To what extent does entrepreneurship education increase the certainty by which students judge entrepreneurship as a potential career?

MASTER THESIS
of
the University of Twente
to obtain the title

Master of Science (M.Sc.) in Business Administration

submitted by
Silas Bübel

supervised by
Dr. Rainer Harms (University of Twente)

Berlin 2015

ABSTRACT

Since the introduction of the first entrepreneurship course in 1947 at the Harvard Business School, entrepreneurship education has gained on popularity with the goal to raise entrepreneurial intentions of students. Many researchers have already found positive evidence for the relationship between entrepreneurship education and entrepreneurial attitudes and intentions. However, there is little research examining another important facet of higher education, which is to provide students with certainty of potential future career opportunities. Therefore, the purpose of this thesis was to determine to what extent entrepreneurship education can increase the certainty by which students judge entrepreneurship as a potential career path. The impact of the entrepreneurship class was determined based on a survey conducted before and after an entrepreneurship class and an extension of the Theory of Planned Behavior by a certainty perspective. Results showed directional support (not statistically significant) for an increase of attitude certainty after the entrepreneurship course. This thesis has made a first step to measure career certainty within the entrepreneurship education context.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Since the introduction of the first entrepreneurship course in 1947 at the Harvard Business School (Katz, 2003), entrepreneurship education has acknowledged a major rise, not only in the U.S., but also in Europe. Especially German-speaking Europe seems to be on the right path to build an educational entrepreneurship infrastructure (Klandt, 2004). A recent publication by the German founder research institution FGF e.V. (Förderkreis Gründungs-Forschung) consisted of a list that shows 128 professorships at universities and schools of applied science and therefore opportunities for students to study entrepreneurship (Knaup, 2015).

The main purpose of entrepreneurship education is to teach students how to start a business and develop entrepreneurial skills (e.g. Albornoz-Pardo, 2013), hence to increase their entrepreneurial intentions. Many authors and institutions have already dealt with entrepreneurship education and its impact on entrepreneurial attitudes and intentions (e.g. Linan, 2004; Souitaris et al., 2007; Mueller, 2011; Gibcus et. al, 2012; Bae et al., 2014; Piperopoulus & Dimov, 2014; Zhang et al., 2014; Fayolle et al., 2015). The results show a positive relation between entrepreneurship education and the propensity to become an entrepreneur.

However, there are few studies examining another important element of education, which is the awareness of students about possible career options (Hull, 2005). Feeling confident about career options is important for students because the choice will have lifelong consequences. Nowadays, there is no clear picture of what a certain career path entails, especially as the labor world changes rapidly and more complex career options evolve. Therefore, entrepreneurship education should also serve the purpose to provide students with a detailed picture of entrepreneurship, so that they can judge this career option for themselves.

There is little research in that particular area that combines entrepreneurship education and career certainty. The missing perspective is important because it is necessary for educators to understand whether entrepreneurship education can provide students with the above mentioned career guidance. Furthermore, it could help educators to determine the right type of course for students. Previous research has split entrepreneurship education into theoretically and practically oriented classes with different effects on entrepreneurial intention (Piperopoulos et al., 2014). Consequently, it may not be sufficient to provide students only with theoretical insights about entrepreneurship, instead, educators could

focus on helping students to assess their personal entrepreneurial skills and entrepreneurial potential (e.g. through developing a new product).

The examination of previous literature on entrepreneurial intentions suggests an extension of the Theory of Planned Behavior with the perspective of career certainty. Career certainty can be defined as the degree to which an individual feels confident about his or her vocational plans (Hartung, 1995). Thus, the research question of this master thesis is formulated as follows:

"To what extent does entrepreneurship education increase the certainty by which students judge entrepreneurship as a potential career?"

To answer this question, this thesis will report the results of a survey conducted among business administration students from the University of Twente before and after an entrepreneurship course. The results may be useful to give insight to career counselors and those who are responsible for planning entrepreneurship courses in higher education. They may not only provide a broader view angle for further research into the effects of entrepreneurship education but also an instrument to evaluate university courses ex post with the aim of career certainty.

The thesis is structured as follows. Section 2 will examine the theoretical foundations of intentional models and career certainty. Section 3 will describe the conceptual framework and how the hypotheses were derived from existing literature. Section 4 will provide insight to the methods used to test the hypotheses while the results will be presented in section 5. At the end conclusions and limitations of the research will be discussed.

2 THEORETICAL FOUNDATIONS

2.1 Entrepreneurial intention models

Career choice and career related decisions are generally of cognitive nature (Krueger et al., 2000). Intending to become an entrepreneur is clearly a mental process as a result of the decision-making of an individual. In order to examine to what extent entrepreneurship education affects this career choice, it is necessary to understand intentional models.

Intentional models have been proven to best explain entrepreneurial behavior (Linan, 2004; Krueger et. al, 2000). There are several competing models when determining entrepreneurial intentions. The most commonly used theoretical frameworks are the Theory of Planned Behavior (TPB) by Ajzen and Shapero's model of the Entrepreneurial Event (EE) (Mueller, 2011). The TPB suggests that intentions to perform a certain behavior can be predicted by three perceptions: attitudes toward that behavior, subjective norms and perceived behavioral control. According to the EE model entrepreneurial intentions depend on perceptions of personal desirability, feasibility, and propensity to act. Both models received strong statistical support (Krueger, 2000; Linan & Santos, 2007).

When comparing the two models, similarities can be derived. First of all, Shapero's model to perform a specific behavior depend on perceptions of perceived desirability and perceived feasibility, meaning an individual will develop intentions to create a firm when an event lets him or her perceive the entrepreneurial activity as more desirable and feasible than other alternatives (Linan & Santos, 2007). These perceptions are included more detailed in Ajzen's model with the perception of the difficulty to perform a certain behavior. Ajzen's model offers an additional construct, which is the perception of subjective norms. It captures the expectation of an individual's environment and the motivation to follow these expectations.

Ajzen's TPB suggests that the relation between behavior and its three attitudinal antecedents is mediated by intention. Intention can be defined as an individual's willingness to perform a given behavior (Ajzen, 1991). While the first two antecedents, personal attitude towards the behavior and perceived social norms, reflect the perceived desirability to perform a behavior, the third one, perceived behavioral control, reflects the perception that the behavior is personally controllable (Krueger et al., 2000).

In general the three constructs can be summarized as follows: attitude depends on the expectations and beliefs about the outcomes of a certain behavior, perceived social norms are about what important people in the individual's life think about the behavior and perceived behavioral control represents the ability to execute a particular behavior (Krueger et al., 2000). Ajzen states that intention together with the perception of perceived behavioral control can explain and predict the actual behavior (Ajzen, 1991).

The relationship among the elements are shown in the following figure 1:

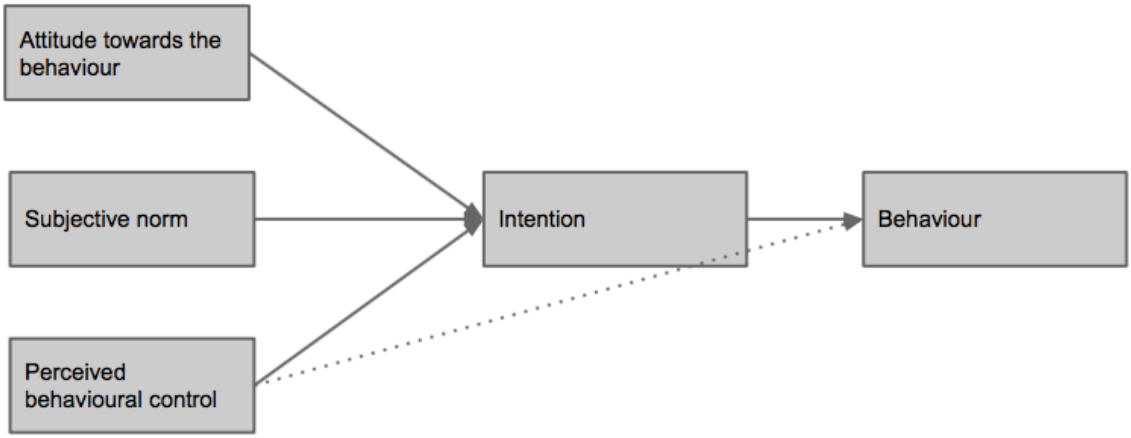

Figure 1: Theory of Planned Behavior (Ajzen, 1991)

Since the aim of this thesis is to analyze the effects of an entrepreneurship course, Ajzen's TPB will further be used as it offers a more detailed and comprehensive approach to examine the effect of entrepreneurship education on entrepreneurial intentions.

Entrepreneurship education can be generally defined as the process to provide students with the ability to recognize new business opportunities and to gain insight, self-esteem and knowledge to pursue them (Jones & English, 2004). Several studies have shown that the TPB is not only suitable to predict start-up intentions (e.g. Kautonen et al., 2013) but also to explain intervention effects of entrepreneurship programs on entrepreneurial intentions (e.g. Fayolle et al., 2005; Souitaris et al., 2006; Mueller, 2011).

2.2 Career indecision and certainty

One of the first researchers that pioneered with studies about career decision was Parsons (1909). He introduced the trait-and-factor theory, which builds the foundation of traditional career development models (Betz et al., 1989; Hartung & Blustein, 2002). According to Parson *"in the wise choice of a vocation there are three broad factors: (1) a clear understanding of yourself, your aptitudes, abilities, interests, ambitions, resources, limitations, and knowledge of their causes; (2) a knowledge of the requirements, conditions of success, advantages and disadvantages, compensation, opportunities, and prospects in different lines of work; (3) true reasoning on the relations of these two groups of facts"* (Parsons, 1909, p. 5 in Brown, 2002). His model puts emphasis on matching individual characteristics and occupational requirements.

However, more recent career models are based on developmental career theory, that focuses on the chooser and the integration of work roles with other roles in life (Foskett & Hemsley-Brown, 1999). Ginzberg et al. (1951) were one of the first to offer a psychological model that states that career development does not happen by chance but through lifelong stages of development patterns that are largely irreversible. These stages can be divided into fantasy stage, tentative stage and realistic stage (Sedofia, 2014). While the other stages last from age 0 to 17, the realistic stage takes place in the age of 17 to young adulthood. It is characterized by specification of occupational choice as well as by development of occupational patterns (Zunker, 1990).

Additionally, Ginzberg et al. (1951) have identified four sets of factors that influence the career choice. The most relevant factor for this thesis is the educational process, which consists of the quality and quantity of education an individual received, that will impact the range of choices a student has (Sedofia, 2014).

However, students' perceptions of what a certain career path entails are also based on personal experience, value and perspectives, which are developed throughout childhood and adolescence. Thus many values and beliefs about career will already be built once reaching adulthood, which means a student in higher education will have biased ideas about careers when getting education (Foskett & Hemsley-Brown, 1999). One could argue that a student's career certainty even begins when they choose to study a certain subject as this can be already regarded as commitment to a certain career path (Daniel et al., 2006).

A central construct of this paper is career certainty, which can be defined as the degree to which the individual feels confident about his or her vocational plans (Daniels et al., 2006). It is increasingly recognized in career development studies as a major concept of the career-decision making process (e.g. Temple & Osipow, 1994; Hartung, 1995; Tracey & Darcy, 2002; Daniels et al., 2006). It is also a primary factor of career decision status (Ma & Yeh, 2005) and generally considered to be in one of the last stages of the career-decision making process (Hirschi, 2007).

Career certainty is part of the career decision domain; in particular it is close to the career indecision construct (Hartung, 1995). Career indecision can be defined as a multidimensional construct that includes, but is not limited to, being unsure of a future career (Sepich, 1987). Yet career certainty and career indecision are two different constructs. They overlap conceptually and empirically but differ in their focus: while career certainty focuses

on the individual commitment to a career, career indecision focuses on the experience difficulties to make a career choice (Tracey & Darcy, 2002).

There have been several approaches developed to assess career certainty and indecision (Osipow, 1999). One widely used measure among students is the Career Decision Scale (CDS) (Osipow et al., 1976; Savickas & Jarjoura, 1991; Gati et al., 2000), which is based on the assessment of career certainty and career indecision resulting in an overall indecision index. Individual item answers can reveal sources of indecision of students. An examination of relations between the CDS and other career assessment scales (i.e Career Decision making Difficulties Questionnaire and the Career Factors Inventory (Chartrand & Nutter, 1996), lead to the emergence of six reliable factors as antecedents of indecision: lack of information, need for information, trait indecision, disagreement with others, identity diffusion, and choice anxiety (Kelly, 2002).

2.3 Factors affecting career certainty and intention

Various similar and also further factors have been identified in literature that affect career certainty and indecision, such as lack of readiness, lack of information and inconsistent information (Gati et al. ,1996; Gati & Saka, 2001), gender and age (Patton & Creed, 2001), information about alternatives, valuation problems and uncertainty about outcomes (Germeijs & De Boeck, 2003), cognitive experience of trait indecision and disagreements with others (Kelly & Lee, 2002) and self-efficacy (Krass & Hughey, 1999). Interestingly, the three factors of the TPB that influence intention have strong similarities to the factors that influence career certainty and indecision.

As mentioned before, the first factor of Ajzen's (1991) TPB is attitude towards a behavior, which refers to an individual's perceived appraisal of the behavior. This is similar to career attitude (Holland & Gottfredson, 1994) which can be a factor that influences the career choice and can explain career indecision and certainty. It is also influenced by self-confidence (Singaravelu et al., 2005, Ma & Yeh, 2005; Van den Broeck, 2008), information about the self and lack of motivation (Gati & Saka, 2001). Interpersonal, content- and career-related activities can be effective factors to reduce career indecision (Jurgens, 2000). Practicums are often considered as valuable education (Daniels et al., 2006) as individuals with more experience are found to be more thoughtful in career planning and thus higher in career attitude.

Ajzen's (1991) second factor is on subjective norms, which refer to social pressure to perform or not perform a certain behavior. There are studies on career indecision that have found strong support for a relation between perceived family conflict and career indecision (e.g. Constantine & Flores, 2006; Ma & Yeh, 2005). Mueller (2011) has found that an entrepreneurial family background can lead to higher openness towards choosing entrepreneurship as a potential career. Furthermore, she argues that a broader network of entrepreneurs can have a positive effect on entrepreneurial intentions. The more individuals define themselves in terms of others, the more likely they are to feel certain about their career choice (Ma & Yeh, 2005).

The third construct of Ajzen's TPB is perceived behavioral control, which is a similar construct as self-efficacy as they both conceptualize a person's ability or the perceived difficulty to perform a given task or behavior (Bandura, 1977; Ajzen 1991). Various studies have reported strong relationships between career self-efficacy and career indecision (e.g. Betz & Luzzo, 1996,; Tempe & Osipow, 1994). Initial entrepreneurial self-efficacy was found to mediate the relation between student's perceived entrepreneurial skills and their intention to start a new venture (Izquierdo & Buelens, 2011).

2.4 Educational intervention

A major goal of education is to educate students throughout their lifetime and provide them with intellectual tools and efficacy beliefs (Zimmermann, 1995). With no intervention, indecision of college students may increase. Therefore, college programs are necessary to reduce academic and career indecision among students by identifying sources of indecision and developing successful strategies for guidance (Picard, 2012).

When designing an intervention, many authors suggest to group uncertain students into multiple subtypes of indecision to address their needs effectively (e.g. Holland & Holland, 1977; Sepich, 1987). In her literature review on career decidedness, Gordon (1998) identified seven general categories of career indecision in college students across a decided-undecided continuum, ranging from very decided over unstable decided and tentatively undecided up to chronically indecisive. Reasons for indecision include lack of career information or low self-esteem levels and anxiety (van Wie, 2011).

Several authors have suggested ways to advise undecided students to reduce their career indecision in the career-decision process (e.g. Betz & Luzzo, 1996; Schein & Laff 1997;

Steele & McDonald, 2000; Stark, 2002). They focus mainly on self-assessments followed by gathering and integrating of career information, establishing a sense of identity for students to increase their self-esteem in their decisions (Fuqua & Hartman, 1983; van Wie, 2011) or increasing the perception of their self-efficacy beliefs (e.g. Betz & Luzzo, 1996).

That entrepreneurship education can influence attitudes and self-efficacy has been shown in previous studies. For example Mueller (2011) has found evidence that entrepreneurship education has a positive effect on attitude. Especially role models and practical experience in student-oriented classes positively affect the attitude towards an entrepreneurial behavior (Mueller, 2011). Others have provided evidence that prior exposure to entrepreneurship in practice and entrepreneurship education increases self-efficacy beliefs and attitude towards entrepreneurship, which in turn led to higher intentions to start a new firm (Basu & Virick, 2008; Izquiredo & Buelens, 2011). Mueller (2011) reported evidence that entrepreneurship education can change perceived behavioral control, for example through interactive elements of practical experience and business planning activities. It seems therefore logical to conclude that an educational intervention can increase the attitude as well as self-efficacy toward entrepreneurship that in turn reduces career indecision.

3 HYPOTHESES

Ajzen's Theory of Planned Behavior is one of the most dominant concepts for determining the relationship between cognitions and intentions in social psychology (Cooke & Sheeran, 2004). The TPB was found to be a good predictor of intentions and behaviors. The three antecedents attitude, subjective norms and perceived behavioral control account for 30-45% of variances in intentions (Kolvereid, 1996; Van Gelderen et al., 2008; Liñán & Chen, 2009).

However, the predictive validity of the TPB can be improved by variables that moderate the relation between cognition and intention as well cognition and behavior (Krosnick & Petty, 1995). In their meta-analysis Cooke & Sheeran (2004) examined the moderating effects of seven properties of cognitions on the relations between cognition and intention as well as between cognition and behavior relations. The seven properties are features of *attitude strength (temporal stability), aspects of attitude structure (accessibility, affective-cognitive consistency, ambivalence), subjective beliefs about attitudes (certainty, involvement), or processes of attitude formation (direct experience)* (Cooke & Sheeran, 2004, p. 160). Previous research has shown that these variables have moderating effects within the TPB (Budd & Spencer, 1984; Nederhof, 1989; Doll & Ajzen, 1992; Trafimow, 1994; Bassili, 1995;

Sheeran et al., 1999; Armitage & Conner, 2000; Conner et al., 2000;). The results of Cooke & Sheeran (2004) support the assumption that moderator variables improve the predictive validity of intentions and behavior.

A central construct of this paper is certainty (sometimes also referred to as confidence). It can be defined as the degree of certainty or confidence he or she has in his or her response about a certain question item. In that context confidence weighting is a well-known term that refers to a questioning method where the respondent is not only asked to give an answer but also how certain he is of the correctness of his answer (Ebel, 1965). Answers with higher certainty scores will receive higher credit than answers with lower certainty scores. Other authors utilize the Certainty of Response Index (CRI) as a six-item scale to identify misconceptions in order to distinguish them from lack of knowledge. The CRI is used along each answer to indicate a degree of certainty and thus a lack of knowledge or misconception (Hasan et al., 1999).

Using certainty as a moderator variable is the best way to use certainty in attitude research (Warland & Sample, 1973; Bennet & Harrel, 1975) as it can substantially improve the accuracy of measured correlations. The idea is that some respondents are unfamiliar or less knowledgeable, thus they have not developed clearly defined attitudes yet. Therefore, response certainty can identify the less certain respondents which allows researchers to take actions (Antil, 1983).

The moderating effect of certainty in the attitude-intention relation supports the assumption that high levels of certainty create stable cognitions and is therefore a good predictor of intention (Cooke & Sheeran, 2004). Using certainty of a response as a moderating variable between attitude and intention demonstrates that the confidence by which a person makes a attitudinal judgments represents the degree to which he or she has actually formed an attitude towards the behavior (Warland & Sample, 1973). Therefore, attitude certainty can be defined as the sense of conviction of one's attitude (Tormala & Rucker, 2007). In a more recent study the construct confidence was used as a moderator between attitude and intention to predict consumer adoption of a technology (Khalifa et al., 2012)

In summary, it can be derived that attitude held with higher certainty has a higher attitude-intention consistency. This results in the first hypothesis:

H1: Attitude certainty moderates positively the relationship between attitude towards entrepreneurship and entrepreneurial intention.

Cooke & Sheeran (2004) found also evidence that direct experience (which refers to whether a participant has performed a certain behavior before or not) results in more informative attitudes and intentions and are hence a better predictor of subsequent behavior. Others have also proposed direct experience to be one antecedent of attitude certainty, which means that people tend to be more certain if their attitudes have been formed through direct experience (Fazio & Zanna, 1978; Petrocelli et al., 2007). This is in line with Ajzen & Fishbein's (2001) argument that direct experiences provide the individual with information about the consequences of a certain behavior which results in more stable cognitions. There is an information processing difference suggested between direct and indirect experience, meaning that direct experience (e.g. through having previously performed a behavior) affects the attitude formation stronger than indirect experience (e.g. watching a tape) (Fazio et al., 1978). There has evidence been found for a pattern of increasing confidence with increasing amounts of information (Peterson & Pitz, 1988).

Based on these findings, it is assumed that an entrepreneurship university course with focus on highly practical entrepreneurial activities and related information (i.e. developing a prototype and conducting customer interviews) will have a positive impact on attitude certainty as students acquire new knowledge about entrepreneurship and its consequences and implications. Thus, it is hypothesized that:

H2: The student's exposure to entrepreneurship education has a positive effect on his or her level of attitude certainty towards entrepreneurship.

The following three hypotheses are based on the TPB and refer to the antecedents of intention. In particular, they refer to attitude towards entrepreneurship, perceived subjective norms and perceived behavioral control. Based on previous research it is hypothesized that these variables have a positive relationship towards entrepreneurial intention.

H3: The student's attitude towards entrepreneurship has a positive effect on his or her entrepreneurial intentions.
H4: The student's subjective norm has a positive effect on his or her entrepreneurial intentions.
H5: The student's perceived behavioral control has a positive effect on his or her entrepreneurial intentions.

The following figure summarizes the research model and the five hypotheses. It is an extension of the TPB with the construct of attitude certainty as moderating variable between attitude and intention. This variable will be used to determine an effect of entrepreneurship education on the certainty of student's attitude towards entrepreneurship.

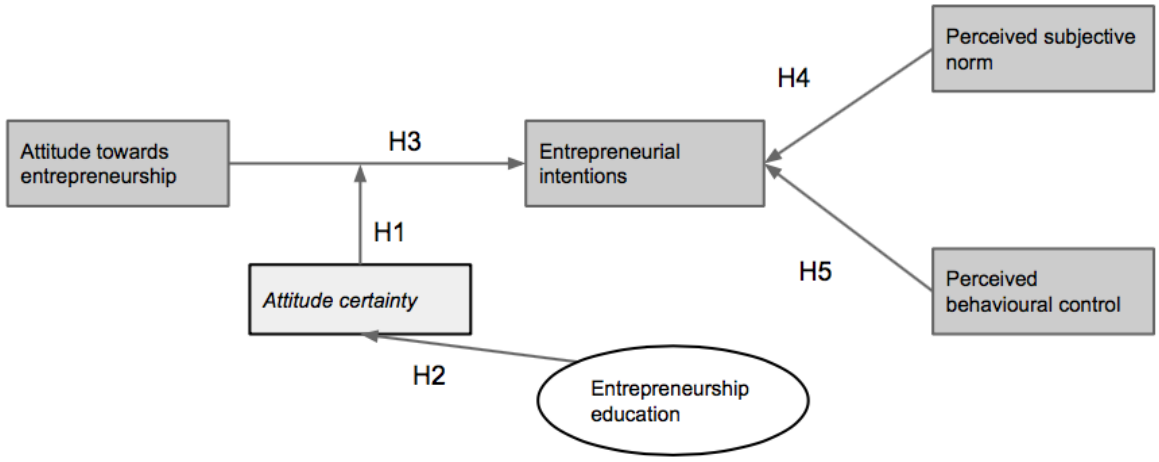

Figure 2: Research model on the effect of entrepreneurship education

4 METHODOLOGY

4.1 Sample

The hypotheses were tested within a quantitative study as an ex ante/ ex post measurement. Students who attended the entrepreneurship course or a finance course (for control purposes) were asked to fill out a questionnaire before and after the courses. The data was collected in 2014 from 432 students, 192 females and 240 males, enrolled in second year bachelor in Business Administration at the University of Twente in Enschede, Netherlands. The entrepreneurship course was rather practically oriented, which means participating students were supposed to generate new ideas, conduct customer interviews and develop first prototypes. This type of practical course should provide students with more certainty towards a certain career path.

For both classes, single questionnaires without a matching second questionnaire were left out of this sample. After sorting out invalid responses, 65 valid pairs of ex ante/ ex post questionnaires were identified in the entrepreneurship course and 22 valid pairs in the

finance control class. It was checked whether the results differed when considering the whole data set (including single questionnaires). The results are attached in the Appendix.

Tables 1 and 2 provide an overview of the demographic distribution of the respondents of the paired sample. The majority of the students of the entrepreneurship class were boys and most students were of the age of 20 or 21, in the finance class even of age 20 or younger. Thus, the sample was characterized by very young students who were still at the beginning of their educational and professional career.

Table 1 Demographics of respondents of the entrepreneurship class (paired sample)

Entrepreneurship class (n=65)		
Gender	Male	57%
	Female	43%
Age	<20	0%
	20	31%
	21	31%
	22	15%
	23	11%
	24	5%
	>24	8%
Own business	No	46%
	Yes	18%
	No Answer	35%

Table 2 Demographics of respondents of the finance class (paired sample)

Finance class (n=22)		
Gender	Male	55%
	Female	45%
Age	<20	41%
	20	27%
	21	14%
	22	14%
	23	0%
	24	5%
	>24	0%
Own business	No	45%
	Yes	9%
	No Answer	45%

Demographics for the whole data set can be found in Appendix 7.1.

4.2 Measures

Similar to Mueller's (2011) approach, the TPB and its variables were used in an ex ante and ex post measurement. She found proof that the relationships between the variables also hold true in that kind of study.

The survey was categorized into attitude, subjective norms, perceived behavioral control, intention and certainty. The questions and scales of the TPB factors were based on the methodology used by Kautonen et al. (2013) and respectively adapted, i.e. questions regarding the behavior were left out since the actual behavior was not scope of this study. They were based on a five-item scale ranging from "strongly disagree" to "strongly agree" in order to assess attitude towards entrepreneurship, perceived subjective norms, perceived behavioral control and entrepreneurial intention.

Certainty was measured by combining each TPB question item with a five-point scale asking the respondent to indicate how sure he or she is about his or her answer. The scale was labeled from "not sure at all" to "very sure". This method was empirically supported by Katz

(1944) (Antil, 1983). Therefore, the factor attitude certainty consisted of the certainty values of the attitude question items.

In order to build indexes for the five factors, internal consistency of the variables attitude, subjective norms, perceived behavioral control, intention and attitude certainty was tested by calculating Cronbach's Alpha. The following table provides an overview of the variables for ex ante and ex post for the entrepreneurship and finance class. All values are above the suggested minimum value of 0.65 (George & Mallery, 2003). Cronbach's Alpha values for the whole data set can be found in Appendix 7.2.

Table 3 Cronbach's Alpha for entrepreneurship class (paired sample)

Factor	Number of items	Cronbach's Alpha ex ante (n=65)	Cronbach's Alpha ex post (n=65)
Attitude towards entrepreneurship	6	0.91	0.91
Attitude certainty	6	0.96	0.91
Subjective norms	3	0.91	0.85
Perceived behavioral control	5	0.69	0.75
Entrepreneurial intention	5	0.96	0.97

Table 4 Cronbach's Alpha for finance class (paired sample)

Factor	Number of items	Cronbach's Alpha ex ante (n=22)	Cronbach's Alpha ex post (n=22)
Attitude towards entrepreneurship	6	0.91	0.87
Attitude certainty	6	0.92	0.92
Subjective norms	3	0.90	0.95
Perceived behavioral control	5	0.78	0.77
Entrepreneurial intention	5	0.94	0.98

4.3 Data analysis

To test a possible influence of the moderating variable attitude certainty (H1), a multiple regression analysis was conducted. As first step, all variables were z-standardized to build

the interaction construct (attitude*attitude certainty). Z-transformation is a procedure to compare two scores from different normal distributions (Janssen & Laatz, 2013). In a next step, three models were entered. The first model analyzed only the control variables age and gender. The second model tested for a direct influence of the assumed moderating variable on the dependent variable and the third model analyzed an interaction effect of the moderating variable.

If the independent variable and assumed moderating variable correlate with each other, a moderation cannot be found. Therefore, a fourth model was tested separately with a dichotomized moderator, meaning attitude certainty was changed to a variable with two groups. By using the "visual binning" feature of SPSS, attitude certainty values below 3 were labeled with a 1 (=low certainty) and certainty values above 3 were labeled with a 2 (=high certainty). In a next step, correlation coefficients of attitude and intention were calculated using a bivariate correlation analysis split into groups with low and high certainty. To compare the Pearson r coefficients a Fisher z-transformation was performed.

To determine an effect of entrepreneurship education on attitude certainty of students (H2), a paired sample t-test, also known as the repeated measure t-test, was conducted. A paired t-test does not directly compare the means of matched pairs, but the differences between the two measures, in this case the difference of attitude certainty ex ante and ex post (Janssen & Laatz, 2013). These changes were then compared with the finance control group. The given samples consisted of student pairs who filled out both questionnaires, before and after the respective class (entrepreneurship class n=65; finance class n=22). In addition to the second hypothesis (H2), a null hypothesis was formulated that assumes that the means of attitude certainty are equal and did not change after the entrepreneurship class.

Similar to Mueller (2011), the validity of the TPB hypothesis (H3-H5) was tested for the ex ante and ex post data set using a hierarchical regression analysis. In the first regression model only the control variables (gender, age) were entered. In the second model, the effect of the independent variables attitude, subjective norms and perceived behavioral control on the dependent variable intention was tested.

5 RESULTS

5.1 Descriptive statistics

The following tables provide an overview of the descriptive statistics of all variables, in particular the mean values and standard deviations of attitude towards entrepreneurship, attitude certainty, perceived subjective norms, perceived behavioral control and entrepreneurial intention. These values were measured ex ante and ex post.

Table 5 Descriptive statistics for variables of entrepreneurship class (paired sample)

Factor	n	Mean	Standard deviation
Entrepreneurship Class			
Ex ante			
Attitude towards entrepreneurship	65	3.68	0.77
Attitude certainty	65	3.79	0,74
Subjective norms	62	3.17	0.92
Perceived behavioral control	64	3.35	0.59
Entrepreneurial intention	63	3.20	1.04
Ex post			
Attitude towards entrepreneurship	65	3.64	0.82
Attitude certainty	64	3.87	0.63
Subjective norms	64	3.13	0.82
Perceived behavioral control	65	3.50	0.60
Entrepreneurial intention	65	3.18	1.15

Table 6 Descriptive statistics for variables of finance class (paired sample)

Factor	n	Mean	Standard deviation
Finance Class			
Ex ante			
Attitude towards entrepreneurship	22	3.59	0.93
Attitude certainty	22	3.71	0.70
Subjective norms	21	3.02	0.97
Perceived behavioral control	22	3.25	0.74
Entrepreneurial intention	22	3.27	0.86
Ex post			
Attitude towards entrepreneurship	22	3.57	0.78
Attitude certainty	22	3.71	0.62
Subjective norms	21	2.97	0.98
Perceived behavioral control	21	3.36	0.65
Entrepreneurial intention	20	2.98	1.05

In table 5 it can be observed that the level of attitude certainty of the paired data set has increased from 3.79 to 3.87. The mean value of attitude certainty of 3.71 in the finance class did not change ex post (table 6). Results for the whole data set can be found in Appendix 7.3.

5.2 Testing Hypothesis 1

Hypothesis 1 (H1) assumes that attitude certainty moderates the relationship between attitude towards entrepreneurship and entrepreneurial intention. The results of the performed regression analysis are provided in the following table.

Table 7 Hierarchical regression analysis for Hypothesis 1 (paired sample)

Entrepreneurship Class (n=65)	Ex ante measurement			Ex post measurement		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dependent variable						
Entrepreneurial intention						
Control variables						
Gender	-0.036	-0.083	-0.099	0.011	-0.060	-0.62
Age	0.326**	0.140	0.152	0.414***	0.117	0.118
Independent Variable						
Attitude towards entrepreneurship		0.492***	0.475***		0.799***	0.825***
Moderator						
Attitude certainty		0.149	0.147		0.079	0.083
Moderator with interaction						
Interaction construct (Attitude towards entrepreneurship * Attitude certainty)			0.067			-0.071
R-Square	0.110**	0.398***	0.401***	0.173***	0.766***	0.771***
Adjusted R-Square	0.078	0.353	0.345	0.144	0.750	0.750

Notes: *** p<0.01, ** p<0.05, * p<0.1
Gender: 1 male; 2 female

The results of model 1 show a significant impact of the control variable age (ex ante β=0.326**, p<0.05; ex post β=0.414***, p<0.01) indicating that older students have stronger entrepreneurial intentions. In model 2, the impact of the independent variable and moderator variable (without interaction) was analyzed. The results imply a significant impact of attitude towards entrepreneurship (ex ante β=0.492***, p<0.01; ex post β=0.799***, p<0.01) and a not significant effect of the moderator on intention (ex ante β=0.149; ex post β=0.079). The interaction effect of the moderating variable was tested in model 3. The results did not reveal a significant moderating effect of the interaction construct (ex ante β=0.067; ex post β=-0.071). The results did not change significantly, when the whole data set was considered (see Appendix 7.5).

One reason why the moderation effect may not be statistically significant could be due to the inter-correlation between attitude and attitude certainty (see correlation matrix in Appendix 7.4). In order to still determine a moderation effect, a bivariate analysis with a dichotomous moderator was conducted. The results are presented in the following table.

Table 8 Bivariate analysis with dichotomous variable for Hypothesis 1 (paired sample)

Entrepreneurship Class	Correlation coefficient (r)	n	Fisher's Z-value	Z-score
Ex ante				
Low certainty	0.581***	21	0.66	0.13
High certainty	0.556***	38	0.63	
Ex post				
Low certainty	0.734***	21	0.66	1.94
High certainty	0.904***	40	0.63	

Notes: *** p<0.01, ** p<0.05, * p<0.1

The table shows a slight increase of correlation coefficient between attitude and intention measured under low certainty (ex ante r=0.581, p<0.01; ex post r=0.734, p<0.01) and a large increase under high certainty. The calculated Z score ex ante is below the critical value of 1.96 (97.5 percentile point), which indicates that the relation between attitude and intention does not differ whether certainty is high or low. The Z-score ex post (z=1.94) is very close to the critical value. The results became clearer when considering the whole data set. The following table shows the results of the bivariate analysis and the Fisher z-transformation for the whole data set.

Table 9 Bivariate analysis with dichotomous variable for Hypothesis 1 (total sample)

Entrepreneurship Class	Correlation coefficient (r)	n	Fisher's Z-value	Z-score
Ex ante				
Low certainty	0.64***	36	0.76	0.43
High certainty	0.69***	90	0.85	
Ex post				
Low certainty	0.58***	32	0.66	2.65
High certainty	0.83***	135	1.20	

Notes: *** p<0.01, ** p<0.05, * p<0.1

First of all, table 9 shows that the percentage of students with high certainty in relation to all students has increased (71% vs. 81%). Further, the correlation coefficients of attitude and intention have slightly increased (ex ante r=0.69, p<0.01; ex post r=0.83, p<0.01). The Z-score of is now clearly above the critical value of 1.96 (z=2.65), which suggests that the null hypothesis needs to be rejected. There is a significant moderation effect of attitude certainty between attitude and intention. Thus, Hypothesis 1 is accepted only in the ex post measurement.

5.3 Testing Hypothesis 2

Hypothesis 2 (H2) assumes that an entrepreneurship course has a positive effect on attitude certainty. The following table provides an overview of the means of attitude certainty, conducted ex ante and ex post for the entrepreneurship class (results for the finance class can be found in Appendix 7.6).

Table 10 Paired sample t-test for Hypothesis 2

Entrepreneurship class (n=65)	Mean	n	SD	Std. Error Mean
Attitude Certainty ex ante	3.79	65	0.74	0.09
Attitude Certainty ex post	3.81	65	0.79	0.10

Paired Samples Test								
	Paired Differences					t	df	Sig.(2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Ex ante - Ex post	-0.023	0.779	0.097	-0.216	0.170	-0.239	65	0.812

The upper part shows the measurement of the 65 pairs and their means of attitude certainty. The mean of the entrepreneurship class was 3.79 ex ante and 3.81 ex post. This indicates a slight increase of attitude certainty. The standard deviation was bigger ex post than ex ante. However, the significance level of 0.812 of the paired t-test suggests that the change is statistically not significant. Thus, the null hypothesis needs to be accepted, stating there is no effect of entrepreneurship education on attitude certainty. The results did not change significantly when an independent t-test with the whole data set (see Appendix 7.6).

5.4 Testing Hypotheses 3-5

Hypotheses 3 to 5 (H3-H5) state that the antecedents of entrepreneurial intention, i.e. attitude towards entrepreneurship, perceived subjective norms and perceived behavioral control, have a positive relation to entrepreneurial intention. These relationships were tested ex ante and ex post using a linear hierarchical regression analysis with the following results:

Table 11 Hierarchical regression analysis for Hypotheses 3-5 (paired sample)

Entrepreneurship Class (n=65)	Ex ante measurement		Ex post measurement	
	Model 1	Model 2	Model 1	Model 2
Dependent variable				
Intention				
Control variables				
Gender	-0.27	-0.133	0.028	-0.020
Age	0.331**	0.043	0.429***	0.105
Independent variable				
Attitude towards entrepreneurship		0.244**		0.635***
Perceived subjective norms		0.534***		0.218**
Perceived behavioral control		0.088		0.105
R-Square	0.112**	0.593***	0.185**	0.802***
Adjusted R-Square	0.080	0.554	0.157	0.784

Notes: *** p<0.01, ** p<0.05, * p<0.1

Gender: 1 male; 2 female

In the first model, only the control variables age and gender were tested. The results indicate that age has a significant impact on entrepreneurial intention (ex ante β=0.331, p<0.05; ex post β=0.429, p<0.01). This implies that older students have generally higher entrepreneurial intentions than younger students, which is in line with the results from Hypothesis 2.

In the second model the three independent variables attitude, subjective norms and perceived behavioral control were tested. Only attitude and subjective norms were found to have a significant positive relation to intention (attitude ex ante β=0.244, p<0.05; ex post β=0.635, p<0.01; subjective norms ex ante β=0.534, p<0.01; ex post β=0.218, p<0.05). Hence H3 and H4 are supported. Perceived behavioral control was found to be statistically insignificant, thus H5 was not supported. The results did not change significantly, when the entire data set was analyzed (see Appendix 7.6).

Interesting to note is the increase of the βcoefficients of attitude ex ante compared to ex post (ex ante β=0.244, p<0.05; ex post β=0.635, p<0.01). The result suggests an increase of the explanatory power of attitude towards entrepreneurship after the entrepreneurship class. This would be in line with other studies that found evidence for a positive effect of entrepreneurship education on attitude (e.g. Mueller, 2011).

6 CONCLUSION AND IMPLICATION

The main purpose of this thesis was to examine whether an entrepreneurship course matters for the certainty of students by which they judge entrepreneurship. In the pedagogical context of entrepreneurship education, this thesis was motivated by the treatment of entrepreneurship education as a tool to increase career certainty of students. Understanding the effect of entrepreneurship education on career certainty can make the planning and assessing of entrepreneurship education more precise. Therefore, this research has attempted to extend the Theory of Planned Behavior, which is a well-known method to predict start-up intentions, by a certainty perspective, which led us to infer that students that take an entrepreneurship class will have a higher certainty of their attitude towards their entrepreneurial intention and thus greater career certainty.

The findings, however, were mixed. It was originally assumed that an entrepreneurship class would lead to a higher degree of attitude certainty towards entrepreneurship. There was directional support that students, which had taken the entrepreneurship class, did have higher attitude certainty towards entrepreneurship compared to the finance control group. In particular, there was a little gap in attitude certainty measured ex ante and ex post in the entrepreneurship class, although it was statistically not significant. In addition, when looking at the whole data set the percentage of students with high certainty values (above neutral) has increased. However, it cannot be concluded with confidence that an entrepreneurship class increases the certainty of a student's attitude towards entrepreneurial intentions.

Furthermore, it was anticipated that certainty would have a moderating effect between attitude towards entrepreneurship and entrepreneurial intentions. The results, however, are not consistent with previous research (Warland & Sample, 1973; Bennet & Harrell, 1975; Cooke & Sheeran, 2004) stating that certainty as moderator would lead to higher attitude-intention consistency. A significant moderating effect of attitude certainty was only found ex post in the entrepreneurship class when changing the attitude certainty variable to a

dichotomous variable with high and low certainty values. This would indicate that the entrepreneurship class did increase attitude certainty, which in turn led to a higher attitude-intention consistency.

Lastly, the results supported partially the hypothesis of the Theory of Planned Behavior factors, which stated that attitude, perceived subjective norms and perceived behavioral control have a positive relationship to entrepreneurial intentions. Only attitude towards entrepreneurship and subjective norms were found to have a significant positive relation to intention, perceived behavioral control was not found to be statistically significant. One explanation could be the nature of the question items. Cronbach's Alpha values for this factor were also low in each sample. In the entrepreneurship class, age did have a significant influence on entrepreneurial intention, leading to the conclusion that older students have generally higher entrepreneurial intentions than younger.

This thesis has made a contribution to the literature on entrepreneurship education by taking a step in the direction of defining the relationship between entrepreneurship education and career certainty. It was one technique developed to measure attitude certainty within the Theory of Planned Behavior framework. Despite the results, this thesis may still enhance the understanding of the impact of entrepreneurship education and help to conceptualize new measurement tools to assess career certainty.

The approach outlined in this study should be replicated in further studies on entrepreneurship education with a larger population as well as in other areas of higher education to construct a new methodology to assess the effect of education on career certainty. It is possible that different entrepreneurship courses (e.g. theoretically or practically oriented) will produce different results.

In addition, it is important to mention that methodological problems in the research design limit the ability to interpret results. Since the hierarchical regression analysis did not show consistent positive results it may be useful to construct a structural equation modeling on this dataset to analyze the relationships of the entire model at the same time. It may be further interesting to measure certainty over several times not only pre- and post the educational intervention.

7 APPENDIX

7.1 Demographics

Table 12 Demographics of respondents of the entrepreneurship class ex ante (total sample)

Entrepreneurship class ex ante (n=137)		
Gender	Male	55%
	Female	42%
	No Answer	3%
Age	<20	1%
	20	24%
	21	29%
	22	22%
	23	10%
	24	6%
	>24	8%
	No Answer	2%
Own business	No	37%
	Yes	15%
	No Answer	48%

Table 13 Demographics of respondents of the entrepreneurship class ex post (total sample)

Entrepreneurship class ex post (n=180)		
Gender	Male	52%
	Female	46%
	No Answer	2%
Age	<20	0%
	20	18%
	21	28%
	22	22%
	23	16%
	24	7%
	>24	7%
	No Answer	3%
Own business	No	25%
	Yes	11%
	No Answer	64%

Table 14 Demographics of respondents of the finance class ex ante (total sample)

Finance class ex ante (n=95)		
Gender	Male	56%
	Female	42%
	No Answer	2%
Age	<20	56%
	20	21%
	21	7%
	22	6%
	23	3%
	24	4%
	>24	2%
	No Answer	1%
Own Business	No	32%
	Yes	9%
	No Answer	59%

Table 15 Demographics of respondents of the finance class ex post (total sample)

Finance class ex post (n=30)		
Gender	Male	60%
	Female	40%
Age	<20	47%
	20	17%
	21	17%
	22	10%
	23	3%
	24	0%
	>24	6%
Own Business	No	17%
	Yes	3%
	No Answer	80%

7.2 Cronbach's Alphas

Table 16 Cronbach's Alpha values of entrepreneurship class (total sample)

Factor	Number of items	Cronbach's Alpha ex ante (n=137)	Cronbach's Alpha ex post (n=180)
Attitude towards entrepreneurship	6	0.88	0.90
Attitude certainty	6	0.94	0.94
Subjective norms	3	0.91	0.89
Perceived behavioral control	5	0.71	0.48
Entrepreneurial intention	5	0.96	0.96

Table 17 Cronbach's Alpha values of finance class (total sample)

Factor	Number of items	Cronbach's Alpha ex ante (n=94)	Cronbach's Alpha ex post (n=30)
Attitude towards entrepreneurship	6	0.92	0.85
Attitude certainty	6	0.92	0.94
Subjective norms	3	0.91	0.91
Perceived behavioral control	5	0.78	0.74
Entrepreneurial intention	5	0.95	0.97

7.3 Descriptive statistics

Table 18 Descriptive statistics for variables of entrepreneurship class (total sample)

Factor	n	Mean	Standard deviation
Entrepreneurship Class			
Ex ante			
Attitude towards entrepreneurship	137	3.65	0.72
Attitude certainty	136	3.72	0.73
Subjective norms	133	2.97	0.99
Perceived behavioral control	135	3.27	0.63
Entrepreneurial intention	134	3.14	1.04
Ex post			
Attitude towards entrepreneurship	178	3.56	0.78
Attitude certainty	178	3.82	0.68
Subjective norms	175	2.96	0.85
Perceived behavioral control	177	3.40	0.94
Entrepreneurial intention	175	3.05	1.09

Table 19 Descriptive statistics for variables of finance class (total sample)

Factor	n	Mean	Standard deviation
Finance Class			
Ex ante			
Attitude towards entrepreneurship	90	3.63	0.94
Attitude certainty	92	3.69	0.71
Subjective norms	93	3.15	0.93
Perceived behavioral control	94	3.27	0.69
Entrepreneurial intention	94	3.35	0.93
Ex post			
Attitude towards entrepreneurship	30	3.66	0.74
Attitude certainty	30	3.83	0.68
Subjective norms	29	3.08	0.90
Perceived behavioral control	29	3.41	0.64
Entrepreneurial intention	28	3.24	1.08

7.4 Correlation matrix

Table 20 Correlation matrix for variables of entrepreneurship class (paired sample)

Entrepreneurship class	I	SN	PBC	A	AC
Ex ante					
Intention (I) N	1 61				
Subjective norms (SN) N	0.708*** 60	1 62			
Perceived behavioral control (PBC) N	0.515*** 60	0.506*** 60	1 61		
Attitude (A) N	0.596*** 59	0.571*** 60	0.423*** 60	1 63	
Attitude certainty (AC) N	0.358*** 61	0.333*** 62	0.188 61	0.413*** 63	1 65
Ex post					
Intention (I) N	1 62				
Subjective norms (SN) N	0.667*** 62	1 64			
Perceived behavioral control (PBC) N	0.599*** 61	0.417*** 63	1 64		
Attitude (A) N	0.864*** 62	0.595*** 64	0.557*** 60	1 63	
Attitude certainty (AC) N	0.374*** 61	0.307*** 63	0.446*** 63	0.375*** 64	1 64

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table 21 Correlation matrix for variables of finance class (paired sample)

Finance class	I	SN	PBC	A	AC
Ex ante					
Intention (I) N	1 22				
Subjective norms (SN) N	0.678*** 21	1 21			
Perceived behavioral control (PBC) N	0.524** 21	0.499** 21	1 21		
Attitude (A) N	0.589*** 22	0.493** 21	0.468** 21	1 22	
Attitude certainty (AC) N	-0.068* 2	0.062 21	0.542** 21	0.388* 22	1 22
Ex post					
Intention (I) N	1 19				
Subjective norms (SN) N	0.633*** 19	1 21			
Perceived behavioral control (PBC) N	0.406* 19	0.504** 21	1 21		
Attitude (A) N	0.717*** 17	0.488** 19	0.627*** 19	1 20	
Attitude certainty (AC) N	0.511** 19	0.326 21	0.519** 21	0.476** 20	1 22

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table 22 Correlation matrix for variables of entrepreneurship class (total sample)

Entrepreneurship class	I	SN	PBC	A	AC
Ex ante					
Intention (I) N	1 130				
Subjective norms (SN) N	0.708*** 129	1 132			
Perceived behavioral control (PBC) N	0.480*** 129	0.455*** 130	1 132		
Attitude (A) N	0.697*** 126	0.555*** 128	0.431*** 129	1 133	
Attitude certainty (AC) N	0.273*** 128	0.294*** 130	0.216** 130	0.344*** 132	1 135
Ex post					
Intention (I) N	1 168				
Subjective norms (SN) N	0.626*** 168	1 174			
Perceived behavioral control (PBC) N	0.423*** 166	0.256*** 171	1 172		
Attitude (A) N	0.810*** 168	0.577*** 173	0.446*** 172	1 179	
Attitude certainty (AC) N	0.234*** 167	0.252*** 172	0.329*** 171	0.307*** 178	1 178

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table 23 Correlation matrix for variables of finance class (total sample)

Finance class	I	SN	PBC	A	AC
Ex ante					
Intention (I) N	1 86				
Subjective norms (SN) N	0.627*** 85	1 93			
Perceived behavioral control (PBC) N	0.393** 83	0.407** 89	1 90		
Attitude (A) N	0.473*** 84	0.451** 91	0.264** 87	1 92	
Attitude certainty (AC) N	0.271*** 85	0.195* 92	0.169 88	0.390* 92	1 93
Ex post					
Intention (I) N	1 27				
Subjective norms (SN) N	0.656*** 27	1 29			
Perceived behavioral control (PBC) N	0.478** 27	0.489*** 29	1 28		
Attitude (A) N	0.633*** 25	0.463** 27	0.485** 17	1 28	
Attitude certainty (AC) N	0.550*** 27	0.441** 29	0.488*** 29	0.367* 28	1 30

Notes: *** p<0.01, ** p<0.05, * p<0.1

7.5 Results for hierarchical regression analysis for Hypothesis 1

Table 24 Hierarchical regression analysis for finance class (paired sample)

Finance Class (n=22)	**Ex ante measurement**			**Ex post measurement**		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dependent variable						
Entrepreneurial intention						
Control variables						
Gender	-0.226	-0.314*	-0.095	-0.008	0.171	0.224
Age	0.243	0.053	-0.291	0.377	-0.034	-0.171
Independent variable						
Attitude towards entrepreneurship		0.746***	0.758***		0.611**	0.712**
Moderator						
Attitude certainty		-0.388**	-0.071		0,270	0.300
Moderator with interaction						
Interaction construct (Attitude towards entrepreneurship * Attitude certainty)			0.570**			0.169
R-Square	0.110**	0.549***	0.674***	0.142	0.578**	0.590**
Adjusted R-Square	0.017	0.443	0.572	0.019	0.437	0.404

Notes: *** p<0.01, ** p<0.05, * p<0.1
Gender: 1 male; 2 female

Table 25 Hierarchical regression analysis for entrepreneurship class (total sample)

Entrepreneurship Class	Ex ante measurement (n=122)			Ex post measurement (n=164)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dependent variable						
Entrepreneurial intention						
Control variables						
Gender	-0.019	-0.047	-0.064	0.083	-0.046	-0.044
Age	0.246***	0.078	0.096	0.218***	0.081*	0.080*
Independent variable						
Attitude towards entrepreneurship		0.656***	0.617***		0.799***	0.789***
Moderator						
Attitude Certainty		0.067	0.073		0.020	0.029
Moderator with interaction						
Interaction construct (Attitude towards entrepreneurship * Attitude Certainty)			0.093			0.038
R-Square	0.061**	0.499***	0.506***	0.054**	0.668***	0.670***
Adjusted R-Square	0.046	0.482	0.485	0.054	0.660	0.659

Notes: *** p<0.01, ** p<0.05, * p<0.1
Gender: 1 male; 2 female

Table 26 Hierarchical regression analysis for finance class (total sample)

Finance Class	Ex ante measurement (n=83)			Ex post measurement (n=25)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Dependent variable						
Entrepreneurial intention						
Control variables						
Gender	0.081	0.049	0.049	0.012	0.121	0.137
Age	0.10	0.043	0.047	0.261	-0.154	-0.239
Independent variable						
Attitude towards entrepreneurship		0.431***	0.433***		0.572***	0.631**
Moderator						
Attitude Certainty		0.110	0.103		0.400**	0.412**
Moderator with Interaction						
Interaction construct (Attitude towards entrepreneurship * Attitude Certainty)			-0.031			0.104
R-Square	0.007	0.235***	0.007	0.068	0.553***	0.068
Adjusted R-Square	-0.018	0.196	-0.018	-0.017	0.463	-0.017

Notes: *** p<0.01, ** p<0.05, * p<0.1
Gender: 1 male; 2 female

7.6 Results of t-test for Hypothesis 2

Table 27 Paired sample t-test for finance class

Finance class (n=22)	Mean	n	SD	Std. Error Mean
Attitude Certainty ex ante	3.71	22	0.70	0.15
Attitude Certainty ex post	3.71	22	0.62	0.13

Paired Samples Test								
	Paired Differences					t	df	Sig.(2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Ex ante - Ex post	0	0.891	0.190	-0.395	0.395	0	21	1.00

Table 28 Independent t-test of entrepreneurship class (total sample)

Entrepreneurship class	Mean	n	SD	Std. Error Mean
Attitude Certainty ex ante	3.72	136	0.73	0.06
Attitude Certainty ex post	3.82	178	0.68	0.05

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
							Std. Error Difference	95% Confidence Interval of the Difference	
Attitude Certainty	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference		Lower	Upper
Equal variances assumed	2.49	0.116	-1.260	312	0.209	-0.101	0.080	-0.259	0.057
Equal variances not assumed			-1.249	280.179	0.213	-0.101	0.081	-0.260	0.058

Table 29 Independent t-test of finance class (total sample)

Finance class	Mean	n	SD	Std. Error Mean
Attitude Certainty ex ante	3.69	92	0.71	0.07
Attitude Certainty ex post	3.83	30	0.68	0.13

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
Attitude Certainty	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0.452	0.503	-0.944	120	0.347	-0.139	0.148	-0.432	0.153
Equal variances not assumed			-0.961	50.779	0.341	-0.139	0.145	-0.431	0.152

7.7 Results of hierarchical regression analysis for Hypotheses 3-5

Table 30 Hierarchical regression analysis for finance class (paired sample)

Finance Class (n=22)	**Ex ante measurement**		**Ex post measurement**	
	Model 1	Model 2	Model 1	Model 2
Dependent variable				
Intention				
Control variables				
Gender	-0.243	-0.170	-0.008	0.007
Age	0.208	-0.212	0.377	-0.005
Independent variables				
Attitude		0.371*		0.498
Perceived subjective norms		0.524**		0.376
Perceived behavioral control		0.094		-0.039
R-Square	0.108	0.616**	0.142	0.590**
Adjusted R-Square	0.009	0.488	0.019	0.404

Notes: *** p<0.01, ** p<0.05, * p<0.1

Gender: 1 male; 2 female

Table 31 Hierarchical regression analysis for entrepreneurship class (total sample)

Entrepreneurship Class	Ex ante measurement (n=122)		Ex post measurement (n=163)	
	Model 1	Model 2	Model 1	Model 2
Dependent variable				
Intention				
Control variables				
Gender	-0.014	-0.075	0.083	-0.041
Age	0.247***	0.00	0.222***	0.063
Independent variables				
Attitude towards entrepreneurship		0.433***		0.647***
Perceived subjective norms		0.441***		0.239***
Perceived behavioral control		0.059		0.053
R-Square	0.062**	0.639***	0.056**	0.710
Adjusted R-Square	0.046	0.624	0.044	0.700

Notes: *** p<0.01, ** p<0.05, * p<0.1

Gender: 1 male; 2 female

Table 32 Hierarchical regression analysis for finance class (total sample)

Finance Class	Ex ante measurement (n=80)		Ex post measurement (n=25)	
	Model 1	Model 2	Model 1	Model 2
Dependent variable				
Intention				
Control variables				
Gender	0.085	0.002	0.012	-0.027
Age	0.052	0.007	0.261	-0.051
Independent variables				
Attitude towards entrepreneurship		0.208**		0.345
Perceived subjective norms		0.423***		0.394
Perceived behavioral control		0.183**		0.164
R-Square	0.010	0.414***	0.068	0.558***
Adjusted R-Square	-0.016	0.374	-0.017	0.442

Notes: *** p<0.01, ** p<0.05, * p<0.1

Gender: 1 male; 2 female

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Ajzen, I., & Fishbein, M. (2001). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. European Review of Social Psychology, 11, 1–33.

Albornoz-Pardo, C. (2013). Is Business Creation the Mean or the End of Entrepreneurship Education? A Multiple Case Study Exploring Teaching Goals in Entrepreneurship Education. Journal of technology management & innovation, 8(1), 1-10.

Antil, J. H. (1983). Uses of response certainty in attitude measurement. Advances in consumer research, 10(1).

Armitage, C. J., & Conner, M. (2000). Attitudinal ambivalence: A test of three key hypotheses. Personality and Social Psychology Bulletin, 26, 1421–1432.

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta Analytic Review. Entrepreneurship Theory and Practice, 38(2), 217-254.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological review, 84(2), 191.

Bassili, J. N. (1995). Response latency and the accessibility of voting intentions: What contributes to accessibility and how it affects vote choice. Personality and Social Psychology Bulletin, 21, 686–695.

Basu, A., & Virick, M. (2008). Assessing entrepreneurial intentions amongst students: A comparative study. In 12th Annual Meeting of the National Collegiate Inventors and Innovators Alliance, Dallas, USA (pp. 19-21).

Bennett, P. D., & Harrell, G. D. (1975). The role of confidence in understanding and predicting buyers' attitudes and purchase intentions. Journal of Consumer Research, 110-117.

Betz, N. E., & Luzzo, D. A. (1996). Career assessment and the career decision-making self-efficacy scale. Journal of Career Assessment, 4(4), 413-428.

Betz, N. E., Fitzgerald, L. F., & Hill, R. E. (1989). Trait-factor theories: Traditional cornerstone of career theory. Handbook of career theory, 26-40.

Brown, D. (Ed.). (2002). Career choice and development. John Wiley & Sons.

Budd, R., & Spencer, C. (1984). Latitude of rejection, centrality and certainty: Variables affecting the relationship between attitudes, norms and behavioral intentions. British Journal of Social Psychology, 23(1), 1-8.

Chartrand, J. M., & Nutter, K. J. (1996). The career factors inventory: Theory and applications. Journal of Career Assessment, 4(2), 205-218.

Conner, M., Sheeran, P., Norman, P., & Armitage, C. J. (2000). Temporal stability as a moderator of relationships in the theory of planned behaviour. British Journal of Social Psychology, 39, 469–493.

Constantine, M. G., & Flores, L. Y. (2006). Psychological distress, perceived family conflict, and career development issues in college students of color. Journal of Career Assessment, 14(3), 354-369.

Cooke, R., & Sheeran, P. (2004). Moderation of cognition intention and cognition behaviour relations: A meta analysis of properties of variables from the theory of planned behaviour. British Journal of Social Psychology, 43(2), 159-186.

Daniels, L. M., Clifton, R. A., Perry, R. P., Mandzuk, D., & Hall, N. C. (2006). Student teachers' competence and career certainty: The effects of career anxiety and perceived control. Social Psychology of education, 9(4), 405-423.

George, D., & Mallery, M. (2003). Using SPSS for Windows step by step: a simple guide and reference. Boston, MA: Allyn y Bacon.

Doll, J., & Ajzen, I. (1992). Accessibility and stability of predictors in the theory of planned behavior. Journal of Personality and Social Psychology, 63, 754–765.

Ebel, R. L. (1965). "Confidence Weighting and Test Reliability". Journal of Educational Measurement 2 (1): 49–57.

Fayolle, A. (2005). Evaluation of entrepreneurship education: behaviour performing or intention increasing?. International Journal of Entrepreneurship and Small Business, 2(1), 89-98.

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. Journal of Small Business Management, 53(1), 75-93.

Fazio, R. H., & Zanna, M. P. (1978). On the predictive validity of attitudes: the roles of direct experience and confidence1. Journal of Personality, 46(2), 228-243.

Fazio, R. H., Zanna, M. P., & Cooper, J. (1978). Direct experience and attitude-behavior consistency: An information processing analysis. Personality and Social Psychology Bulletin, 4(1), 48-51.

Foskett, N. H., & Hemsley-Brown, J. (1999). Invisibility, perceptions and image: Mapping the career choice landscape. Research in Post-Compulsory Education, 4(3), 233-248.

Fuqua, D. R., & Hartman, B. W. (1983). Differential diagnosis and treatment of career indecision. The Personnel and Guidance Journal, 62(1), 27-29.

Gati, I., & Saka, N. (2001). High school students' career related decision making difficulties. Journal of Counseling & Development, 79(3), 331-340.

Gati, I., Krausz, M., & Osipow, S. H. (1996). A taxonomy of difficulties in career decision making. Journal of counseling psychology, 43(4), 510.

Gati, I., Osipow, S. H., Krausz, M., & Saka, N. (2000). Validity of the career decision-making difficulties questionnaire: Counselee versus career counselor perceptions. Journal of Vocational Behavior, 56(1), 99-113.

Germeijs, V., & De Boeck, P. (2003). Career indecision: Three factors from decision theory. Journal of Vocational Behavior, 62(1), 11-25.

Gibcus, P., de Kok, J., Snijders, J., Smit, L., & van der Linden, B. (2012). Effects and impact of entrepreneurship programmes in higher education. Brussels: EIM Business and Policy Research for Directorate-General Enterprise and Industry, European Commission.

Ginzberg, E., Ginsburg, S. W., Axelrad, S., & Herma, J. L. (1951). Occupational choice. New York.

Gordon, V. N. (1998). Career decidedness types: A literature review. The Career Development Quarterly, 46(4), 386.

Hartung, P. J. (1995). Assessing Career Certainty and Choice Status. ERIC Digest.

Hartung, P. J., & Blustein, D. L. (2002). Reason, Intuition, and Social Justice: Elaborating on Parsons's Career Decision Making Model. Journal of Counseling & Development, 80(1), 41-47.

Hasan, S., Bagayoko, D., & Kelley, E. L. (1999). Misconceptions and the certainty of response index (CRI). Physics education, 34(5), 294-299.

Hirschi, A., & Läge, D. (2007). The relation of secondary students' career-choice readiness to a six-phase model of career decision making. Journal of Career Development, 34(2), 164-191.

Holland, J. L., & Gottfredson, G. D. (1994). CASI: Career Attitudes and Strategies Inventory: An inventory for understanding adult careers. Psychological Assessment Resources.

Holland, J. L., & Holland, J. E. (1977). Vocational indecision: More evidence and speculation. Journal of Counseling Psychology, 24(5), 404

Hull, D. M. (2005). Career pathways: Education with a purpose. CORD.

Izquierdo, E., & Buelens, M. (2011). Competing models of entrepreneurial intentions: the influence of entrepreneurial self-efficacy and attitudes. International Journal of Entrepreneurship and Small Business, 13(1), 75-91.

Janssen, J., & Laatz, W. (2013). Statistische Datenanalyse mit SPSS für Windows: eine anwendungsorientierte Einführung in das Basissystem Version 8 und das Modul Exakte Tests. Springer-Verlag.

Jones, C., & English, J. (2004). A contemporary approach to entrepreneurship education. Education+ Training, 46(8/9), 416-423.

Jurgens, J. C. (2000). The undecided student: Effects of combining levels of treatment parameters on career certainty, career indecision, and client satisfaction. The Career Development Quarterly, 48(3), 237.

Katz, D. (1944). The measurement of intensity. In, H. Cantrel (ed.), Gauging public opinion.

Katz, J. A. (2003). The chronology and intellectual trajectory of American entrepreneurship education: 1876–1999. Journal of business venturing, 18(2), 283-300.

Kautonen, T., Gelderen, M., & Fink, M. (2013). Robustness of the theory of planned behavior in predicting entrepreneurial intentions and actions. Entrepreneurship Theory and Practice.

Kelly, K. R., & Lee, W. C. (2002). Mapping the domain of career decision problems. Journal of Vocational Behavior, 61(2), 302-326.

Khalifa, M., Cheng, S. K., & Shen, K. N. (2012). Adoption of mobile commerce: A confidence model.

Klandt, H. (2004). Entrepreneurship education and research in German-speaking Europe. Academy of Management Learning & Education, 3(3), 293-301.

Knaup, Ulrich (2015). FGF-Report: Liste der Entrepreneurship-Professuren in Deutschland. Förderkreis Gründungs-Forschung e.V. Ausgabe März 2015.

Kolvereid, L. (1996). Prediction of employment status choice intentions. Entrepreneurship Theory and Practice, 21(1), 47–57.

Krass, L. J., & Hughey, K. F. (1999). The impact of an intervention on career decision-making self-efficacy and career indecision. Professional School Counseling, 2(5), 384.

Krosnick, J. A., & Petty, R. E. (1995). Attitude strength: An overview. Attitude strength: Antecedents and consequences, 1, 1-24.

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. Journal of business venturing, 15(5), 411-432.

Liñán, F. (2004): “Intention-based models of entrepreneurship education”, Piccolla Impresa / Small Business, Iss. 3, pp. 11-35.

Liñán, F., & Chen, Y. W. (2009). Development and Cross Cultural application of a specific instrument to measure entrepreneurial intentions. Entrepreneurship Theory and Practice, 33(3), 593-617.

Ma, P. W. W., & Yeh, C. J. (2005). Factors influencing the career decision status of Chinese American youths. The Career Development Quarterly, 53(4), 337-347.

Mueller, S. (2011) ‘Increasing entrepreneurial intention: effective entrepreneurship course characteristics’, Int. J. Entrepreneurship and Small Business, Vol. 13, No. 1, pp.55-74.

Nederhof, A. J. (1989). Self involvement, intention certainty and attitude—intention consistency. British Journal of Social Psychology, 28(2), 123-133.

Osipow, S. H. (1999). Assessing career indecision. Journal of Vocational Behavior, 55(1), 147-154.

Osipow, S. H., Carney, C. G., Winer, J. L., Yanico, B. J., & Koschier, M. (1976). Career decision scale (rev.). Odessa, FL: Psychological Assessment Resources.

Parsons, F. (1909). Choosing a vocation. Houghton Mifflin.

Patton, W., & Creed, P. A. (2001). Developmental issues in career maturity and career decision status. Career Development Quarterly, 49(4), 336-351.

Peterson, D. K., & Pitz, G. F. (1988). Confidence, uncertainty, and the use of information. Journal of Experimental Psychology: Learning, Memory, and Cognition, 14(1), 85.

Petrocelli, J. V., Tormala, Z. L., & Rucker, D. D. (2007). Unpacking attitude certainty: attitude clarity and attitude correctness. Journal of personality and social psychology, 92(1), 30.

Picard, F. (2012). Reducing academic and career indecision: The effectiveness of a first-year college program. The Online Journal of Counselling and Education, 1(3), 71-83.

Piperopoulos, P., & Dimov, D. (2014). Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self Efficacy, and Entrepreneurial Intentions. Journal of Small Business Management.

Savickas, M. L., & Jarjoura, D. (1991). The Career Decision Scale as a type indicator. Journal of Counseling Psychology, 38(1), 85.

Schein, H. K., & Laff, N. S. (1997). Working with Undecided Students: A Hands-On Strategy. NACADA Journal, 17(1), 42-48.

Seodfia, John (2013). Developmental Approaches: Ginzberg's Theory Of Career Choice And Development, International Journal Of Innovative Education Research 2 (1) 20-25.

Sepich, R. T. (1987). A review of the correlates and measurements of career indecision. Journal of Career Development, 14(1), 8-23.

Sheeran, P., Orbell, S., & Trafimow, D. (1999). Does the temporal stability of behavioral intentions moderate intention-behavior and past behavior-future behavior relations?. Personality and Social Psychology Bulletin, 25(6), 724-734.

Singaravelu, H. D., White, L. J., & Bringaze, T. B. (2005). Factors Influencing International Students' Career Choice A Comparative Study. Journal of Career Development, 32(1), 46-59.

Souitaris, V., Zerbinati, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. Journal of Business venturing, 22(4), 566-591

Stark, K. (2002). Advising undecided students: What works best. The Mentor: An Academic Advising Journal, 4(3).

Steele, G. E., & McDonald, M. L. (2000). Advising students in transition. Academic advising: A comprehensive handbook. San Francisco, CA: Jossey-Bass, 144-161.

Temple, R. D., & Osipow, S. H. (1994). The relationship between task-specific self-efficacy egalitarianism and career indecision for females. Journal of Career Assessment, 2(1), 82-90.

Tormala, Z. L., & Rucker, D. D. (2007). Attitude certainty: A review of past findings and emerging perspectives. Social and Personality Psychology Compass, 1(1), 469-492.

Tracey, T. J., & Darcy, M. (2002). An idiothetic examination of vocational interests and their relation to career decidedness. Journal of Counseling Psychology, 49(4), 420.

Trafimow, D. (1994). Predicting intentions to use a condom from perceptions of normative pressure and confidence in those perceptions. Journal of Applied Social Psychology, 24, 2151–2163.

Van den Broeck, A., Vansteenkiste, M., & De Witte, H. (2008). Self-determination theory: A theoretical and empirical overview in occupational health psychology.

Van Gelderen, M., Brand, M., van Praag, M., Bodewes, W., Poutsma, E., & van Gils, A. (2008). Explaining entrepreneurial intentions by means of the theory of planned behaviour. Career Development International, 13(6), 538–559.

Van Wie, K. O. (2011). Academic advising and career development for undecided transfer students. Transfer Students in Higher Education. Eds. Mark Poisel and Sonya Joseph. Columbia, SC: National Resource Center for the First year Experience & Students in Transition.

Warland, R. H., & Sample, J. (1973). Response certainty as a moderator variable in attitude measurement. Rural Sociology.

Zhang, Y., Duysters, G., & Cloodt, M. (2014). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. International entrepreneurship and management journal, 10(3), 623-641.

Zimmerman, B. J. (1995). Self-efficacy and educational development. Self-efficacy in changing societies, 202-231.

Zunker, Vernon G. (1998) Career Counseling: Applied Concepts of Life Planning. 5th ed. Pacific Grove, CA: Brooks/Cole Publishing Co.