (3) An ‘interaction with practice component’, comprising of talks from experts and networking events and finally (4) a ‘university support’ component, including market-research resources, space for meetings, a pool of technology with commercial potential and even seed funding to student-teams.

Table 1
University components of entrepreneurship education programs in higher education in the Netherlands according to the awareness of GUESSS survey participants.



Thus, entrepreneurship education programs in higher education in the Netherlands (see Table 1) are consisted of:

At least one taught component of lectures and seminars about entrepreneurship: (1) Entrepreneurship in general, (2) Family firms, (3) Financing entrepreneurial ventures, (4) Technology entrepreneurship, (5) Social entrepreneurship, (6) Entrepreneurial Marketing, (7) Innovation and Idea generation, (8) Business Planning.

One 'business-planning' component: (1) A Business plan contests / workshops.

At least one 'interaction with practice component' of Networking and coaching offerings: (1) Workshops/networking with experienced entrepreneurs, (2) Contact platforms with potential investors, (3) Mentoring and coaching programs for entrepreneurs, and (4) Contact point for entrepreneurial issues.

At least one 'university support' component of resources for founders: (1) Technology and research resources (library, web), and (2) Seed funding/ financial support from University.

2.5 The impact of entrepreneurship education programs on entrepreneurial intention

This section presents previous research on the impact of entrepreneurship education on entrepreneurial intention.

Notwithstanding the recognition that education may influence people's attitudes towards entrepreneurship, the impact of entrepreneurship education, though explicit from general education on entrepreneurial intentions, is still relatively uninvestigated (Donckels, 1991; Krueger & Brazeal, 1994; Von Graevenitz, 2010).

There are qualitative papers that suggest a link among entrepreneurship education and entrepreneurial attitudes and intention. Robinson et al. (1991) proposed that the attitude model of entrepreneurship has ramifications for entrepreneurship education programs, while attitudes are open to change and can be influenced by educators and practitioners. Dyer (1994) also points out that specialized courses in entrepreneurship, or training in how to found an own business, may give potential entrepreneurs the confidence they need to begin their business. On the other hand, there is little empirical evidence to support this link. Gorman et al. (1997) confirm the latter and highlight the necessity for further investigation in the relationship between entrepreneurship education and entrepreneurial attitudes.

Table 2

Empirical papers that have investigated the impact of entrepreneurship education courses/ programs on entrepreneurial intention.

	Sample	Pre-test pro-test design	TPB¹	Effect²
Peterman & Kennedy (2003)	220 secondary school students	yes	○	positive
Fayolle et al. (2006)	20 university students	yes	●	positive
Souitaris et al. (2007)	250 university students	yes	●	positive
Oosterbeek et al. (2010)	562 university students	no	○	negative
Von Graevenitz et al. (2010)	196 university students	yes	○	negative

Note: (1) Studies that based on Theory of planned behavior (TPB)

(2) Effect of entrepreneurship education program/ course on entrepreneurial intention

Regarding the empirical papers, the recent studies of Peterman & Kennedy (2003), Fayolle et al. (2006), and Souitaris et al. (2007) confirm a positive impact of entrepreneurship education programs. Peterman & Kennedy (2003) surveyed a sample of secondary school students enrolled in the Young Achievement Australia (YAA) enterprise program. They use a pre-test post-test control group research design. The findings of Peterman & Kennedy (2003) suggest that the enterprise program favorably influenced participants' perceptions of both desirability and feasibility. In a similar vein, Souitaris et al. (2007) examine the entrepreneurial attitude and intention of university students in two universities. They use a pretest–post-test quasi-experimental design and draw on the theory of planned behavior. Based on the results of 250 science and engineering students (124 taking the program and 126 in a control group), Souitaris et al. (2007) concluded that exposure to entrepreneurship education program increase some attitudes and the overall entrepreneurial intention. Fayolle et al. (2006) provide evidence for a positive impact of entrepreneurship education program on entrepreneurial intention of students.

On the contrary, the papers of Oosterbeek et al. (2010) and Von Graevenitz et al. (2010) demonstrate a negative effect. Oosterbeek et al. (2010) examine the impact of SMC program (a leading entrepreneurship program in higher education in the Netherlands) on intentions

towards entrepreneurship drawing on an instrumental variables approach in a difference-in-differences framework. Their findings outline that the effect of the entrepreneurship program on entrepreneurial intentions is significantly negative. Von Graevenitz et al. (2010) also investigate the impact of a compulsory entrepreneurship class using ex-ante and ex-post-survey responses from students at a German university. Their results show significant positive effects on participants' self-assessed entrepreneurial skills, but entrepreneurial intentions decrease after the end of the course.

Overall, previous research on the effects of entrepreneurship education shows that entrepreneurship programs have a significant influence on entrepreneurial intention. However, the direction of the effect of entrepreneurship education on entrepreneurial intentions still remains unclear (see Table 2). Peterman & Kennedy suggest the development of “credible methods of testing preconceived hypotheses, using control groups, large sample sizes” (Peterman & Kennedy, 2003, p.130), in order to move this young field of research beyond its exploratory stage (Alberti, 1999; Von Graevenitz et al., 2010).

The focus of the current study is to examine the exact effect of entrepreneurship education programs on entrepreneurial intention of students at higher education in the Netherlands, using control group, a large sample of students and drawing on the theory of Planned Behavior.

2.6 Conceptual Model & Hypotheses

This section presents the conceptual model and the four hypotheses derived from the literature review.

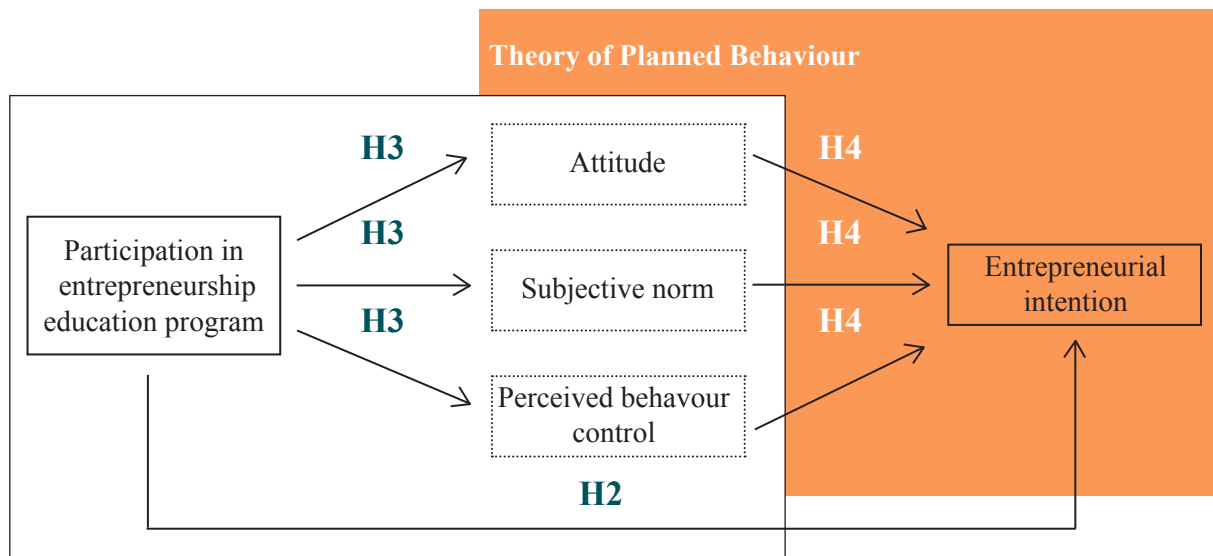
Figure 2

Conceptual model and hypotheses

A



B



(A) Participation in entrepreneurship education program affects Entrepreneurial intention.

(B) Participation in entrepreneurship education program is hypothesized to exert indirect effects on entrepreneurial intention, through the attitude towards entrepreneurship, subjective norm and perceived behavioral control.

In order to replicate and confirm early results and link entrepreneurship education with entrepreneurial intention, based on the TPB and the literature review, the following hypotheses are suggested:

Hypothesis 1: Students, who participated in an entrepreneurship education program, are more likely to have higher entrepreneurial intention than non-participants.

Hypotheses 2: Participation in an entrepreneurship education program indirectly affects entrepreneurial intention, through attitude towards entrepreneurship, subjective norm and perceived behavioral control.

Hypothesis 3: Students, who participated in an entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, perceived behavioral control than non-participants.

Hypothesis 4: The higher the attitude towards entrepreneurship, subjective norm and the greater the perceived behavior control, the stronger is the entrepreneurial intention of students.

3. Data description & Methodology

3.1 Data

For this study, secondary data is drawn from the “Global University Entrepreneurial Spirit Students’ Survey” (GUESSS). This survey is an international research project that investigates the entrepreneurial spirit of students worldwide. Particularly, the aim of GUESSS is to observe systematically and in a long term the entrepreneurial intentions and activities of students as well as, to evaluate university activities and offerings related to the entrepreneurship.

In 2011, 26 countries participated while the Netherlands joined in for the first time. The complete GUESSS data set for 2011 includes information from more than 93,000 respondents across 26 countries, of which 13,121 are from the Netherlands. Because of their successful data collection, the Dutch GUESSS team won the ‘Best Data Collector 2011’ award, together with Brazil and Germany.

In the context of GUESSS, the entrepreneurial intentions of university students in higher education in the Netherlands, and in particular the intention to found a business, are investigated. An email with a short introduction of the project and a link to the online survey was sent to students. The majority of the participating educational institutions sent the link to the online survey directly to their students. While, four institutions put the link on their intranet page and one institution published the link in a newsletter. Table 1 presents the participating educational institutions in the Dutch GUESSS survey as well as the number of addressed students, responses and response rate.

Table 3**Participating Universities/ Universities of Applied Sciences in the Dutch GUESSS survey**

Educational Institution	Method	No. of addressed students	No.of reponses	Response rate
Universities (WO)				
Erasmus Univ. Rotterdam	Direct mail	11,086	1,676	15.12
Nyenrode Business Univ.	Direct mail	4,045	315	7.79
Radboud Univ. Nijmegen	Direct mail	1,500	86	5.73
Univ. of Groningen	Direct mail	25,000	1,627	6.51
Eindhoven Univ. of Technology	Direct mail	1,494	132	8.84
Maastricht Univ.	Direct mail	14,500	449	3.1
Univ. of Twente	Direct mail	8,416	731	8.69
Utrecht Univ.	Direct mail	30,000	3,115	10.38
Univ. of Amsterdam	Intranet	30,825	76	0.25
VU Univ. Amsterdam	Direct mail	5,000	253	5.06
Tilburg Univ.	Direct mail	1,000	282	28.2
Universities of Applied Sciences(HBO)				
Hanze Univ. of Appl. Sciences	Direct mail	23,320	814	3.49
InHolland Univ. of Appl. Science	Direct mail	33,000	996	3.02
Univ. of Appl. Sciences Utrecht	Direct mail	38,000	1,738	4.57
Amsterdam Univ. of Appl. Sciences	Intranet	41,779	332	0.79
HAN Univ. of Appl. Sciences	Newsletter	1,400	60	4.29
Zuyd Univ. of Appl. Sciences	Intranet	13,200	30	0.23
The Hague Univ. of Hospitality Mgt	Direct mail	1,900	78	4.11
Breda Univ. of Appl. Sciences	Intranet	7,000	29	0.41
The Hague Uni of App Sciences	Direct mail	200	55	27.5
Other ¹			247	
Total			13,121	

Note: (1) Universities / Universities of Applied Sciences with no systematic data collection.

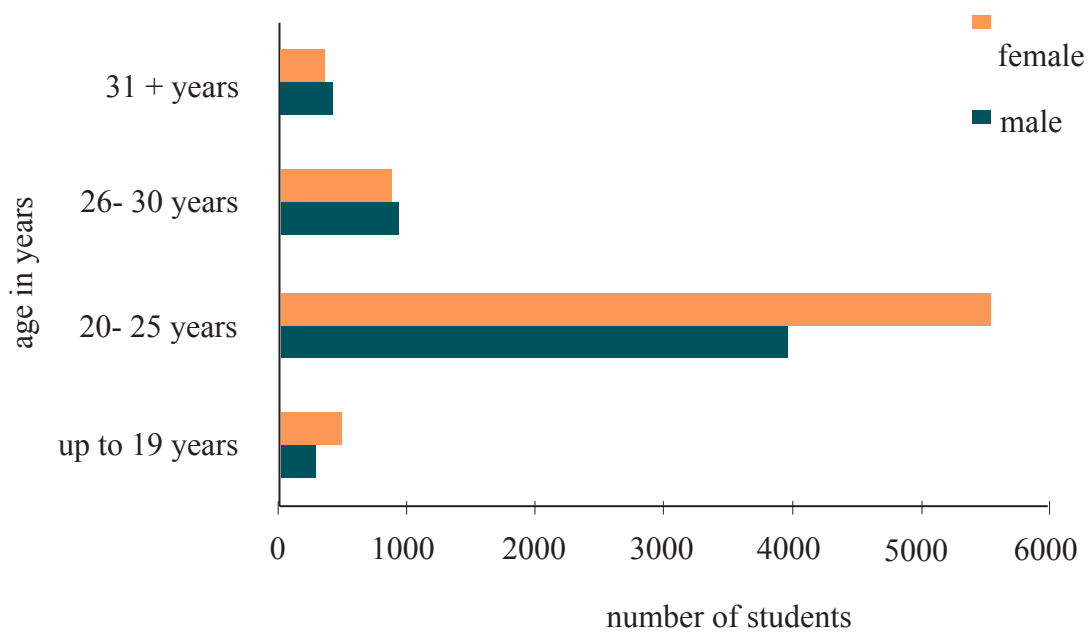
Source: National report of the Netherlands 2011- 2012.

3.2 Sample

The sample of this study consists of students from 11 universities (WO) and 9 universities of applied sciences (HBO). Respondents from educational institutions with no systematic data collection and respondents from international educational institution are excluded. Furthermore, respondents, who are already entrepreneurs, and also those, that answered that they were entrepreneurs in the past, but not in the present, are also excluded from the sample.

The average age of students in this sample is 23.8 years, and the median age is 23 years. As shown in Figure 3, the majority of students belongs to the age category of “20 to 25 years old”. This can be explained by the fact that the level of studies of most students is either undergraduate (Bachelor) or graduate (Master). Regarding the gender, on average, more females than males participated in the GUESSS survey (58% females). The high participation rate of females may be explained by the fact that few technical programs are included in GUESSS. Moreover, almost 28% of students have one or both of their parents currently self-employed or have the majority ownership in a business. Previous research notes that the decision to be an entrepreneur is influenced by having self-employed parents (Verheul et al., 2012).

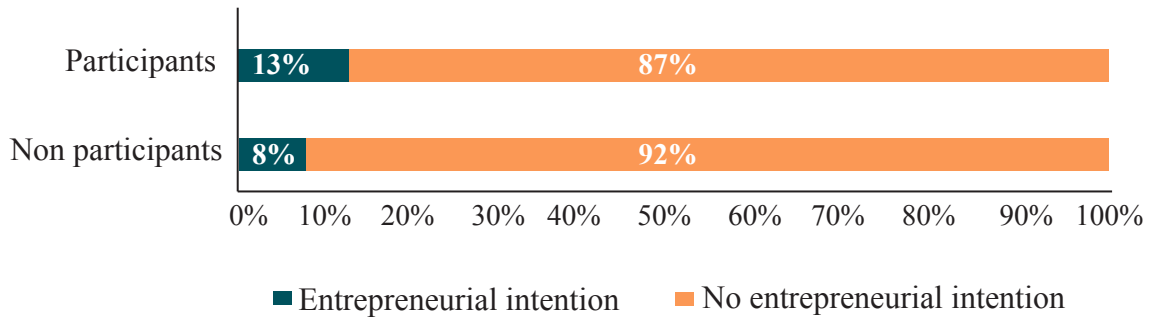
Figure 3
Age distribution of the sample grouped by gender



With regards the academic background of students, 70% of the respondents are undergraduate students (bachelor students) and 27.58% are graduate students (master students). Additionally, Most of students in the sample attend one of the following fields of study: business and economics, natural sciences or social sciences. In the sample, 68% of respondents attend university and 32% attend university of applied sciences. Only 2.55% of the sample is exchange students.

Figure 4

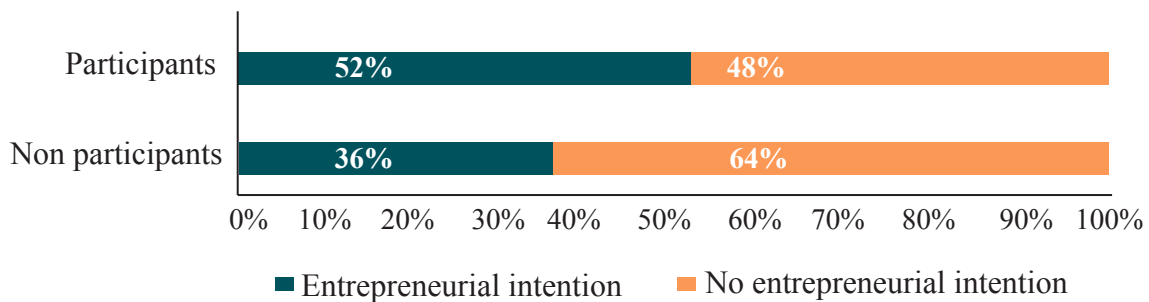
Percentage of participants in an entrepreneurship program and non participants who intend to found an own business right after their studies



In terms of entrepreneurial intentions of students right after their studies, around 13% of the students who participated in the entrepreneurship program have intentions to found their own business. Meanwhile, only around 8% of the students who did not participate in the entrepreneurship program intend to be a founder (see Figure 4).

Figure 5

Percentage of participants in an entrepreneurship program and non participants who intend to found an own business five years after their studies



It is interesting to note that, five years after their studies, more students have the intention to be a founder. Particularly, 52% of the students who participated in the program intend to found their own company compared to 36% of non-participants (see Figure 5).

3.3 Measures

3.3.1 Entrepreneurial Intention

The dependent variable “entrepreneurial intention” has been measured in various ways in the previous empirical papers. In order to construct this dependent variable, Davidsson based on the following questions: (1) ‘Have you ever considered founding your own firm?’ (Three response categories from “never occurred to me” to “have seriously considered”)', and ‘How likely do you consider it to be that within one (or five) years from now you will be running your own firm?’ (five response categories from “not likely at all” to “dead certain”) (Davidsson, 1995, p. 12). On the other hand, Souitaris et al. (2007) used a different approach. They measured the intention of an individual based on a 3-item measure, which indicates the intention of an individual to begin a business compared to the intention to pursue a career as an employee.

In this study, respondents were asked which career path they intend to pursue right after completion of their studies, and which career path five years after completion of their studies. In turn, they had to choose between four possible answers: (1) Employee, (2) Founder, (3) Successor, (4) Others.

Therefore two dependent variables are constructed. The dependent variables (entrepreneurial intention right after studies and entrepreneurial intention five years after studies) are dummies and indicate whether the student has intention to be a founder instead of employee. The dependent variable entrepreneurial intention right after studies takes the value 1 if respondents intend to be a founder right after their studies and value 0 if respondents intend to be an employee. Meanwhile, the dependent variable entrepreneurial intention five years after studies takes the value 1 if respondents intend to be a founder five years after their studies and value 0 if respondents intend to be an employee.

Table 4**Variable Description**

Variable	Measurement
Dependent variables	
Entrepreneurial intention right after studies	Dummy variable; 1 if respondents intend to be a founder right after their studies, 0 if respondents intend to be an employee
Entrepreneurial intention five years after studies	Dummy variable; 1 if respondents intend to be a founder five years after their studies, 0 if respondents intend to be an employee
Main independent variable	
Entrepreneurship education program	Dummy variable; 1 if respondent attended an entrepreneurship education program including at least one of the taught components, one business-planning component, at least one of the interaction with practice components and at least one of the university support components. Otherwise, it takes value 0 if respondent did not attend the program.
Mediators	
Attitude toward entrepreneurship	Interval variable; seven-point likert scale (from 1=strongly disagree to 7=strongly agree), average score (4 items). Please indicate your level of agreement with the following statements: (1) Being an entrepreneur implies more advantages than disadvantages to me (Cronbach's $\alpha = 0.93$). (2) A career as entrepreneur is attractive for me (Cronbach's $\alpha = 0.90$). (3) If I had the opportunity and resources, I would become an entrepreneur (Cronbach's $\alpha = 0.90$). (4) Being an entrepreneur would entail great satisfactions for me (Cronbach's $\alpha = 0.90$).
Subjective norms	Interval variable; seven-point likert scale (from 1=strongly disagree to 7=strongly agree), average score (3 items). Please indicate how much you care about the opinion of the following persons: (1) Parents / other family members (Cronbach's $\alpha = 0.86$). (2) Friends / fellow students (Cronbach's $\alpha = 0.83$). (3) People important to me in general (Cronbach's $\alpha = 0.76$).
Perceived behavioural control	Interval variable; seven-point likert scale (from 1=strongly disagree to 7=strongly agree), average score (12 items). Please indicate your degree of certainty in performing the following roles / tasks:

Table 4 (continued)

Variable	Measurement
	(1) Establish and achieve goals and objectives (Cronbach's $\alpha = 0.85$). (2) Generate new ideas (Cronbach's $\alpha = 0.85$). (3) Develop new products and services (Cronbach's $\alpha = 0.84$). (4) Perform financial analysis (Cronbach's $\alpha = 0.84$). (5) Reduce risk and uncertainty (Cronbach's $\alpha = 0.84$). (6) Take calculated (goed ingeschatte) risks (Cronbach's $\alpha = 0.84$). (7) Make decisions under uncertainty and risk (Cronbach's $\alpha = 0.84$). (8) Manage time by setting goals (Cronbach's $\alpha = 0.85$). (9) Take responsibility for ideas and decisions (Cronbach's $\alpha = 0.85$). (10) Start my own firm (Cronbach's $\alpha = 0.83$). (11) Lead my own firm to success (Cronbach's $\alpha = 0.83$). (12) When you think of the word "entrepreneur", how closely do you fit that image (1=0%, 7=100%)? (Cronbach's $\alpha = 0.83$).
Control variables	
Age	Continuous variable, reveals the age of respondents
Gender	Dummy variable; 1 if respondent is female, 0 if respondent is male
Business&Economics	Dummy variable; 1 if respondent's field of study is business and economics, 0 if field of study is natural science, social sciences or other
Bachelor	Dummy variable; 1 if responden's level of dtudy is undergraduate (bachelor), 0 if it is graduate, PhD or other
University Institution	Dummy variable; 1 if the institution is university (WO), 0 if it is university of applied sciences (HBO)
Self-employed parents	Dummy variable; 1 if the respondents has one or both of their parents self-employed, 0 otherwise

3.3.2 Mediators

3.3.2.1 Attitude towards entrepreneurship

The measure of attitude towards entrepreneurship is in accordance with the proposed one by Linan & Chen (2009). In their study, Linan & Chen (2009) measured attitude towards entrepreneurship through an aggregate attitude scale which included five statements. In this study, attitude towards entrepreneurship has been measured through a 7-point Likert-scale with four items⁵. Respondents were asked to rate their level of agreement (from 1=strongly disagree to 7=strongly agree) with four different statements about their personal valuation of being an entrepreneur. The reliability of the scale is confirmed as Cronbach's alpha is > 0.70 (see table 4). Therefore, the variable is calculated as the average of four sub-questions (see Table 4).

Table 4

Mediators: average score, standard deviation and Cronbach's alpha

Mediators	Number of items	Average score	Standard deviation	Cronbach's alpha
Attitude towards entrepreneurship	4	4.2	1.55	0.93
Subjective norm	3	5.5	0.98	0.85
Perceived behavioural control	12	4.5	0.85	0.85

3.3.2.2 Subjective norm

Subjective norm measure is also in line with Linan & Chen (2009). Subjective norm has been measured through a 7-point Likert-scale with three items. Respondents were asked whether they would pursue a career as an entrepreneur, how people in their environment would react to/judge that decision.

⁵ Liñán and Chen (2009) used the following statements in order to measure the attitude towards entrepreneurship: (a) Being an entrepreneur implies more advantages than disadvantages to me, (b) A career as entrepreneur is attractive for me, (c) If I had the opportunity and resources, I'd like to start a firm, (d) Being an entrepreneur would entail great satisfactions for men and (e) Among various options, I would rather be an entrepreneur. GUESSS survey excludes the last statement (e).

People in respondents' environment related to three groups: parents / other family members, friends / fellow students, and people important to them in general. Furthermore, a 7-point scale was given from (1=very negative to 7=very positive). The reliability of the scale is confirmed as Cronbach's alpha is >0.70 . The average of three sub-questions is obtained so as to construct the subjective norm variable (see Table 4).

3.3.2.3 Perceived Behavioral Control (PBC)

The PBC measure shows the perception of the ease or difficulty of becoming an entrepreneur. In GUESSS survey, respondents were asked to indicate their level of certainty with twelve different roles / tasks related to PBC. In this sense, a 7-point scale was given ranging between 1= completely unsure to 7=completely sure. The reliability of the scale is confirmed as Cronbach's alpha is >0.70 . The variable was calculated as the average of twelve sub-questions (see table 4).

3.3.3 Participation in an entrepreneurship education program

Respondents were asked whether they attended or made use of University offerings in entrepreneurship. In this study, it is assumed that students who participated in an entrepreneurship education program, have attended at least one of the offerings of each of the following three categories in the higher education in the Netherlands: lectures and seminars about entrepreneurship, networking and coaching offerings and provision of resources for founders (see Table 1 and section 2.4).

Particularly, the independent variable "participation in entrepreneurship education program" is a dummy variable with value one if respondents answered yes there is such an offering in my university, which I attended, to at least one of the taught components, to one business-planning component, to at least one of the interaction with practice components and to at least one of the university support components offerings. Otherwise, the independent variable takes the value 0 if respondents did not participate to any of the entrepreneurship university offerings.

3.3.4 Control Variables

In this model, the influence of control variables on entrepreneurial intention (right and

five years) after studies is examined. The age of students is one of the control variables. Reynolds (1995) suggests that age influences the propensity to start your own business. Gender is also included and is a dummy variable with value=1 if respondent is a female and value=0 otherwise. A dummy variable is also included that indicate the field of study (Business & economics). This variable takes the value=1 if respondent follow the business and economics field and zero if respondent follow one of the following study fields: natural sciences, social sciences, or other. Moreover, a dummy variable that indicates the type of university is included. In the Netherlands, there are two types of institutions in the higher education: WO and HBO. Thus, the university institution variable is a dichotomous, taking the value one if respondent attends a university and zero if respondent attends a university of applied sciences. Finally, a variable for self-employed parents is included which indicates if students have one or both of their parents self-employed. Having self-employed parents can influence the intention or the actual decision to become an entrepreneur (Scheter et al., 1989; Parker and van Praag 2012, Verheul et al. 2012).

3.4 Methodology

In order to test the hypotheses, derived from both the TPB and literature review, mediation methodology is applied. More specifically, because of the binary construct of the dependent variables, a binary mediation methodology is chosen which includes ordinary least squares (OLS) and binary logistic regressions⁶.

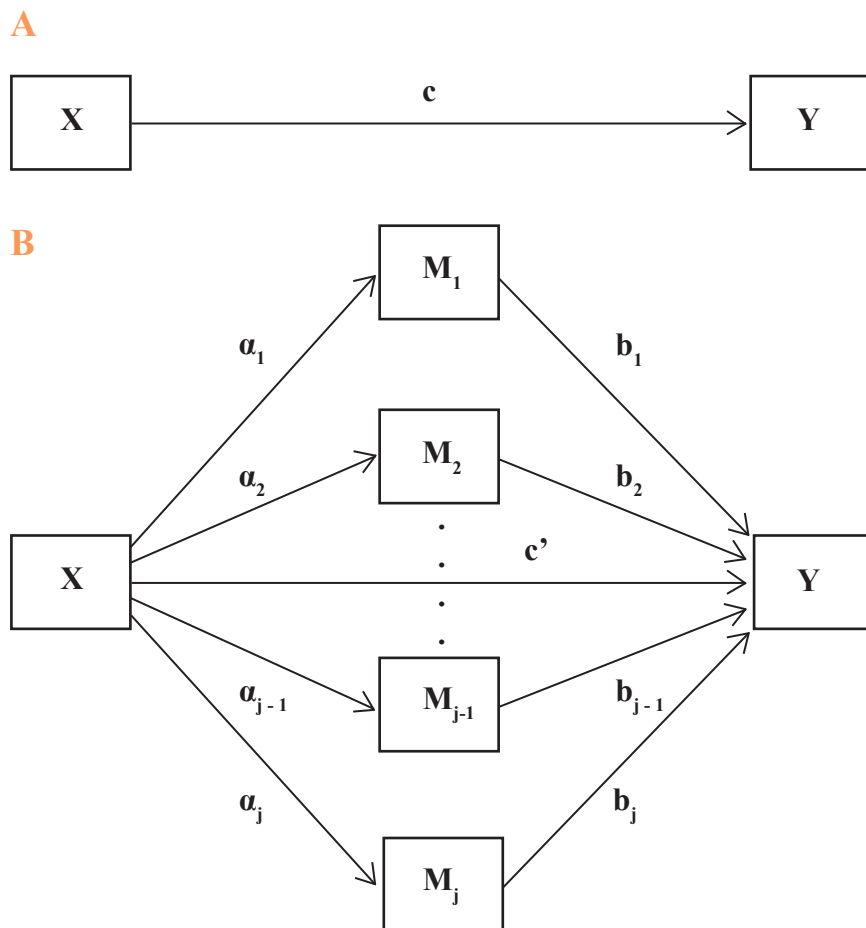
In the model, entrepreneurial intention is the dependent variable and the main independent variable is participation in entrepreneurship education program. Additionally, drawing on the theory of planned behavior, attitude towards entrepreneurship, subjective norm and perceived behavioral control are used as mediators between the dependent and independent variable. Therefore, we control for variables that are related to the entrepreneurship education (field of studies, type of university, level of studies) and demographic variables (age, gender, self-employed parents).

⁶ In logistic regression, information is taken about the sign of the impact and significance level. In order to obtain the average discrete changes in the probability respondent to have the intention towards entrepreneurship, average marginal effects have to be used.

3.4.1 Multiple mediator model

Mediation models hypothesize how, or by what means, the independent variable (X) affects the dependent variable (Y) through one or more intervening variables or mediators (M) (Preacher & Hayes, 2008a). In the context of this paper, it will be tested how participation in entrepreneurship education program affects entrepreneurial intention through attitude toward entrepreneurship, subjective norm and perceived behavioral control. Because of the three mediators in this model, a multiple mediator model is applied.

Figure 6
Multiple mediation design with three mediators



Note: (A) X affects Y (total effect).

(B) X is hypothesized to exert indirect effects on Y through M_1 , M_2 and M_3 .

Source: Preacher & Hayes, (2008a)

Figure 6 illustrates the multiple mediation design with the three mediators; (A) represents the total effect of participation in EEP on entrepreneurial intention (path c), while, (B) represents both the direct effect of participation in EEP on entrepreneurial intention (path c') and the indirect effects of the independent variable on the dependent variable through the three mediators (attitude toward entrepreneurship, subjective norm and perceived behavioral control). The specific effect of participation in EEP on entrepreneurial intention, for instance, through attitude towards entrepreneurship is defined as the product of the two unstandardized paths linking the independent variable to the dependent variable via this mediator (Preacher & Hayes, 2008a). This indirect effect is quantified as a_1b_1 (see Figure 6). The total indirect effect of participation in EEP on entrepreneurial intention is the sum of specific indirect effects: $\sum_i(a_i b_i)$, $i = 1$ to j .

The total effect of participation in EEP on entrepreneurial intention is the sum of the direct effect and all j of the specific indirect effects: $c = c' + \sum_i(a_i b_i)$, $i = 1$ to j and the total indirect can also calculated as $c - c'$.

Investigating multiple mediation should involve two parts: (a) investigating the total indirect effect, or deciding whether the set of mediators transmits the effect of X to Y ; and (b) testing hypotheses regarding individual mediators in the context of a multiple mediator model. In the complete mediation, after controlling for the mediators, the independent variable is no longer affecting the dependent variable (c' is zero). On the other hand, in the case of partial mediation when the mediator is introduced, the path from independent to dependent is reduced in absolute size but is still different from zero,

In this paper two approaches are proposed for testing total and specific indirect effects in the multiple mediator model: The causal steps approach, which developed by Baron & Kenny (1986) and Judd & Kenny (1981), and bootstrapping method.

3.4.2 The causal steps approach

In general, mediation can be said to occur when (1) the IV significantly affects the mediator, (2) the IV significantly affects the DV in the absence of the mediator, (3) the mediator has a significant unique effect on the DV, and (4) the effect of the IV on the DV shrinks upon the addition of the mediator to the model. These criteria can be used to informally judge whether or not mediation is occurring.

3.4.3 Bootstrapping method

Mediation may be formally assessed through the bootstrapping method. Statistical methodologists who study mediation are advocating bootstrapping as one of the better methods for estimating and testing hypotheses about mediation (e.g., MacKinno et al. 2004; Preacher & Hayes, 2008a; Shrout & Bolger, 2002).

4. Results

Both Spearman correlation⁷ and Pearson correlation were applied and showed similar results. Table 5 (below) presents the means, the standard deviations and the Pearson correlations. At the top of the table the dependent variable is presented, and follow the three mediators and explanatory variables. The data are not suffering from shared variance (correlations are below the 0.60) except between perceived behavioral control and attitude towards entrepreneurship. Since mediators in a multiple mediator model will typically be inter-correlated, a shared variance among mediators is expected. Additionally, the Variance Inflation Factor (VIF) is calculated. Its value is far below critical levels (Chatterjee et al., 2000), which suggest that multicollinearity is not a cause of concern.

4.1 Entrepreneurial intention right after studies

⁷ Pearson correlation is most appropriate for measurements taken from an interval scale, while the Spearman is more appropriate for measurements taken from ordinal scales. Both of the latter are tested showing similar results.

Table 5
Descriptive statistics and Pearson correlations of variables

Variable	Mean	Sd	EI	ATE	SN	PBC
Entrepreneurial intention (EI)	0.08	0.27	1.0000			
Attitude towards entrepreneurship (ATE)	4.18	1.55	0.1874***	1.0000		
Subjective norms (SN)	5.46	0.98	0.0626***	0.4538***	1.0000	
Perceived behavioural control (PBC)	4.46	0.85	0.1549***	0.6204***	0.3842***	1.0000
Participation in EEP (PEEP)	0.10	0.30	0.0444***	0.1535***	0.0898***	0.1915***
Age	24	4.74	0.0391**	0.0063	-0.0539***	0.0153
Gender	0.55	0.49	-0.0422**	-0.2217***	-0.0549***	-0.2377***
Business&Economics	0.29	0.45	-0.0081	0.2379***	0.1395***	0.2716***
Bachelor	0.66	0.47	0.0580***	0.0580***	0.0461**	0.0229
University institution	0.70	0.45	-0.1202***	-0.0908***	-0.0520***	-0.0587***
Self-employed parents	0.45	0.86	0.0346**	0.1103***	0.1154***	0.1097***

Variable	PEEP	Age	Gender	B&E	Bachelor	UI	SP
Participation in EEP (PEEP)	1.0000						
Age	-0.0468**	1.0000					
Gender	-0.0880***	-0.0642***	1.0000				
Business&Economics (B&E)	0.1718***	-0.0346**	-0.1779***	1.0000			
Bachelor	0.0684***	-0.2859***	0.0010	0.0057	1.0000		
University institution (UI)	-0.1577***	-0.0933***	0.0145	0.0085	-0.3751***	1.0000	
Self-employed parents (SP)	0.0277*	-0.0538***	0.0422***	0.0201*	0.0220*	-0.0201*	1.0000

Notes: N= 6130, Sd: standard deviation

Table 6
Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention right after studies

	Entrepreneurial Intention	
	Standard Errors	Average Marginal Effects
Participation in EEP	0.293**	0.142
<i>Control Variables</i>		
Age	0.024**	0.008
Gender	-0.335**	0.097
Business&Economics	-0.142	0.109
Bachelor	0.221*	0.126
University Institution	-0.656***	0.109
Self-employed parents	0.136**	0.051
N	6130	
Log-likelihood	-1644.5327	
Pseudo R ²	0.0301	

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **Gender**: 1= female, **Business&Economics**: 1= business and economics; 0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

As can be seen from the Table 5 (above), participation in an entrepreneurship education program is positively and significantly correlated with entrepreneurial intention directly after studies ($r=0.04$, $p<0.000$). Logistic regression, as shown in Table 6, indicates that that participation in an entrepreneurship education shows a positive and significant effect on the probability of having an entrepreneurial intention right after studies (0.293, $p<0.000$). Participants in the entrepreneurship education program (EEP) are more likely to intend to start their own business, directly after their studies, compared to non-participants. On average, participation in EEP *ceteris paribus* increases the probability of having entrepreneurial intention right after studies by 2%.

Regarding the control variables, Table 6 shows that older students are more likely to have entrepreneurial intention after studies. Being female decreases the probability of having entrepreneurial intention after studies by 2.4%. Bachelor students are more likely to have entrepreneurial intention after studies compared to students from higher level of study. Furthermore, attending a University decreases the probability of intending to be a founder by 4.6% than attending a University of Applied Sciences. Finally, having one or both of the parents self-employed increases the probability of having entrepreneurial intention after studies by 0.9%. In addition, the R-square indicates that approximately 3% of variance in intention is explained by the model.

Test of Hypothesis 1

The results showed that students, who participated in an entrepreneurship education program, are more likely to have entrepreneurial intention right after their studies than non-participants. Therefore Hypothesis 1 is accepted.

Table 7
Multiple binary mediator model

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (Path c'): direct effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (Path b1,b2,b3): effect of each mediator on entrepreneurial intention right after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.458***	0.172***	0.361***	0.308**	0.067
<i>Mediators</i>					
Attitude (ATE)					0.456***
Subjective norm (SN)					-0.205**
Perceived behavioural control (PBC)					0.398***
<i>Control Variables</i>					
Age	-0.002	-0.011***	0.002	0.024**	0.025**
Gender	-0.591***	-0.071**	-0.313***	-0.370***	-0.028
Business&Economics	0.662***	0.259***	0.434***	-0.136	-0.496***
Bachelor	0.129**	0.036	0.018	0.227*	0.207
University Institution	-0.190***	-0.109***	-0.068**	-0.621***	-0.560***
Self-employed parents	0.184***	0.125***	0.102***	0.140**	0.065
N	5832	5832	5832	5832	5832
Log-likelihood				-1553.1284	-1436.6883
Pseudo R ²				0.0292	0.1020

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention right after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

The Table 5 shows that participation in entrepreneurship education is positively and significantly correlated to attitude ($r=0.15$, $p<0.000$), to subjective norm ($r=0.08$, $p<0.000$) and to perceived behavioral control ($r=0.19$, $p<0.000$). OLS regression models (Table 7; path a1, a2, a3) also shows that participation in entrepreneurship education has a positive and significant effect on attitude towards entrepreneurship (0.458, $p<0.000$), subjective norm (0.172, $p<0.000$), and perceived behavioral control (0.361, $p<0.000$).

It can be seen from the Table 7 (path c') that participation in entrepreneurship education shows a positive but insignificant effect on the probability of having entrepreneurial intention right after studies (0.067). However, this is expected because of the inclusion of the mediators.

It is apparent from Table 5 that attitude towards entrepreneurship is positively and significantly correlated to entrepreneurial intention after studies ($r=0.18$, $p<0.000$). Likewise, Table 7 (path b1) shows that attitude towards entrepreneurship shows a positive and significant effect on the probability of having entrepreneurial intention after studies (0.456, $p<0.000$). A higher attitude towards entrepreneurship and, *ceteris paribus*, increases the probability of having entrepreneurial intention. Subjective norm is positively and significantly correlated with entrepreneurial intention after studies (Table 5: $r=0.05$, $p<0.000$). Nevertheless, Table 7 shows that subjective norm shows a negative and significant effect on the probability of having entrepreneurial intention after studies (-0.205 , $p<0.05$). This rather contradictory result may be due to net suppression⁸. A higher subjective norm decreases the probability of having entrepreneurial intention. Perceived behavioral control is positively and significantly correlated with entrepreneurial intention after studies (Table 5: $r=0.15$, $p<0.000$). Perceived behavioral control also shows a positive effect on the probability of having entrepreneurial intention after studies (Table 7: 0.398, $p<0.000$). A higher perceived behavioral control, *ceteris paribus*, increases the probability of having entrepreneurial intention.

Based on causal steps approach, the above analysis shows that partial mediation occurs. (1) Participation in entrepreneurship education program significantly affects the mediators. (2) Participation in entrepreneurship education program significantly affects the entrepreneurial intention in the absence of the mediators. (3) The three mediators have a significant unique effect on the entrepreneurial intention, and (4) the effect of participation in entrepreneurship education program on the entrepreneurial intention shrinks upon the addition of the mediators to the model. These criteria can be used to informally judge whether or not mediation is occurring, but more proof is needed so as to formally assess mediation. In order to further test the hypotheses about mediation the hypothesized effects are bootstrapped.

⁸ Net suppression occurs when a predictor variable has a regression weight with an opposite sign to its correlation with the criterion. Subjective norm is positively correlated with the dependent variable, but it has a negative regression coefficient.

Table 8
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0309	0.00533695	0.0212072	0.0425331
Indirect 2 (path a2b2)	-0.0052	0.0020866	-0.0101926	-0.0018033
Indirect 3 (path a3b3)	0.0213	0.00497506	0.0120008	0.0316482
Total indirect	0.0470	0.00590755	0.0358275	0.0592969
Direct effect (path c')	0.0099	0.02322892	-0.0392086	0.0517237
Total effect (path c)	0.0570	0.02343756	0.0052399	0.0983014
Proportion of total effect mediated	0.8249			
N	5832			
Replications	2000			

Table 8 provides the Bootstrapping effects. As can be seen from this table, participation in entrepreneurship education exerts an effect on entrepreneurial intention after studies through attitude, controlling for all other included mediators. The estimated indirect effect (indirect 1) is 0.0309. As zero is not in the confidence interval, the indirect effect is reliably different from zero. Furthermore, participation in entrepreneurship education exerts an effect on entrepreneurial intention after studies through subjective norm, controlling for all other included mediators. The estimated indirect effect (indirect 2: -0.0052) is reliably different from zero, as zero is not in the confidence interval. Participation in entrepreneurship education also exerts an effect on entrepreneurial intention after studies through perceived behavioral control, controlling for all other included mediators. The estimated indirect effect (indirect 3: 0.0213) is reliably different from zero, as zero is not in the confidence interval.

Regarding the total indirect effect of participation in entrepreneurship education on entrepreneurial intention after studies through attitude, subjective norm and perceived behavioral control, is reliably different from zero. With 2000 bootstrap samples, the point estimate is 0.0470. With respect to the total effect of participation in entrepreneurship education on entrepreneurial intention after studies, is 0.0570. As zero is not in the confidence interval, the total effect is reliably different from zero.

Test of Hypothesis 2

The results show that participation in an entrepreneurship education exerts an effect on entrepreneurial intention after studies through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Therefore Hypothesis 2 is accepted.

Test of Hypothesis 3

The results show that students, who participated in an entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, perceived behavioral control than non-participants. Therefore Hypothesis 3 is accepted.

Test of Hypothesis 4

Attitude towards entrepreneurship and perceived behavioral control, show a positive and significant effect on entrepreneurial intention of students while subjective norm shows a negative but also significant effect. Therefore Hypothesis 2 is partly accepted.

4.2 Entrepreneurial intention five years after studies

Table 9
Descriptive statistics and Pearson correlations of variables

Variable	Mean	Sd	EI	ATE	SN	PBC
Entrepreneurial intention (EI)	0.40	0.49	1.0000			
Attitude towards entrepreneurship (ATE)	4.18	1.55	0.5233***	1.0000		
Subjective norms (SN)	5.46	0.98	0.2620***	0.4538***	1.0000	
Perceived behavioural control (PBC)	4.46	0.85	0.3503***	0.6204***	0.3842***	1.0000
Participation in EEP (PEEP)	0.10	0.30	0.0994***	0.1535***	0.0898***	0.1915***
Age	24	4.74	0.0258**	0.0063	-0.0539***	0.0153
Gender	0.55	0.49	-0.0777**	-0.2217***	-0.0549***	-0.2377***
Business&Economics	0.29	0.45	-0.1016***	0.2379***	0.1395***	0.2716***
Bachelor	0.66	0.47	0.0938***	0.0580***	0.0461**	0.0229
University institution	0.70	0.45	-0.1521***	-0.0908***	-0.0520***	-0.0587***
Self-employed parents	0.45	0.86	0.1007**	0.1103***	0.1154***	0.1097***

Variable	PEEP	Age	Gender	B&E	Bachelor	UI	EP
Participation in EEP (PEEP)	1.0000						
Age	-0.0468**	1.0000					
Gender	-0.0880***	-0.0642***	1.0000				
Business&Economics (B&E)	0.1718***	-0.0346**	-0.1779***	1.0000			
Bachelor	0.0684***	-0.2859***	0.0010	0.0057	1.0000		
University institution (UI)	-0.1577***	-0.0933***	0.0145	0.0085	-0.3751***	1.0000	
Self-employed parents (SP)	0.0277*	-0.0538***	0.0422***	0.0201*	0.0220*	-0.0201*	1.0000

Notes: N= 6130, Sd: standard deviation

Table 10
Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention five years after studies

	Entrepreneurial Intention		
	Standard Errors	Average Marginal Effects	
Participation in EEP	0.379***	0.089	0.086***
<i>Control Variables</i>			
Age	0.012**	0.005	0.002**
Gender	-0.237***	0.055	-0.053***
Business&Economics	0.391***	0.060	0.088***
Bachelor	0.272***	0.066	0.061***
University Institution	-0.538***	0.064	-0.121***
Self-employed parents	0.232***	0.031	0.052***
N	6130		
Log-likelihood	-3952.1945		
Pseudo R ²	0.0392		

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 9 shows that participation in entrepreneurship education program is positively and significantly correlated with entrepreneurial intention five years after studies ($r=0.09$, $p<0.000$). Logistic regression, as shown in Table 10, indicates that participation in entrepreneurship education, shows a positive and significant effect on the probability of having entrepreneurial intention five years after studies (0.379, $p<0.000$). Participants in entrepreneurship education program (EEP) are more likely to intend to start their own business, five years after their studies, compared to non-participants. On average, participation in EEP, *ceteris paribus* increases the probability of having entrepreneurial intention five years after studies by 8.6%.

Regarding the control variables, it can be seen from the results in Table 10 that older students are more likely to have entrepreneurial intention five years after studies. Being female decreases the probability of having entrepreneurial intention five years after studies by 5.3%. Students who study business and economics studies are more likely to start their own business than students from other study fields. Bachelor students are more likely to have entrepreneurial intention five years after studies compared to students from higher level of study. Furthermore, attending a University decreases the probability of intending to be a founder by 12.1% than attending a University of Applied Sciences. Finally, having one or both of the parents self-employed increases the probability of attending to start a business five years after studies by 5.2%. In addition, the R-square indicates that approximately 4% of variance in intention is explained by the model.

Test of Hypothesis 1

The results showed that students, who participated in an entrepreneurship education program, are more likely to have entrepreneurial intention five years after their studies than non-participants. Therefore Hypothesis 1 is accepted.

Table 11**Multiple binary mediator model: OLS and Logistic regressions**

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (Path c'): direct effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (Path b1,b2,b3): effect of each mediator on entrepreneurial intention five years after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.458***	0.172***	0.361***	0.390**	0.062
<i>Mediators</i>					
Attitude (ATE)					0.909**
Subjective norm (SN)					0.080**
Perceived behavioural control (PBC)					0.136**
<i>Control Variables</i>					
Age	-0.002	-0.011***	0.002	0.012**	0.019**
Gender	-0.591***	-0.071**	-0.313***	-0.230***	0.286***
Business&Economics	0.662***	0.259***	0.434***	0.136	-0.122*
Bachelor	0.129**	0.036	0.018	0.415*	0.257**
University Institution	-0.190***	-0.109***	-0.068**	-0.534***	-0.544***
Self-employed parents	0.184***	0.125***	0.102***	0.232**	0.124**
N	5832	5832	5832	5832	5832
Log-likelihood				-3749.6581	-2887.2414
Pseudo R ²				0.0404	0.2611

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention 5 years after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

As can be seen from the Table 9, participation in an entrepreneurship education is positively and significantly correlated to attitude ($r=0.09$, $p<0.000$), to subjective norm ($r=0.15$, $p<0.000$) and to perceived behavioral control ($r=0.08$, $p<0.000$). OLS regression models (Table 11; path a1, a2, a3) also shows that participation in entrepreneurship education has a positive and significant effect on attitude towards entrepreneurship (0.458, $p<0.000$), subjective norm (0.172, $p<0.000$), and perceived behavioral control (0.361, $p<0.000$).

Table 11 (path c') shows that participation in entrepreneurship education shows a positive but an insignificant effect on the probability of having entrepreneurial intention five years after studies (0.062). However, this is expected because of the inclusion of the mediators.

It can be seen from the Table 9 that attitude towards entrepreneurship is positively and significantly correlated to entrepreneurial intention five years after studies ($r=0.52$, $p<0.000$). Likewise, Table 11 (path b1) shows that attitude towards entrepreneurship shows a positive and significant effect on the probability of having entrepreneurial intention five years after studies (0.909, $p<0.05$). A higher attitude towards entrepreneurship, *ceteris paribus*, increases the probability of having entrepreneurial intention. Subjective norm is positively and significantly correlated with entrepreneurial intention five years after studies (Table 9: $r=0.26$, $p<0.000$). Table 11 (above) shows that subjective norm shows a positive and significant effect on the probability of having entrepreneurial intention five years after studies (0.080, $p<0.05$). A higher subjective norm increases the probability of having entrepreneurial intention five years after studies. Perceived behavioral control is positively and significantly correlated with entrepreneurial intention after studies (Table 9: $r=0.35$, $p<0.000$). Perceived behavioral control also shows a positive effect on the probability of having entrepreneurial intention five years after studies (Table 11: 0.136, $p<0.05$). A higher perceived behavioral control, *ceteris paribus*, increases the probability of having entrepreneurial intention five years after studies.

Based on the causal steps approach, the above analysis shows that partial mediation occurs. (1) Participation in entrepreneurship education program significantly affects the mediators. (2) Participation in an entrepreneurship education program significantly affects the entrepreneurial intention in the absence of the mediators. (3) The three mediators have a significant unique effect on the entrepreneurial intention, and (4) the effect of participation in entrepreneurship education program on the entrepreneurial intention shrinks upon the addition of the mediators to the model. These criteria can be used to informally judge whether or not mediation is occurring, however more proof is needed so as to formally assess mediation. In order to further test the hypotheses about mediation the hypothesized effects are bootstrapped.

Table 12
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0525	0.00691787	0.0385348	0.0654817
Indirect 2 (path a2b2)	0.0017	0.00101022	0.0001491	0.0042494
Indirect 3 (path a3b3)	0.0062	0.0024365	0.0016638	0.0112715
Total indirect	0.0604	0.0074482	0.0452038	0.0749282
Direct effect (path c')	0.0078	0.01334456	-0.0176389	0.0350968
Total effect (path c)	0.0683	0.01515138	0.038056	0.0982578
Proportion of total effect mediated	0.8852			
N	5832			
Replications	2000			

Table 8 shows that participation in entrepreneurship education exerts an effect on entrepreneurial intention five years after studies through attitude, controlling for all other included mediators. The estimated indirect effect (indirect 1) is 0.0525. As zero is not in the confidence interval, the indirect effect is reliably different from zero. Furthermore, participation in entrepreneurship education exerts an effect on entrepreneurial intention five years after studies through subjective norm, controlling for all other included mediators. The estimated indirect effect (indirect 2: 0.0017) is reliably different from zero, as zero is not in the confidence interval. Participation in entrepreneurship education also exerts an effect on entrepreneurial intention five years after studies through perceived behavioral control, controlling for all other included mediators. The estimated indirect effect (indirect 3: 0.006) is reliably different from zero, as zero is not in the confidence interval.

Regarding the total indirect effect of participation in entrepreneurship education on entrepreneurial intention five years after studies through attitude, subjective norm and perceived behavioral control, is reliably different from zero. With 2000 bootstrap samples, the point estimate is 0.0604.

With respect the total effect of participation in entrepreneurship education on entrepreneurial intention five years after studies, the estimated effect is 0.0683. As zero is not in the confidence interval, the total effect is reliably different from zero.

Test of Hypothesis 2

The results show that participation in an entrepreneurship education exerts an effect on entrepreneurial intention after studies through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Therefore Hypothesis 2 is accepted.

Test of Hypothesis 3

The results show that students, who participated in an entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, perceived behavioral control than non-participants. Therefore Hypothesis 3 is accepted.

Test of Hypothesis 4

Attitude towards entrepreneurship, subjective norm and perceived behavioral control, show a positive and significant effect on the entrepreneurial intention of students. Therefore Hypothesis 4 is accepted.

4.3 Robustness of the Model

As a further robustness check we investigate whether the same results are obtained for males and females. The Tables 13- 24 in Appendices present the resulting models for each gender.

The results for female students revealed that participation in entrepreneurship education shows a positive but insignificant effect on the probability of having entrepreneurial intention right after studies. Mediation is not occurring. Nevertheless, females who participated in entrepreneurship education programs are more likely to have higher entrepreneurial intention five years after their studies than non-participants. In addition, participation in entrepreneurship education program indirectly affects entrepreneurial intention, through attitude towards entrepreneurship and subjective norm.

Regarding male students, significant results are obtained for both entrepreneurial intentions directly and five years after studies. In particular, males, who participated in entrepreneurship education program, are more likely to have higher entrepreneurial intention than non-participants. Participation of male students in entrepreneurship education program indirectly affects entrepreneurial intention right studies, through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Participation of male students in entrepreneurship education program indirectly affects entrepreneurial intention five years after studies, through attitude towards entrepreneurship and perceived behavioral control.

Overall, running the same analysis for male and female students confirms the robust

ness of the model for entrepreneurial intention five years after studies.

5. Conclusion & discussion

This study proposed the following research question: Do students, who attended an entrepreneurship education program, have higher entrepreneurial intention than those who did not attend? To address this question four hypotheses were developed, based on a conceptual model; inspired by previous studies on the subject and the theory of planned behavior.

The results obtained from the empirical analysis indicate that participants in an entrepreneurship education program (EEP) are more likely to intend to start their own business, directly after their studies, compared to non-participants (Hypothesis 1 is accepted). On average, participation in EEP, *ceteris paribus* increases the probability of having entrepreneurial intention right after studies by 2%. Participation in entrepreneurship education, exerts an effect on entrepreneurial intention after studies through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Therefore, attitude toward entrepreneurship, subjective norm and perceived behavioral control partially mediates the latter relationship (Hypothesis 2 is accepted). Moreover, students, who participated in entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, and greater perceived behavioral control than non-participants (Hypothesis 3 is accepted). Attitude towards entrepreneurship and perceived behavioral control, show a positive and significant effect on entrepreneurial intention of students right after their studies, while subjective norm shows a negative but also significant effect (Hypothesis 4 is partly accepted).

The results also show, that participants in an entrepreneurship education program (EEP) are more likely to intend to start their own business, five years after their studies, compared to non-participants (Hypothesis 1 is accepted). On average, participation in EEP, *ceteris paribus*, increases the probability of having an entrepreneurial intention five years after studies by 8.6%. Participation in entrepreneurship education, exerts an effect on entrepreneurial intention after studies through attitude towards entrepreneurship, subjective norm and perceived behavioral control. Therefore, partial mediation is occurring (Hypothesis 2 is accepted). Furthermore, students, who participated in an entrepreneurship education program, are more likely to have higher attitude towards entrepreneurship, subjective norm, perceived behavioral control than non-participants (Hypothesis 3 is accepted). Attitude towards entrepreneurship, subjective norm and perceived behavioral control, show a positive and significant effect on entrepreneur

ial intention of students five years after studies (Hypothesis 4 is accepted).

Not surprisingly, the students who participated in the entrepreneurship education program showed a higher propensity towards entrepreneurship than the control group. The present findings seem to be consistent with previous research which found a positive link between participation in entrepreneurship education and entrepreneurial intention. The results also showed that the framework built on TPB model can be used to explain entrepreneurial intention. The three predictors of TPB (attitude towards entrepreneurship, subjective norm and perceived behavioral control) mediate the relationship under investigation. Participation in the entrepreneurship program indirectly affects the entrepreneurial intention. Moreover, students who participated in an entrepreneurship education program have on average a higher probability of founding their own business five years after studies rather than directly after their studies (8.6% vs. 2%). A possible explanation for this might be that graduates want to first gain work experience and then, in a later stage of their career path, to consider founding their own company.

Nevertheless, several limitations have to be kept in mind when considering the findings and conclusions of this paper. This study is limited by its cross-sectional data; students are observed only at a single point in time, not across time. The latter prevents the development of a pre-test and post-test research design necessary for the better assessment of effectiveness of the entrepreneurship education programs. Furthermore, the “self-selection bias” cannot be averted. Presumably, participants may have a prepossession towards entrepreneurship prior to their enrollment to an entrepreneurship education program. As a result, students with a stronger intention towards entrepreneurship may choose to participate in entrepreneurship courses or programs. One also crucial limitation is the lack of information on the actual content and objective of university offerings in entrepreneurship. It is difficult to understand which elements of these offerings influence the entrepreneurial intention of students. Moreover, a positive impact of EEP is not always an indicator of effective entrepreneurship program. Maybe a negative impact means that entrepreneurship education helps students to realize whether entrepreneurship is the right career path for them. Because of the use of secondary data, it is not clear if students are still participating or have already completed the program.

Students, who attended an entrepreneurship education program have higher entrepreneurial intentions (either right or five years after their studies) than those who did not attend. However, one has to take into account that the latter intention is mediated by the attitude towards entrepreneurship, subjective norm and perceived behavioral control.

This study uses a large sample consisting of many educational institutions, within higher education, in the Netherlands. Previous studies based on a particular course or program from one particular educational institution, making generalization difficult. The aim of the present study is to contribute also both to Theory of Planned Behavior (by empirically linking entrepreneurship education programs with the intention towards entrepreneurship) and to the field of entrepreneurship education (by evaluating the entrepreneurship education programs in influencing entrepreneurial intentions of students).

In addition, the results of this study may have implications for entrepreneurship educators, educational institutions at higher education in the Netherlands and policy makers. Firstly, policy makers have to determine the degree up to which entrepreneurship education is effective while achieving its goals and qualifying the resources allocated to it. By gaining more insight into the impact of entrepreneurship education, and the impact of entrepreneurship education programs, can contribute to overcome the obstacles hindering in pursuing an entrepreneurial career. The current research can provide valuable feedback to Dutch universities, in order to offer more sophisticated and well-structured educational programs to students. For instance, the knowledge of a larger impact of participation in programs on the entrepreneurial intention five years after studies and rather than on the entrepreneurial intention directly after studies.

The framework we outline in this report opens up several avenues for future work. However, more research on this topic needs to be undertaken before the impact of participation in entrepreneurship education program on entrepreneurial intention of students is more clearly understood. In this report, the aforementioned relationship was measured only for intentional founders compared to employees. In future investigations it might be possible to use successors. Furthermore, the impact of participation in the program on entrepreneurial intention was measured in a single point of time. Longitudinal data could be collected so as to measure the latter. This will lead to the development of a pre and post-test model design; suitable for the assessment of attitude, subjective norm, and perceived behavioral control before and after participation in the entrepreneurship education program.

Shook et al. (2003) suggest that 'Future work on entrepreneurial intentions should attempt to integrate and reduce the number of alternative intention models'. Further work needs to be done to establish whether a coherent and robust theoretical framework like this of TPB is used. More research is needed to better understand the impact of either a cohesive entrepreneurship education program or each component of these programs. An interesting avenue for

further research would be to investigate the role of the subjective norm. In this study the subjective norm is significant and positive only in the relationship between participation in the entrepreneurship education program and entrepreneurial intention five years after studies. Further research might address questions to students to understand which exact elements of entrepreneurship courses affect entrepreneurial intention; learning about entrepreneurship or inspiring lecturers. More broadly, research is also needed to determine the impact of entrepreneurship education programs not only on intentions but entrepreneurial mindset of students.

In this investigation, the aim was to assess the impact of participation in entrepreneurship education programs, at higher educational institutions in the Netherlands, on the entrepreneurial intention right or five years after studies. However, an assessment of an overall impact of entrepreneurship education at higher education can determine the degree up to which entrepreneurship education is effective while achieving its goals and qualifying the resources allocated to it.

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Appendices

Gender Analysis

Entrepreneurial intention right after studies

Female

Table 13

Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention right after studies

	Entrepreneurial Intention		Average Marginal Effects
		Standard Errors	
Participation in EEP	0.204	0.236	0.012
<i>Control Variables</i>			
Age	0.049**	0.011	0.003**
Business&Economics	-0.390	0.187	-0.024
Bachelor	0.291	0.179	0.017
University Institution	-0.792***	0.155	0.048***
Self-employed parents	0.097	0.073	-0.005
N	3457		
Log-likelihood	-820.83743		
Pseudo R ²	0.0440		

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **EI**: entrepreneurial intention right after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 14**Multiple binary mediator model: OLS and Logistic regressions**

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (Path c', b1,b2,b3): direct effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (b1,b2,b3): effect of each mediator on entrepreneurial intention right after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.517***	0.157**	0.431***	0.240	-0.029
<i>Mediators</i>					
Attitude (ATE)					0.272***
Subjective norm (SB)					-0.107
Perceived behavioural control (PBC)					0.428***
<i>Control Variables</i>					
Age	-0.000	-0.009**	0.000	0.046***	0.050***
Business&Economics	0.712***	0.264***	0.461	-0.373	-0.700***
Bachelor	0.176**	0.100	0.027	0.279	-0.243
University Institution	-0.203**	-0.090**	-0.049	-0.733***	-0.694***
Self-employed parents	0.218***	0.149***	0.117	0.095	0.009
N	3286	3286	3286	3286	3286
Log-likelihood				-768.42882	-731.72496
Pseudo R ²				0.0387	0.0846

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention right after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 15
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0193	0.00599426	0.0095456	0.0329712
Indirect 2 (path a2b2)	-0.0023	0.0022597	-0.0080354	0.0008903
Indirect 3 (path a3b3)	0.0252	0.00734481	0.012647	0.042508
Total indirect	0.0422	0.00738367	0.0287931	0.0575409
Direct effect (path c')	0.0040	0.03557842	-0.0784914	0.060409
Total effect (path c)	0.0382	0.0362014	-0.0389461	0.1007131
Proportion of total effect mediated				
N	3286			
Replications	2000			

Entrepreneurial intention five years after studies

Table 16
Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention five years after studies

	Entrepreneurial Intention	
	Standard Errors	Average Marginal Effects
Participation in EEP	0.577*** 0.135	0.125***
<i>Control Variables</i>		
Age	0.017** 0.008	0.003**
Business&Economics	0.383*** 0.088	-0.083***
Bachelor	0.313** 0.090	0.068***
University Institution	-0.589*** 0.086	0.128***
Self-employed parents	0.266*** 0.040	-0.057***
N	3457	
Log-likelihood	-2161.5553	
Pseudo R²	0.0451	

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 17**Multiple binary mediator model: OLS and Logistic regressions**

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (Path c', b1,b2,b3): direct effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (b1,b2,b3): effect of each mediator on entrepreneurial intention five years after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.517***	0.157**	0.431***	0.601***	0.319*
<i>Mediators</i>					
Attitude (ATE)					0.869***
Subjective norm (SB)					0.134**
Perceived behavioural control (PBC)					0.038
<i>Control Variables</i>					
Age	-0.000	-0.009**	0.000	0.017**	0.024**
Business&Economics	0.712***	0.264***	0.461***	0.420	-0.134
Bachelor	0.176**	0.100**	0.027	0.332***	-0.279**
University Institution	-0.203**	-0.090**	-0.049	-0.562***	-0.568***
Self-employed parents	0.218***	0.149***	0.117***	0.095	0.150**
N	3286	3286	3286	3286	3286
Log-likelihood				-2047.9548	-1587.4133
Pseudo R ²				0.0465	0.2609

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention five after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 18
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0511	0.00978741	0.0323906	0.0710388
Indirect 2 (path a2b2)	0.0023	0.00144633	0.0002724	0.0061771
Indirect 3 (path a3b3)	0.0018	0.00341573	-0.0049366	0.0086554
Total indirect	0.0554	0.01044574	0.0341629	0.0757365
Direct effect (path c')	0.0362	0.01842987	-0.001346	0.0705918
Total effect (path c)	0.0916	0.02164467	0.0493952	0.1336712
Proportion of total effect mediated				
N	3286			
Replications	2000			

Male

Entrepreneurial intention right after studies

Table 19
Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention right after studies

	Entrepreneurial Intention		Average Marginal Effects
		Standard Errors	
Participation in EEP	0.340**	0.179	0.028**
<i>Control Variables</i>			
Age	-0.003	0.013	-0.000
Business&Economics	-0.006	0.140	-0.000
Bachelor	0.228	0.179	0.019
University Institution	-0.494***	0.156	-0.041***
Self-employed parents	0.190***	0.072	0.015***
N	2673		
Log-likelihood	-813.56006		
Pseudo R²	0.0202		

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 20**Multiple binary mediator model: OLS and Logistic regressions**

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (Path c', b1,b2,b3): direct effect of Participation in EEP on entrepreneurial intention right after studies

Logistic regression (b1,b2,b3): effect of each mediator on entrepreneurial intention right after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.416***	0.188***	0.308***	0.345*	0.135
<i>Mediators</i>					
Attitude (ATE)					0.725***
Subjective norm (SB)					-0.292***
Perceived behavioural control (PBC)					0.359***
<i>Control Variables</i>					
Age	-0.005	-0.013***	0.004	-0.003	-0.006
Business&Economics	0.606***	0.250***	0.407***	-0.004	-0.404***
Bachelor	0.064	-0.053	-0.001	0.234	0.203
University Institution	-0.168**	-0.142***	-0.093**	-0.494***	-0.446***
Self-employed parents	0.130***	0.086***	0.078***	0.197***	0.131
N	2546	2546	2546	2546	2546
Log-likelihood				-776.45289	-683.10943
Pseudo R ²				0.0207	0.1387

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention right after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 21
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0470	0.00989617	0.0293157	0.0677167
Indirect 2 (path a2b2)	-0.0085	0.00355874	-0.0175009	-0.0031318
Indirect 3 (path a3b3)	0.0172	0.0064353	0.0064368	0.0313547
Total indirect	0.0557	0.01003703	0.0349758	0.075271
Direct effect (path c')	0.0211	0.03078413	-0.0428135	0.0794621
Total effect (path c)	0.0769	0.0318319	0.0093693	0.1354305

Proportion of total effect mediated	
N	2546
Replications	2000

Male

Entrepreneurial intention five years after studies

Table 22
Logistic regression: effect of participation in entrepreneurship education program (EEP) on entrepreneurial intention five years after studies

	Entrepreneurial Intention		
		Standard Errors	Average Marginal Effects
Participation in EEP	0.229*	0.119	0.054*
<i>Control Variables</i>			
Age	0.007	0.008	0.001
Business&Economics	0.381***	0.082	0.090***
Bachelor	0.231**	0.098	0.054**
University Institution	-0.464***	0.096	-0.110***
Self-employed parents	0.186***	0.048	0.044***
N	2673		
Log-likelihood	-1786.1722		
Pseudo R²	0.0250		

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 23**Multiple binary mediator model: OLS and Logistic regressions**

OLS regressions (Path a1, a2, a3): effect of Participation in EEP on three mediators.

Logistic regression (Path c): total effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (Path c', b1,b2,b3): direct effect of Participation in EEP on entrepreneurial intention five years after studies

Logistic regression (b1,b2,b3): effect of each mediator on entrepreneurial intention five years after studies

	Path a1	Path a2	Path a3	Path c	Path c', b1, b2, b3
	ATE	SN	PBC	EI	EI
Participation in EEP	0.416***	0.188**	0.308***	0.235**	-0.127*
<i>Mediators</i>					
Attitude (ATE)					0.970***
Subjective norm (SB)					0.009
Perceived behavioural control (PBC)					0.264***
<i>Control Variables</i>					
Age	-0.005***	-0.013***	0.004	0.006	0.013
Business&Economics	0.606***	0.250***	0.407***	0.394***	-0.137
Bachelor	0.064	-0.053	-0.001	0.231**	0.237**
University Institution	-0.168**	-0.142***	-0.093**	-0.490***	-0.514***
Self-employed parents	0.130***	0.086***	0.078***	0.178***	0.087**
N	2546	2546	2546	2546	2546
Log-likelihood				-1697.466	-1291.385
Pseudo R ²				0.0261	0.2591

Notes: ***: p-value less than 0.01; **: p-value less than 0.05; *: p-value less than 0.10, **EEP**: entrepreneurship education program, **ATE**: attitude towards entrepreneurship, **SN**: subjective norm, **PBC**: perceived behavioral control, **EI**: entrepreneurial intention five after studies, **Gender**: 1= female, **Business&Economics**: 1= business and economics;0= social sciences and natural sciences, **Bachelor**: 1=bachelor; 0= Master, PhD, or other, **University Institution**: 1= WO; 0= HBO.

Table 24
Bootstrapping indirect effects, total indirect, direct and total effects

	Observed coef.	Bootstrap Std. Err.	Bias-corrected confidence interval	
Indirect 1 (path a1b1)	0.0568	0.01065463	0.037523	0.0784376
Indirect 2 (path a2b2)	0.0002	0.00177234	-0.0032352	0.0040287
Indirect 3 (path a3b3)	0.0114	0.00387352	0.0046637	0.0196712
Total indirect	0.0686	0.01157193	0.046281	0.0912677
Direct effect (path c')	-0.0179	0.02044504	-0.0575414	0.0227471
Total effect (path c)	0.0506	0.02289846	0.066792	0.0967271
Proportion of total effect mediated				
N	2546			
Replications	2000			

