Sanna Joensuu-Salo

Entrepreneurial intention, behavior and entrepreneurship education

A longitudinal approach

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Tiivistelmä

Yrittäjyydellä on iso merkitys yhteiskunnassa suhteessa hyvinvointiin ja työllistämiseen. Vaikka yrittäjyysaikomuksia ja yrittäjyyskoulutuksen vaikutusta on paljon tutkittu, pitkittäisasetelmat ovat harvinaisia. Tämän tutkimuksen teoreettisena viitekehyksenä toimii suunnitellun käyttäytymisen teoria (Theory of Planned Behavior, TPB). Pitkittäistutkimuksena tarkastellaan TPB-mallia suhteessa yrittäjyysaikomusten kehittymiseen, yhteyttä yrittäjyysaikomusten ja yrittäjäksi ryhtymisen välillä sekä yrittäjyyskoulutuksen vaikutusta. Väitöskirja koostuu neljästä tutkimusartikkelista, joissa käytetään pitkittäisdataa suomalaisista ammattikorkeakouluopiskelijoista opintojen aikana ja valmistumisen jälkeen. Analyysissä hyödynnetään latenttia kasvukäyrän mallintamista, logistista regressioanalyysiä, polkuanalyysiä ja lineaarista regressioanalyysiä. Tulokset osoittavat, että pääsääntöisesti yrittäjyysaikomukset laskevat opintojen aikana. Kuitenkin pidemmällä aikavälillä tarkasteltuna yrittäjyysaikomukset pysyvät stabiilina. Opintojen aikana mitatut yrittäjyysaikomukset selittävät yrittäjäksi ryhtymistä vielä vuosien kuluttua. Yrittäjyyskoulutuksella on yrittäjyysaikomuksia ylläpitävä vaikutus. Yrittäjyyskoulutus ei vaikuta aina välittömästi vaan vaikutukset voivat esiintyä pitkällä aikavälillä. Yrittäjyys on vahvasti sukupuolittunut ilmiö. Yrittäjyysaikomuksiin pystytään parhaiten vaikuttamaan opintojen aikana. TPB-malli toimii hyvin pitkittäistutkimuksessa selittäen yrittäjyysaikomusten kehittymistä sekä linkkiä aikomusten ja yrittäjäksi ryhtymisen välillä.

Asiasanat

Yrittäjyysaikomukset, yrittäjyys, yrittäjyyskoulutus, korkeakoulu, pitkittäistutkimus

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Entrepreneurial intention, behavior and entrepreneurship education. A longitudinal approach

Abstract

Entrepreneurship is an important factor in the society creating well-being, new jobs and seeking opportunities to change the world we live in. While entrepreneurial intention and entrepreneurship education are both widely researched areas in entrepreneurship, there is still a lack of longitudinal settings. This dissertation uses Theory of Planned behavior as a theoretical framework. A longitudinal approach is used in analyzing the entrepreneurial intention development and TPB model, the link between entrepreneurial intention and actual start-up behavior, and entrepreneurship education and its impact on entrepreneurial intentions. Research questions are addressed in four different research articles, which all use longitudinal data from students and graduates from Universities of Applied Sciences in Finland. Latent growth curve modelling, logistic regression analysis, path analysis and multiple linear regression analysis are used in the data analysis. Results show that entrepreneurial intentions of higher education students decrease during their studies. However, in a longer term, entrepreneurial intention is a temporarily stable construct. Entrepreneurial intention measured during study time significantly explains entrepreneurial behavior after many years. Entrepreneurship education works as a preservative both in a short and in a long term, and it has delayed effects. Entrepreneurship is strongly gendered. Entrepreneurial intentions are best influenced during higher education studies. TPB works in a longitudinal setting in respect to the development of entrepreneurial intentions, and the link between entrepreneurial intentions and entrepreneurial behavior.

Keywords

entrepreneurial intention, entrepreneurial behavior, entrepreneurship education, higher education, longitudinal approach

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Finally, I want to thank my husband Valtteri who urged me to do this second doctoral thesis. When I did the first one, my first child Aarne was just born. Now he is 14 years old, and my daughter Fanny is 13 years old. Time goes by, but research work still fascinates and inspires me.

Alajärvi, September 2020

Sanna Joensuu-Salo

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Abbreviations

TPB	Theory of Planned Behavior
EI	Entrepreneurial Intention
PBC	Perceived Behavioral Control
ATT	Attitudes
SN	Subjective Norm
EE	Entrepreneurship Education
EB	Entrepreneurial Behavior

List of articles

This dissertation is based on the following articles:

[1] Joensuu-Salo, S., Viljamaa, A. and Varamäki, E. (2020). Do intentions ever die? The temporal stability of entrepreneurial intention and link to behavior. Education + Training, Vol. 62, No. 3, pp. 325-338. https://doi.org/10.1108/ET-03-2019-0053

[2] Joensuu, S., Viljamaa, A., Varamäki E. and Tornikoski, E. (2013). Development of entrepreneurial intention in higher education and the effect of gender – a latent growth curve analysis. Education + Training, Vol. 55, No. 8/9, pp. 781-803. https://doi.org/10.1108/ET-06-2013-0084

[3] Varamäki E., Joensuu, S., Tornikoski E. and Viljamaa, A. (2015). The development of entrepreneurial potential among higher education students. Journal of Small Business and Enterprise Development, Vol. 22, No. 3, pp. 563-589. https://doi.org/10.1108/JSBED-02-2012-0027

[4] Joensuu-Salo, S. 2020. A long-term effect of entrepreneurial education on entrepreneurial intentions: results from Finnish higher education students. Accepted in Journal of Finnish Studies, Vol. 23, No. 2, (in publication).

1 INTRODUCTION

Entrepreneurship is an important factor in the society creating well-being, new jobs and seeking opportunities to change the world we live in. Many scholars see entrepreneurship as processes to create newness (Lumpkin & Dess 1996; Ireland, Hitt & Sirmon 2003) in the context of Schumpeter's (1934) conceptualization. Ireland and Webb (2007) state that entrepreneurship is widely viewed as an important stimulus of positive outcomes at both the firm level and the society level. Hence, for the society it is vital to understand the entrepreneurial process and ways to boost entrepreneurial behavior. Entrepreneurship is a journey of the hearts and minds. We need to understand more deeply what is the meaning of entrepreneurial intention, how it develops over time, and how it leads to entrepreneurial behavior? What is in fact this journey, and can it be supported through entrepreneurship education?

Entrepreneurial intention has been seen as the first step in entrepreneurial process (Gartner, Shaver & Katz 1994; Liñán & Chen 2009), and the research of entrepreneurial intention has gained wide interest among scholars during the past 20 years (Kolvereid 1996; Krueger & Carsrud 1993; Fayolle & Liñán 2013; Kautonen, van Gelderen & Fink 2015). Entrepreneurial intention has been defined e.g. according to Krueger, Reilly and Carsrud (2000, 420) as "the target behaviors of starting a business". However, Thompson (2009) argues that there is a lack of a clear definition of individual entrepreneurial intent. He seeks to clarify the construct and ends up with the following definition: "individual entrepreneurial intent is perhaps most appropriately and practically defined as a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future". In this dissertation, entrepreneurial intention is defined as individual's commitment to starting a new business (Krueger & Carsrud 1993) after student's graduation. Hence, this definition is similar to Thompson's (2009) suggestion.

One of the most used theories in the context of entrepreneurial intention research is the Theory of Planned Behavior (TPB) developed by Ajzen (1991). Other theories concerning entrepreneurial intention are Shapero's (1982) entrepreneurial event model and Lüthje and Franke's (2003) model. The TPB model originates from the psychology of intention (Ajzen & Fishbein 1969). The validity of TPB in predicting various human behaviors has been confirmed by many researchers (e.g. Chu, Chen & Sung 2016; Yang, Choi & Lee 2018). The history of TPB lies in the Theory of Reasoned Action (Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). Theory of

Reasoned Action propose that behavioral intentions are the immediate antecedents to behavior and are a function of salient information or beliefs about the likelihood that the behavior in question will lead to a specific outcome. Fishbein and Ajzen (1975) divided these beliefs into behavioral and normative antecedents. The behavioral beliefs are influenced by individual's attitudes toward the given behavior and normative beliefs are influenced by the individual's subjective norm. Ajzen (1985; 1991) extended this theory by adding perceived behavioral control as an antecedent to behavior intentions. Ajzen (1991) suggests, that beliefs about the required resources and opportunities for performing the given behavior (i.e. perceived behavioral control) have both direct and indirect effect via intentions to behavior. As such, Theory of Planned behavior has three conceptually independent antecedents of intentions: attitudes, subjective norm and perceived behavioral control (Ajzen 1991). Madden, Ellen and Ajzen (1992) argue, that the Theory of Reasoned Action is applicable when the behavior in question is under volitional control, but when this volitional control declines, the Theory of Planned Behavior was shown to be superior in predicting the target behavior. In entrepreneurship, it can be assumed that beliefs about the possessed resources and opportunities to become an entrepreneur will be vital in explaining the entrepreneurial behavior. This is one of the reasons why the Theory of Planned Behavior has been proven to be suitable in explaining entrepreneurial intention and behavior in different contexts (Maalaoui et al. 2018, Armitage & Conner 2001; Sheeran 2002; Krueger & Carsrud 1993; Krueger, Reilly & Carsrud 2000; Barbosa, Fayolle & Lassas-Clerc 2006). Hence, in this dissertation, Theory of Planned Behavior is applied in predicting entrepreneurial intention and behavior.

In addition to entrepreneurial intention and TPB model, this dissertation addresses the question of entrepreneurship education and its impact on intention. There has been a growing interest in recent years to invest in promoting entrepreneurship by the means of entrepreneurship education (EE); especially in Finland, the Ministry of Education and Culture published in year 2017 updated national guidelines for entrepreneurship education, which guide and support educational institutions to initiate, strengthen, and develop their entrepreneurship education strategies and practices (Ministry of Education and Culture 2017). The impact of EE has been measured with different outcomes, one being entrepreneurial intention (see Longva & Foss 2018). In addition to predicting entrepreneurial behavior, The Theory of Planned behavior can be applied when evaluating the outcomes of entrepreneurship education. Fayolle, Gailly & Lassas-Clerc (2006) tested a framework in which entrepreneurship education programs can be evaluated using TPB model. They found that TPB is a relevant tool to model the development of entrepreneurial intention through pedagogical processes.

While entrepreneurial intention and entrepreneurship education are both widely researched areas in entrepreneurship, there is still a lack of longitudinal settings (e.g. Matlay & Carey 2007; Liñán & Fayolle 2015) and the link between intentions and actual start-up requires more research (Sequeira et al. 2007; Carsrud & Brännback 2011; Schlaegel & Koenig 2014). Furthermore, the findings of Longva and Foss (2018) reveal a substantial lack of methodologically rigorous studies on EE impact; and delayed effects of entrepreneurship education are still unexplored (Block & Stumpf 1992; Longva & Foss 2018). From the theoretical point of view, this dissertation provides new knowledge about the TPB in the context of entrepreneurship; how the changes in antecedents of intentions effect the change in intentions in the long term, and what is the impact of time element in the predictive power of TPB. This time element has been discussed as a challenge for the theory (see Tornikoski & Maaloui 2019). The focus is on studying whether entrepreneurial intentions of higher education students predict future real entrepreneurial behavior and whether these entrepreneurial intentions remain stable over time. In addition, this dissertation addresses the question can entrepreneurship be taught - and if so, what are the effects in a long term? This dissertation contributes to entrepreneurial intention research by examining the TPB model in a longitudinal follow-up of the same person from study time until 6-8 years after graduation, the link between entrepreneurial intention and actual behavior, and the impact of EE. This kind of longitudinal setting is rare in entrepreneurship research.

The importance of longitudinal setting stems from the possibility to understand the entrepreneurial processes of young people. Young people at the stage of higher education studies are planning their future career and forming beliefs about their work identity. Entrepreneurship may be their choice either at the study time, after studies or later in their life. More understanding is needed to find the best ways to foster entrepreneurial spirit of higher education students. The importance of focusing on young people and their entrepreneurial intentions has been acknowledged by other scholars as well (e.g. Shneor et al. 2020; Ojiaku, Nkamnebe, & Nwaizugbo 2018; Shirokova, Osiyevskyy & Bogatyreva 2016; Zampetakis et al. 2011).

1.1 Objectives and research questions

One could say that entrepreneurial intention research has already seen it all. Krueger (2009) wrote an interesting paper named “Entrepreneurial intentions are dead: long live entrepreneurial intentions”. In this article, he argued how entrepreneurial intention research has developed over the years and what is yet to

come. He suggests, that the construct of intention is deeply fundamental in decision-making, and this is why entrepreneurial intention research should not be overlooked but it needs to develop. First aspect is longitudinal designs. Krueger (2009) argues that there are zero studies showing how the changes in the antecedents of intention affects the changes in intention. This is a major gap in entrepreneurial intention research. In this dissertation, this phenomenon is examined. In addition, because longitudinal designs are really difficult to implement, there exist many gaps in entrepreneurial intention research including testing the whole TPB-model in a longitudinal design (especially intention-action link), examining the temporal stability of entrepreneurial intention in a long term and testing the effect of entrepreneurship education in a longitudinal setting. This dissertation fills these gaps by providing almost ten-year period in examining the TPB model in various settings.

Entrepreneurial intention research should have contribution to the practice and especially to the practice of entrepreneurship education (Krueger 2009). Like mentioned before, entrepreneurship education research lacks longitudinal settings; therefore there exist no studies measuring delayed effects of entrepreneurship education on entrepreneurial intentions (Longva & Foss 2018).

Regarding these aforementioned research gaps, this dissertation has three objectives. All the objectives relate to longitudinal aspect and are approached with different research questions. *The first objective* of this dissertation is to analyze the entrepreneurial intention development and TPB model in a longitudinal setting. The research questions concerning the first objective are as follows:

RQ 1: How entrepreneurial intention and its antecedents develop over time? Has TPB explanation power in a longitudinal setting?

RQ 2: What are the possible gender differences in the development of entrepreneurial intention over time?

The second objective relates to the link between entrepreneurial intention and actual start-up behavior in a longitudinal setting. The research question concerning the second objective is as follows:

RQ 3: What is the link between entrepreneurial intention and actual entrepreneurial behavior over time?

The third objective is related to entrepreneurship education and its impact on entrepreneurial intentions in a longitudinal setting. Research questions concerning the third objective are as follows:

RQ 4: How the choices of entrepreneurship pedagogy effect the development of entrepreneurial intention?

RQ 5: What are the possible delayed effects of entrepreneurship education on entrepreneurial intention over time?

These research questions are addressed in four different research articles. The first article examines how entrepreneurial intention develops over time and how temporarily stable the construct is. In addition, it examines the link between entrepreneurial intention and actual behavior in two longitudinal settings (1-3 years and 6-8 years). Hence, the research questions 1 and 3 are answered. The second article examines the development of intentions over time on individual level. The objective is to analyze potential gender differences in entrepreneurial intention development using multi-wave panel data. Hence, the article answers research questions 1 and 2. The third article investigates the changes in entrepreneurial intention and the antecedents of intention on individual level. This article examines how changes in antecedents affect the change in entrepreneurial intention. In addition, the third article examines the impact of entrepreneurship education on the changes in entrepreneurial intention and its antecedents. The third article answers research questions 1 and 4. The fourth article examines the long-term effect of antecedents (attitudes, perceived behavioral control and the subjective norm) on entrepreneurial intentions in maximum four-year period. In addition, it examines the long-term effect of entrepreneurship education on entrepreneurial intentions and therefore answers research questions 1 and 5. Figure 1 illustrates how research papers contribute to research questions of this dissertation.

Article 1: Do intentions ever die? Temporal stability of entrepreneurial intention and link to behavior RQ: 1, 3
Article 2: Development of entrepreneurial intention in higher education and the effect of gender – a latent growth curve analysis RQ: 1, 2
Article 3: The development of entrepreneurial potential among higher education students RQ: 1, 4
Article 4: A long-term effect of entrepreneurial education on entrepreneurial intentions: results from Finnish higher education students RQ: 1, 5

Figure 1. Research articles and related research questions of the dissertation.

Article 1 is a peer-reviewed journal article published in 2020 in Education + Training and co-authored by Joensuu-Salo, Viljamaa and Varamäki. Article 2 is also a peer-reviewed journal article co-authored by Joensuu, Viljamaa, Varamäki and Tornikoski published in 2013 in Education + Training. The third article is a peer-reviewed journal article published in 2015 in Journal of Small Business and Enterprise Development and co-authored by Varamäki, Joensuu, Tornikoski and Viljamaa. Article 4 is sole authored by Joensuu-Salo and this peer-reviewed journal article has been accepted in publication in Journal of Finnish Studies 23 (2). Joensuu-Salo is the lead author in articles 1, 2 and 4, and second co-author in article 3.

In joint articles, Joensuu-Salo had the main responsibility for managing the review process, collecting the data, analyzing the data and writing the article. Research designs were jointly discussed with authors, and all of the authors participated in writing the theoretical framework and conclusions.

1.2 Structure of the dissertation

There are two parts in this dissertation. The first part gives a summary of this research containing introduction part, theoretical foundation, methodological choices and overview of the research articles. Discussion and conclusions are presented in the final section of the first part. The second part consists of published articles related to this dissertation. Table 1 presents the summary of research articles: purpose, methodology, and main findings.

Table 1. Summary of the research articles.

	Purpose	**Data and methodology**	**Main findings**
Article 1	A longitudinal follow-up of the TPB-model: examining the same individuals from a point at which they were studying until six to eight years after graduation and the link between entrepreneurial intention and actual behavior.	Three data collection waves between years 2008 and 2018. Second wave 282 respondents; third wave 89. A latent growth curve modelling and a logistic regression analysis.	Entrepreneurial intention is temporarily stable construct. Entrepreneurial intention measured during study time significantly explains entrepreneurial behavior after many years.
Article 2	The development of entrepreneurial intentions over time; potential gender differences in intention development; the relatedness of the initial level and development of the antecedents	Longitudinal data collected in three waves. 192 individuals with all three measurement waves and 104 individuals with two measurement waves. Latent growth curve analysis with	Entrepreneurial intention of higher education students decreases during their studies. There is a gender difference in the initial level of entrepreneurial intentions and how intentions develop over time. The initial level of intentions does not affect the future

	Purpose	**Data and methodology**	**Main findings**
	of intentions to the initial level and the development of intentions.	structural equation modeling.	development of intentions.
Article 3	Examines the changes in individuals' entrepreneurial intentions and the antecedents of intentions, as well as the impact of entrepreneurship education on the changes.	Longitudinal data from 197 higher education students, in their first and third year of studies. Path analysis.	The entrepreneurial intentions decreased over time. Changes in attitudes and perceived behavioral control have a significant positive impact. Versatile entrepreneurship courses have direct effect on changes in attitudes. Gender differences in development of intentions.
Article 4	Examines the long-term effect of attitudes, PBC and the subjective norm on entrepreneurial intentions, and the long-term effect of entrepreneurship education on entrepreneurial intentions after graduation.	Time 1: 2008-2012, Time 2: 2013. The combined data for 282 graduates. Multiple linear regression analysis.	Attitudes to an entrepreneurial career have explanatory power that is retained with time. Attitudes measured during the period of higher education explained entrepreneurial intentions even two to four years after graduation. Entrepreneurship education has a long-term effect on entrepreneurial intentions.

2 THEORETICAL FRAMEWORK

This research applies Theory of Planned Behavior by Ajzen (1991) in examining the development of entrepreneurial intention and its antecedents, the link between intention and entrepreneurial behavior, and the impact of entrepreneurship education on the development of entrepreneurial intention. First, the context of entrepreneurial intention research is discussed. Second, the history of entrepreneurial intention research is presented. Third, the theory of planned behavior is introduced as a theoretical framework for the thesis. Fourth, entrepreneurship education and its impact on entrepreneurial intention is addressed. Last, the gender effect is discussed concerning the development of entrepreneurial intention, entrepreneurial behavior and entrepreneurship education.

2.1 Entrepreneurial intention and the theories of entrepreneurship

Entrepreneurship is important for economic growth; entrepreneurs enter and expand existing markets, and create entirely new markets presenting opportunities for others to profit, and thereby further boosting economic growth (Kuratko 2011). Bruton, Zahra and Cai (2018) state that entrepreneurship has been seen as a manifestation of an individual's need for independence and achievement. It is a way for individuals to control their destiny and employment. However, Bruton et al. (2018) argue that the models of entrepreneurship are highly affected by history, culture, and institutions defining the nature, scope, manifestation, and outcomes of entrepreneurship.

Entrepreneurship theory has been evolving past 40 years. However, Chell and Karataş-Özkan (2014) state that entrepreneurship is a relatively young field and still developing its theoretical base. Frederick et al. (2016) define a theory of entrepreneurship as a verifiable and logically coherent formulation of relationships or underlying principles that explain entrepreneurship. Entrepreneurship is interdisciplinary combining different fields and schools of thought. Frederick et al. (2016) identify seven schools of thought in entrepreneurship. Four of them represent the macro view of entrepreneurship and three represent the micro view of entrepreneurship. The macro view of entrepreneurship presents the external factors that relate to success or failure in entrepreneurial ventures while the micro view concentrates on the factors that can be controlled by the entrepreneur directly or adjusting their influence (Kuratko et al. 2015). Macro view can be divided to social and cultural school of thought,

financial/capital school of thought, displacement school of thought, and ecological school of thought. In the schools of micro view there are entrepreneurial trait school of thought, venture opportunity school of thought and strategic planning school of thought (Frederick et al. 2016).

The field of entrepreneurship research has been argued to be fragmented without common theoretical basis or shared definitions (Davidsson, Low & Wright 2001; Shane & Venkataraman 2000). As a response to this argument, Shane and Venkataraman (2000) proposed a conceptual framework. They define the field of entrepreneurship research as studying a) sources of opportunities, b) the processes of discovery, evaluation, and exploitation of opportunities, and c) the set of individuals who discover, evaluate and exploit them. In their framework, they have four assumptions. First, they view that certain individuals have a tendency to respond to opportunities; second, they argue that entrepreneurship does not require the creation of new organizations; third, they complement sociological and economic work regarding population-level factors influencing firm creation; and fourth, they complement research on the process of firm creation.

Frederick, O'Connor and Kuratko (2016) highlight that entrepreneurship is above all a mindset. This mindset is manifested in seeking opportunities, taking risks and implementing creative solutions and ideas. Alvarez & Busenitz (2001) argue that entrepreneurship can be seen through recource-based-theory. They introduce two entrepreneurial concepts: 1) entrepreneurial recognition (recognition of opportunities and opportunity seeking behavior as a resource), and 2) the process of combining and organizing resources as a resource. Hence, opportunity recognition is in the center of prior definitions of entrepreneurship of Alvarez & Busenitz (2001), Frederick et al. (2016) and Shane and Venkataraman (2000).

Despite of the precious work of defining entrepreneurship, Frederick et al. (2016: 14) argue that it is important that definitions of entrepreneurship evolve into the twenty-first century. They end up in the following definition: *"Entrepreneurship is a dynamic process of vision, change and creation. It requires an application of energy and passion towards the creation and implementation of value-adding ideas and creative solutions. Essential ingredients include the willingness to take calculated risks in terms of time, equity or career; the ability to formulate an effective venture team; the creative skill to marshal needed resources; and, finally, the vision to recognise opportunity where others see chaos, contradiction and confusion."*

Entrepreneurship research can be divided in three main streams 1) trait approach, 2) behavioral approach, and 3) cognitive approach (McStay 2008; Sivarajah & Achchuthan 2013). The trait approach relates to studies that try to identify distinct

traits that are specific to the entrepreneur. McStay (2008) argues that no agreement about these traits have been found. However, Sivarajah & Achchuthan (2013) summarize certain characteristics in prior research that have been associated with entrepreneurship such as need for achievement, locus of control, risk taking, tolerance of ambiguity, creativity, need of autonomy, and self-efficacy. Within trait approach, also a term personality approach has been used. Frese & Rauch (2008) define the personality approach to "…assume that the effects of a person's traits on his or her entrepreneurial behavior are mediated by specific traits and motivations, and moderated by environmental conditions."

According to Sivarajah & Achchuthan (2013), behavioral approach concentrates in explaining "what it is that entrepreneurs do." The focus is in venture creation process and entrepreneur's role in that process. Aldrich & Martinez (2001) found a shift from trait-based approaches to behavioral approach. Many authors cite to Gartner (1988, 21), who argued that "the research on the entrepreneurship should focus on what the entrepreneur does and not who the entrepreneur is". Behavioral approach is interested in how entrepreneurs interact with environment and make decisions, exploit and act on profit opportunities (Tipu & Arain 2011).

The third approach is the cognitive approach, which focuses in explaining the antecedents of entrepreneurial behavior (Sivarajah & Achchuthan 2013). The cognitive approach is interested in the cognitive processes of entrepreneurs – how they think and how they process information. Majority of the research in cognitive approach has studied different cognitive elements such as scripts, self-efficacy, cognitive styles and heuristics (Sánchez, Carballo & Gutiérrez 2011). Cognitive factors like cognitive styles, values and mental processes are believed to differ between entrepreneurs and non-entrepreneurs. Sánchez et al. (2011) state that the use of intentions model in entrepreneurship research is one of the valuable results of the cognitive approach.

This dissertation represents the cognitive approach in entrepreneurship research. Intention research is one part of the cognitive approach focusing in antecedents of behavior. Individuals seeking entrepreneurial opportunities are of interest. Like Shane & Venkataraman (2000) acknowledge, entrepreneurship needs individuals, who respond to entrepreneurial opportunities and stimulus. And, like Frederick et al. (2016) state, this requires a certain mindset of seeking opportunities, taking risks and implementing change.

When exploring the mindset and cognitions of entrepreneurial individuals, one aspect is the concept of self. This is one of the main research interests in cognitive approach (Sánchez et al. 2011), and is also related to entrepreneurial intentions. One of the most used models in entrepreneurship research concerning the concept

of self is Bandura's (1986) Social Cognitive Theory and the concept of self-efficacy (Bandura 1988). In Bandura's (1986) Social Cognitive Theory, behavior, cognitive, and other personal factors and environmental events operate as interacting determinants influencing each other bidirectionally. The sources of influences can be different in strength and may not occur simultaneously. Wood and Bandura (1989) state that it takes time for a causal factor to exert its influence. Social cognitive theory puts a central role to cognitive, vicarious, self-regulatory, and self-reflective processes. One of the main mechanisms in regulatory process is individual's belief about their personal efficacy. This perceived self-efficacy relates to capabilities to mobilize the motivation, cognitive resources, and courses of action needed to exercise control. These can be instilled and strengthened by mastery experiences, modeling, social persuasion, and physiological states (Wood & Bandura 1989).

Bandura (1994) defines perceived self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives." These self-beliefs determine the level of motivation; people with strong belief in their capabilities put greater effort to their actions despite of challenges. These beliefs have an effect on how we feel, think, motivate ourselves and behave. Bandura (1994) identifies four processes through which these beliefs produce the effects. These include cognitive, motivational, affective and selection processes.

Self-efficacy has been widely researched in entrepreneurship and has proven to be an important factor effecting entrepreneurial intention (Zhao, Seibert & Hills 2005; Lans, Gulikers & Batterink 2010). In addition, self-efficacy is related to opportunity recognition and career intention (Krueger & Brazeal 1994; Kickul et al. 2009). Wang et al. (2016) showed that certain personality traits (extraversion, openness, conscientiousness, and agreeableness) predicted entrepreneurial intention through self-efficacy.

The concept of self-efficacy is close to Ajzen's (1991) concept of perceived behavioral control, which is one of the antecedents of entrepreneurial intention. It can be argued that overall the concept of self, defined as "*cognitions that capture one's definition of oneself, how they are encoded, organized and retrieved in order to participate in one's psychological adjustment*" (Gana 2012:1), is strongly related to individual's entrepreneurial intention and behavior.

Entrepreneurship research has utilized theories from social psychology. Especially regarding entrepreneurial intentions, Bandura's social cognitive theory (1986) and Ajzen's (1991) Theory of Planned behavior has gained wide acceptance. The history of entrepreneurial intention research is discussed next.

2.2 The history of entrepreneurial intention research

The history of intention research lies in social psychology. The most used model in intention research has been the Theory of Planned Behavior (TPB) developed by Ajzen (1991), which will be discussed in more detail in section 2.3. Armitage and Conner (2001) reviewed altogether 185 studies using TPB and found strong support for the model; TPB is a valid model explaining intention and behavior. Intention has been researched i.e. in the context of ethical behavior (Jafarkarimi et al. 2016), health psychology (Montanaro & Bryan 2014) and teacher behavior (Macfarlane & Woolfson 2013) among other things.

Entrepreneurial intention has gained wide interest in the stream of entrepreneurship research. Maalaoui et al. (2018) identified a set of 955 authors with 600 journal articles contributing in entrepreneurial intention research. Their study reveal that various concepts can be related to entrepreneurial intention, such as education, motivation, SME growth, entrepreneurial orientation and entrepreneurial ecosystem. Despite the magnitude of previous studies, there is still a growing interest in studying entrepreneurial intention in various settings as Maalaoui et al. (2018) state.

Based to prior research, Farrukh et al. (2018) define entrepreneurial intention as "self-acknowledged conviction by any individual that he/she is willing to initiate new business enterprise, and he/she continuously plans to accomplish this in future". The definition follows the views of Krueger and Carsrud (1993) and Thompson (2009). In very simple terms, entrepreneurial intention can be defined as "intention to start a new business" (Israr & Hashim 2015). Despite of the numerous studies applying entrepreneurial intention, Thompson (2009) argues that the construct is vague and has been used loosely to cover different situations for example career orientation, vocational aspirations, nascent entrepreneurs, outlook on self-employment and the desire to own a business. However, he agrees that entrepreneurial intention is an important and continuing construct in entrepreneurship theory and research.

One important aspect of entrepreneurial intention is that it is viewed as intentional, planned behavior (Krueger, Reilly & Carsrud 2000). Thompson (2009) summarizes that "intent is used in the sense of a conscious and planned resolve that drives actions necessary to launch a business". The most used models in entrepreneurial intention research are Ajzen's (1991) TPB and Shapero's and Shokol's (1982) Entrepreneurial Event Model (Maalaoui et al. 2018).

TPB differs from Entrepreneurial Event Model in adding social norms as an antecedent of intention. In Shapero's and Shokol's model the antecedents of

intention are perceived desirability (close to TPB's attitudinal component), propensity to act (background factor in the TPB) and perceived feasibility (close to TPB's perceived behavioral control). As Maalaoui et al. (2018) summarize, both models are suitable in predicting entrepreneurial behavior. Krueger, Reilly and Carsrud (2000) compared these two models and provided support for both models. They argue that both TPB and Entrepreneurial Event model offer a valuable tool for understanding the process of entrepreneurship. In addition to TPB and Entrepreneurial Event Model, also Bird's (1988) Entrepreneurial Intentions Model has been applied in prior research. The Bird's model was further developed by Boyd and Vozikis (1994), who added the concept of self-efficacy to the model. Quite recently, a new model was developed by Esfandiar et al. (2019). In their model, TPB and Entrepreneurial Event Model are integrated as in the pioneering version of Krueger (2009). However, it can be argued that TPB has been the most dominant model in entrepreneurial intention research to this date (Fayolle & Liñán 2014).

TPB has been applied in entrepreneurial intention research in many studies during the past 20 years (Krueger & Carsrud 1993; Carr & Sequeira 2007; Kautonen, Van Gelderen & Fink 2015). As Ajzen (1991: 181) refers to intention as "individual's intention to perform a given behavior", entrepreneurial intention can be defined as individual's intention to perform entrepreneurial behavior (i.e. become an entrepreneur). When applying TPB in entrepreneurial intention research, attitudes refers to attitudes towards entrepreneurship, PBC refers to individual's perception of the ease or difficulty of succeeding as an entrepreneur and subjective norm refers to the social pressure from the most significant others if individual would become an entrepreneur.

The relative importance of antecedents of intention may vary across different contexts. In entrepreneurial intention research, all the three antecedents have been found to explain entrepreneurial intention. In some studies, the most important factor has been perceived behavioral control (Krueger, Reilly & Carsrud 2000; Kristiansen & Indarti 2004; Segal, Borgia & Schoenfeld 2005; Sequeira, Mueller & McGee 2007; Prodan & Drnovsek 2010; Drost & McGuire 2011). In other studies, the most significant predictor of intentions has been attitudes (Zampetakis et al. 2009; Moi, Adeline & Dyana 2011). Some studies have found subjective norm to be the most important antecedent of intention (Aizzat et al. 2009; Engle et al. 2010; Siu & Lo 2013). Kautonen, Van Gelderen and Fink (2015) showed that antecedents of entrepreneurial intentions (attitudes towards entrepreneurship, perceived behavioral control related to entrepreneurship and subjective norm) jointly explained 59 percent of the variation in entrepreneurial intention.

Liñán and Fayolle (2015) published a literature review on entrepreneurial intention research. Their citation analysis shows that papers can be classified in five categories: 1) Core entrepreneurial intention model, 2) Personal-level variables, 3) Entrepreneurship education, 4) Context and institutions, and 5) Entrepreneurial process. In addition, they found some new research areas. Each category has different sub-categories. Most of the published research articles can be classified to the second category (personal-level variables). In his category the articles examine i.e. background factors, personality, gender issues, specific subsamples and perceived barriers. Category 5 was least presented, covering only 39 articles. This category (Entrepreneurial process) has articles examining variables affecting the process and longitudinal studies. Liñán and Fayolle (2015) state that further research is necessary in the field on entrepreneurial intention to increase understanding in this area. Maaloui et al. (2018) also identified different streams in entrepreneurial intention research. They categorized it into three major types. These include 1) research examining the antecedents of intention, 2) research examining the path between intention and action, and 3) research developing Ajzen's TPB with additional dimensions.

Entrepreneurial intention research is increasingly emerging within the field of entrepreneurship. To mention a few, Martins and Perez (2020) suggest, that entrepreneurial intention is affected by the valuation of entrepreneurship and the venture failure stigmatization. Alam et al. (2020) found that entrepreneurial motivation and entrepreneurship education has effects in entrepreneurial intentions of engineering students. Tomy and Pardede (2020) propose an entrepreneurial intention model focusing on higher education. They show that entrepreneurial awareness has a positive effect on entrepreneurial intention. Santos and Liguori (2019) found that entrepreneurial self-efficacy is positively related to entrepreneurial intentions. In addition, they show that this relationship is partially mediated by entrepreneurial outcome expectations and moderated by subjective norms. The empirical results of Kumar, Paray and Dwivedi (2020) show a relationship and a positive impact of individual entrepreneurial orientation upon entrepreneurial intentions. They also highlight the importance of gender, academic background, and region in examining entrepreneurial intentions. Also Lopes et al. (2020) show the effect of region in their research. Higher education students in insular regions have a greater probability to become entrepreneurs than students in the mainland regions. Regarding TPB, Lechuga Sancho, Martín-Navarro and Ramos-Rodríguez (2020) highlight the important role of attitudes as moderator of entrepreneurial intentions, and show that the direct effect of perceived behavioral control on intentions increases as attitudes increase.

Longitudinal studies examining entrepreneurial intentions are rare. There are only few studies examining the individual level development of entrepreneurial intentions and intention-action link. One of these is the one from Liñán, Rodriguez-Cohard and Guzmán (2011), who examined the temporal stability of entrepreneurial intention showing that entrepreneurial intention is a quite stable construct. Regarding the link between entrepreneurial intentions and action in a longitudinal setting has been examined at least by Kibler, Kautonen and Fink (2014), Kautonen, van Gelderen and Fink (2015), van Gelderen, Kautonen and Fink (2015), Liñán and Rodriguez-Cohard (2015), Bogatyreva et al. (2019), and Weiss, Anisimova and Shirokova (2019). Bogatyreva et al. (2019) used the GUESS survey to establish a time lag between intention and action. They found that national culture is an important factor affecting the translation of entrepreneurial intention into behavior. Weiss et al. (2019) used two data waves (first wave 2013/2014 and second wave 2016) to examine the moderating role of regional social capital in the intention-action link. They found that intention-behavior link is weakened by cognitive regional social capital. The time intervals in these studies have been quite short, from one year (Kibler et al. 2014; van Gelderen et al. 2015; Kautonen et al. 2015) to three years (Liñán & Rodriguez-Cohard 2015; Bogatyreva et al. 2019; Weiss et al. 2019). The main findings of these studies suggest that TPB is a relevant model in predicting behavior. Table 2 provides a summary of the most important studies examining the entrepreneurial intention-action link with the main results.

Table 2. Studies and main results examining the entrepreneurial intention-action link.

Authors	Data	Time interval	Main results
Kibler, Kautonen & Fink (2014)	2011 and 2012 waves; 984 answers from adult population; two countries (Finland and Austria)	1 year	Intention has a positive effect on behavior, PBC has a positive impact on behavior. Effect of intention is stronger if regional social legitimacy is high.
Kautonen, van Gelderen & Fink (2015)	2011 and 2012 waves; 969 answers from adult population; two countries (Finland and Austria)	1 year	Support for the TPB theory: all predicted relationships were positive and significant. Intention has a direct

			effect on behavior, and attitude, subjective norm and PBC have an indirect effect on behavior via intention.
van Gelderen, Kautonen & Fink (2015)	2011 and 2012 waves; 161 answers from adult population; one country (Finland)	1 year	Positive relationship between entrepreneurial intention and action. Self-control positively moderates the relationship. Interaction effects between action aversion, action doubt, and intention strength.
Liñán and Rodriguez-Cohard (2015)	2004 and 2007/2008 waves; 135 student responses; one country (Spain)	3 years	Stability of entrepreneurial intention, stability of TPB over time, positive link between entrepreneurial intention and action.
Bogatyreva et al. (2019)	2011 and 2013/2014 GUESSS waves; 1434 students; 9 countries	3 years	Positive link between entrepreneurial intention and action. National culture has an effect on the entrepreneurial intention-action link. Weakening traits are power distance, uncertainty avoidance, individualism, long-term orientation and indulgence. Masculinity strengthens the intention-action link.

Weiss, Anisimova & Shirokova (2019)	2013/2014 and 2016 GUESSS waves; 663 students; 7 countries	3 years	Positive and significant link between entrepreneurial intention and start-up activities. Intention–action link is weakened by cognitive regional social capital and strengthened by structural regional capital and by relational regional social capital.

As TPB has been the most used model in entrepreneurial intention research (Maalaoui et al., 2018), TPB will be applied in this dissertation in a longitudinal setting. The model is used in examining the individual level longitudinal development of entrepreneurial intention and its antecedents, in predicting entrepreneurial behavior, and examining the impact of entrepreneurship education in a long term. Next, the TPB model is presented more thoroughly.

2.3 Theory of Planned Behavior

Theory of Planned Behavior (TPB) is probably the most used model in entrepreneurial intentions research (Maalaoui et al. 2018). The model is suitable for studying entrepreneurial behavior because entrepreneurial activity has been considered to be intentional and reasoned (Krueger, Reilly & Carsrud 2000). In TPB cognitive self-regulation is a central part.

TPB is an extension of Ajzen´s and Fishbein´s theory of reasoned action (see Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). Original model was seen limited in situations where individuals do not have complete volitional control. This limitation lead to the development of TPB (Ajzen 1991). The most important factor in TPB is intention, which is defined as "individual's intention to perform a given behavior" (Ajzen 1991: 181). Assumption is that the more stronger is the intention, more likely is the given behavior. Ajzen (1991) highlights that the behavior in question should be under volitional control (person can decide to perform or not to perform the behavior). However, the actual control depends on many factors (such as required resources or opportunities). This plays a central role in TPB: perceived behavioral control refers to individual's "perception of the ease or

difficulty of performing the behavior of interest" (Ajzen 1991: 183). The definition of perceived behavioral control is close to Bandura's (1982) self-efficacy.

In TPB, perceived behavioral control (if realistic) and intention directly predicts behavior (Ajzen 1991). There are some requirements to this theory to be valid. First, when measuring perceived behavioral control or intention, the concepts must correspond to the behavior that is predicted. Second, intention and perceived behavioral control should remain stable before the behavior is measured. Third, perceived behavioral control should realistically reflect the behavior in question. With these conditions, intention and perceived behavioral control should predict actual control. If a person has complete control over the situation, then mere intention should be enough to explain behavior. When volitional control decreases, the role of perceived behavioral control in predicting the given behavior increases. (Ajzen 1991.)

Perceived behavioral control has a double role in TPB; in some cases it predicts behavior but it is also an antecedent of intention, and explains behavior via intention (Ajzen 1991). In addition to perceived behavioral control, there are two other antecedents of intentions: attitudes towards the given behavior and subjective norm. Perceived behavioral control affects behavior in two ways: directly and indirectly via intentions. Attitudes and subjective norm have indirect effect on behavior via intentions (Ajzen 1991).

Fishbein and Ajzen (2009: 76) define attitudes "as a latent disposition of tendency to respond with some degree of favorableness or unfavorableness to a psychological object". As such, the most essential aspect of attitude is its bipolar evaluative nature (Eagly & Chaiken 1993; Krosnick, Judd & Wittenbrink 2005). This means that attitudes can range from negative, neutral to positive point. In addition, attitudes can be defined to have hypothetical disposition (Fishbein & Ajzen 2009). Fishbein and Ajzen (2005) argue, that there may be two kinds of attitudes: instrumental and experiential. Instrumental attitudes refer to cognitive nature – something may be for example harmful or beneficial. Experiential attitudes refer to affective nature – something can be boring or interesting. When measuring attitudes, these both aspects should be considered. Research has shown that the mean correlations of attitudes with intentions range from .45 to .60 (Fishbein & Ajzen 2009).

Subjective norm refers to the assumption that social environment has an effect on people's intentions and actions. As Fishbein and Ajzen (2009: 129) state, "social norms refer to what is acceptable or permissible behavior in a group or society…(and) have been conceptualized as strict rules, as general guidelines, or simply as empirical regularities". In the context of TPB, social norms are viewed

more narrowly as individual's perception of social pressure to perform or not to perform a given behavior (Fishbein & Ajzen 2009; Ajzen 1991). More precisely, subjective norm refers to perceived social pressure from important others (how the most important people to individual prescribe, desire, or expect the performance of the behavior in question).

Figure 1 presents Ajzen's (1991) theory of planned behavior. Attitudes, subjective norm and perceived behavioral control are antecedents of intentions, which predicts behavior. Perceived behavioral control may have a double role: it has an effect on intentions but may also have a direct effect on behavior.

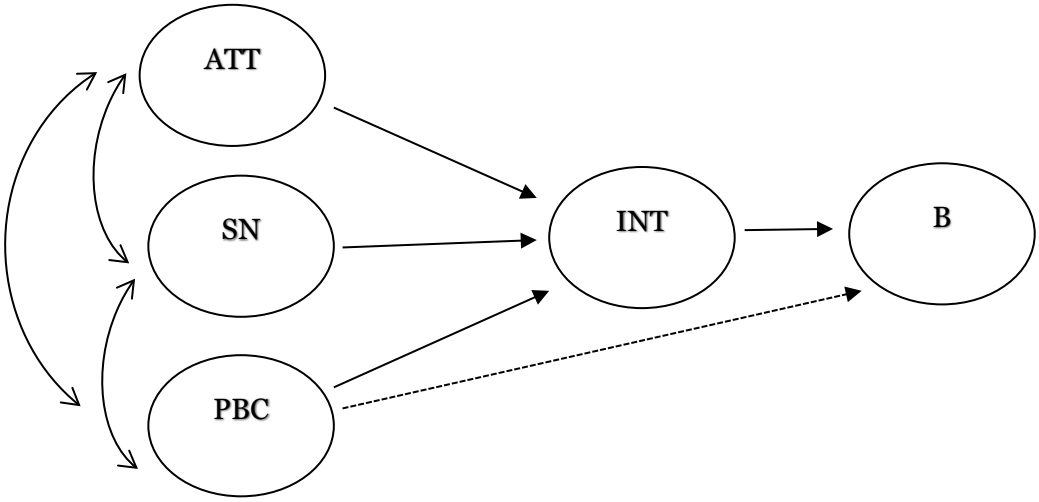

Figure 2. Theory of planned behavior by Ajzen (1991). ATT=attitudes, SN=subjective norm, PBC=perceived behavioral control, INT=intentions, B=behavior

Ajzen's Theory of Planned Behavior has been found to be valid in different situations; the meta-analysis of Kim and Hunter (1993) verified that intentions predict behavior, and attitudes towards the given behavior successfully explain intentions. In addition, they showed that attitudes explain over 50 percent of the variance in intention and intentions explain 30 percent of the variance in behavior. Another meta-analysis of Armitage and Conner (2001) showed that the TPB-model explained 27 percent of the variance in behavior, and antecedents of intentions explained 39 percent of the variance in intentions.

TPB-model has also been criticized, i.e. Sugar, Crawley and Fine (2005) state that the TPB-model is behavior specific, and requires one to independently examine individual behaviors rather than examine them as part of an interrelated system. Tornikoski and Maalaoui (2019) published an article based on the interview of professor Ajzen answering to the challenges of the model. These challenges

included potential impact of the time element in the intention model, the issue of commitment, intent as a dynamic process, the concept of collective intent, philosophical viewpoints, intention-action gap, the difference between implementation intention and intention, and dealing with dueling intents. They conclude the article with several suggestions based on Ajzen's interview. The first suggestion relates to focusing on specific entrepreneurial behavior; a generic entrepreneurship goal could be modelled as an antecedent. In addition, the effect of this generic entrepreneurship goal on specific entrepreneurial behavior, would be mediated by the three antecedents of intention. Second, they highlight the importance of measuring the original intentions as concrete as possible. Third, the time perspective in intention studies should be defined more explicitly. Fourth, TPB can also be used as a conceptual framework for behavior change interventions. This viewpoint could benefit especially entrepreneurship education research. Despite of the critiques presented to Ajzen's Theory of Planned Behavior model, it continues to be a useful and popular model in entrepreneurship research.

2.4 The impact of entrepreneurship education on entrepreneurial intention

Entrepreneurship courses have increased enormously among universities after the turn of the millennium (Finkle & Deeds 2001; Matley 2005). There has been confusion of the concept, where both terms entrepreneurship education and enterprise education have been used (Garacan & O'Cinneide 1994; Jones & English 2004). The term entrepreneurship education has mainly been used in United States focusing on setting up a venture, while the term enterprise education has been used in United Kingdom focusing more broadly on personal development and entrepreneurial mindset of students (Lackéus 2015). Jones and English (2004) suggest, that term entrepreneurial education could be used unifying the existing terms of enterprise and entrepreneurship education. Despite of this debate, European commission (European commission [Cited at 21.1.2020]]) has agreed to use the term entrepreneurship education and defines it as follows: *"Entrepreneurship education prepares people to be responsible and enterprising individuals. It helps people develop the skills, knowledge, and attitudes necessary to achieve the goals they set out for themselves*."

Jamieson (1984) suggested a three-category framework, which is widely used by entrepreneurship scholars (Henry & Lewis 2018). It differentiates between education "about", "for" of "in" enterprise. "About" refers to awareness raising and encouraging students to value the development of enterprising skills; "For" refers to preparing students for self-employment and new venture creation; and "In"

refers to skills and abilities needed to manage and develop an existing business (Henry & Lewis 2018). Thomassen et al. (2019) investigated the role of context in entrepreneurship education, emphasizing a pedagogical perspective in the analysis. They found out that even though context have a strong influence to entrepreneurship education, it is arbitrarily described. They argue that educators have limited control over the context, and a universal best practice of entrepreneurship education can not be identified.

Thrane et al. (2016) developed an interesting framework for entrepreneurship education based on the work of Shane and Venkataraman (2000). Their six-step teaching model operationalizes a series of entrepreneurial learning elements. These include identity work; disclosing disharmonies; qualifying disharmonies into general anomalies; constructing innovative solutions; prototyping; and business modelling. They argue that entrepreneurship education has been lacking from conceptual framework before. The idea of their framework is to translate Shane & Venkataraman's (2000) individual-opportunity framework to a micro-level perspective for entrepreneurship education.

Aamir et al. (2019) reviewed papers published in Education + Training special issues related to entrepreneurship education during the period of 2011–2018. They categorized papers into four levels (primary, secondary, tertiary level and TVET referring to technical and vocational education and training). Formal education, enterprise education, experiential learning and transdisciplinary approaches were found as mediums of entrepreneurship education. In addition, they identified six clusters related to entrepreneurship education being entrepreneurial attributes, personality traits, learning, risks, motivations and Theory of Planned Behavior. Previously, Henry and Lewis (2018) reviewed similarly recent published research on entrepreneurship education in special issues of Education + Training journal and assessed its overall contribution to the field. Their results show that papers focused on four primary areas, which were 1) offerings and assessment, 2) skills and competences, 3) outcomes, and 4) attitudes and/or motivational dimensions.

The questions "can entrepreneurship be taught" and "what are the best pedagogical ways in entrepreneurship education" have been under a debate among scholars (Aamir, Atsam & Erdem 2019). Most of the studies suggest that there are ways to teach entrepreneurship (Henry, Hill & Leitch 2005; Mitra & Matley 2004); however, there is a lack of research of the impact of entrepreneurship education on entrepreneurial intention or entrepreneurial competences (Sánchez, 2010). Longva & Foss (2018) call for experimental designs in impact research on entrepreneurship education. They found out in their literature review that there is

a substantial lack of methodologically rigorous studies on impact of entrepreneurship education.

Measuring the impact of entrepreneurship education may involve learning outcomes as cognitive, skill-based or affective (Fisher, Graham & Compeau 2008), or like suggested by Kyrö (2008) as cognition, conation or affection. Also Beliaeva, Laskovaia & Shirokova (2017) focused on entrepreneurial learning. They found that there is a positive relationship between entrepreneurial learning and students' entrepreneurial intentions. Longva and Foss (2018) state that measuring the impact of entrepreneurship education is simply aiming to see if a pedagogical intervention has caused a change in specific outcome variables. They categorized different outcome measures in entrepreneurship education impact studies. These categories are 1) Cognitive (knowledge: comprehension about entrepreneurship, business basics; traits: need for achievement, proactiveness, self-esteem, risk propensity), 2) Skill-based (business modelling, opportunity recognition, creative thinking, teamwork, 3) Affective (passion/inspiration, attitude to entrepreneurship, subjective norm, 4) Conative (entrepreneurial intention, entrepreneurial self-efficacy), and 5) Behavioral (nascency, venture creation, intrapreneurship, social entrepreneurship, employability).

There have been several studies in which entrepreneurship education has been researched through systematic literature reviews (see Longva & Foss 2018). Table 3 presents the main findings from studies of Pittaway and Cope (2007), Mwasalwiba (2010), Rideout and Gray (2013); Lorz, Mueller and Volery (2013), Martin, McNally and Kay (2013), Bae et al. (2014) and Nabi et al. (2017). Majority of the findings indicate positive relationship between entrepreneurship education and entrepreneurial intentions; however, there is a lack of longitudinal studies. One recent study of Otache et al. (2019) applied a longitudinal approach with a one-group pretest-posttest experimental research design. They found that attitudes were positively linked with students' entrepreneurial intentions, and mediated the relationship between entrepreneurship education and students' entrepreneurial intentions. In addition, the link between entrepreneurship education and actual entrepreneurial behavior has found to be positive in prior research. Morris, Shirokova and Tsukanova (2017) showed that start-up activities of students were positively related with students' involvement in entrepreneurship related curricular programmes. This same results was found by Shirokova, Tsukanova & Morris (2018) with both curricular and co-curricular programing. In addition, they found that specific cultural dimensions moderate these impacts.

Table 3. Findings from systematic literature reviews related in entrepreneurship education.

Source	Range	Findings
Pittaway & Cope (2007)	185 articles, published from 1970 to 2004	EE has a role in enhancing students' propensity for entrepreneurship. However, there is a need to examine will this propensity turn into entrepreneurial behavior and what is the impact of education on performance. The impact of EE on outcomes like graduate entrepreneurship is underresearched. Other outputs of education (less policy-driven and instrumentalist) needs to be included in the debate. The role of regional, national or supra-national education policy needs to be researched.
Mwasalwiba (2010)	108 articles; for impact studies 17 articles	Found 27 impact indicators. Graduate start-ups were the highest ranked success indicator and students' academic standards the second. The third group of indicators originates from psychological constructs (change in students' attitudes, perceptions, interest, self-efficacy, confidence, abilities and skills towards entrepreneurship). Results conclude that entrepreneurship education has some positive impact on students entrepreneurial intentions, attitudes, increased level of confidence, knowledge and ability of venture creation, desirability and feasibility.
Rideout & Gray (2013)	12 articles, published from 1997 to 2011.	Modest support for a Social Cognitive Theory: effects on entrepreneurial self-efficacy. Limited support for the link between entrepreneurial intentions and entrepreneurial acts. Positive impact on hard outcomes (business start-ups, serial entrepreneurial activity, time to start up, and various personal and business economic measures).
Lorz et al. (2013)	39 impact studies, published from 1984 to 2010.	Thirty studies reported solely positive effects on the measured outcome variables. Eight studies reported mixed results. A positive impact was reported for a

Source	Range	Findings
		total of 67 dependent variables. Only two studies reported negative influences on three outcome variables. Attitudes and perceptions were the most commonly used dependent variable.
Martin et al. (2013)	Meta-analysis of 42 studies, published between years 1979-2011	Entrepreneurship education is associated with higher levels of (a) total entrepreneurship-related human capital assets, (b) entrepreneurship-related knowledge and skills, (c) positive perceptions of entrepreneurship, and d) intentions to become an entrepreneur. Entrepreneurship education is positively associated with (a) entrepreneurship outcomes in general (b) start-up, and (c) entrepreneurship performance.
Bae et al. (2014)	Meta-analyses of 73 studies, published between years 1996-2012	Entrepreneurship education is positively associated with entrepreneurial intentions. The relationship between entrepreneurship education and entrepreneurial intentions is stronger than between business education and entrepreneurial intentions. Entrepreneurship education was not a significant predictor of post-entrepreneurial intentions after controlling the effect of pre-education entrepreneurial intentions on post-education entrepreneurial intentions.
Nabi et al. (2017)	159 articles, published from 2004 to 2016	The most common impact indicators are related to lower level indicators of subjective/personal change: attitude, skills and knowledge, perceived feasibility, and entrepreneurial intention. Higher level indicators of longer term, objective, or socioeconomic impact are much less frequent. Most articles claim a positive link between an EE program and subjective (e.g., personal change) or objective (e.g., business start-up activity) impact indicators. Results suggest we know considerably more about the direct EE-intentions relationship in general than about the moderating role of gender, culture-, or context-specific patterns.

2.5 The role of gender in entrepreneurial intention

One important aspect in this research is gender. The definition of gender is different from sex. Sex refers to biology, anatomy, hormones, and physiology when gender is constructed through social, cultural, and psychological means (Gupta et al. 2009). Nikou et al. (2019) base their arguments in Feminist Theory and state, that different factors may influence women's entrepreneurial intentions than men. Thus, these pathways leading entrepreneurial behavior may differ with genders. Nikou et al. (2019) summarize that social feminist theory, role stereotype and role congruity theory implies that women entrepreneurs differ from male counterparts in respect to attitudes, beliefs and approaches leading to entrepreneurial intentions.

Prior research suggests that women-owned businesses under-perform in number of employees and turnover (Brem 2008). However, Marlow and McAdams (2013) argue that this notion is misleading, and the explaining factor is rather the reflection of sector performance norms of women-owned firms. They further note that this discrimination has its origins in the historical socio-economic context which informs and sustains normative, hierarchical subordination which shapes women's life chances.

Prior studies indicate that men have higher entrepreneurial intentions than women have (Zhao et al. 2005; Zhang et al. 2014). In addition, women have less confidence concerning their abilities and skills required in entrepreneurship than men, and therefore see more hindrances in becoming an entrepreneur (Kelley et al. 2017). Gender can have an indirect effect on intentions via self-efficacy (Cardon & Kirk 2015; Ladge et al. 2019). Maes, Leroy & Sels (2014) showed that the effect of gender on entrepreneurial intentions was mediated by perceived behavioral control and personal attitudes. In addition, Kickul, Wilson and Marlino (2004) found out that self-efficacy had a stronger effect on entrepreneurial career interest with girls than with boys. The confidence seems to play a key role when considering the effects of gender on entrepreneurial intentions.

Shneor and Jenssen (2014) studied 1782 Norwegian students and differences between women and men in terms of entrepreneurial intentions. Their results show that role models are more important for male students than for female students. The effect of role models on entrepreneurial intentions was not found with female students. Interestingly, the direct effect of entrepreneurship education on entrepreneurial intentions was evident only with female students. This shows, that females and males differ in entrepreneurial intentions and factors effecting these intentions. As Nikou et al. (2019) suggest, some contextual factors may cause

women to experience different kind of socialization process than men, especially regarding education and networks. This, in turn, may cause differences in entrepreneurial intentions.

Concerning entrepreneurial behavior, the differences between men and women are apparent. Findings of Global entrepreneurship monitor shows that especially in Europe, men are more likely to be involved in entrepreneurial activity than women, and for every ten male entrepreneurs, there are just six female ones (Global Entrepreneurship Monitor 2018). The ratio of male to female entrepreneurs varies across the participated countries and is lowest in Europe and highest in Latin America. Nikou et al. (2019) argue that the differences between genders regarding the start-up process may be caused by overt discrimination and/or systemic factors. The situation may vary in different countries, but the gender effect on entrepreneurial behavior is not disputable.

In addition to entrepreneurial intentions and behavior, gender has a role in entrepreneurship education. Previous research suggests that the effects of entrepreneurship education are different between genders. Shinnar et al. (2014) showed that entrepreneurship education increased entrepreneurial self-efficacy of male students but female students did not experience similar effect. Westhead and Solesvik (2016) also reported that male students had higher intensity of entrepreneurial intention after entrepreneurship education than female students. The effects may be caused by different factors. One suggestion is that male role models and male entrepreneurial stereotypes are emphasized in publicity causing entrepreneurship to be depicted as a masculine phenomenon (Achtenhagen & Welter 2011). However, also positive findings exist. With Norwegian secondary school pupils, entrepreneurship education increased the proportion of females that perceive that they have the necessary knowledge and business skills (Johansen & Foss 2013).

To summarize the earlier studies, gender has an effect on entrepreneurial intention, on entrepreneurship education impact, on entrepreneurial behavior, and on the interplay of entrepreneurial intention and its antecedents.

3 METHODOLOGY AND RESEARCH DESIGN

Research is all about making choices. The underlying assumptions of research needs to be addressed, phenomenon being examined needs to be grounded in theoretical framework and data collection and analysis methods have to be chosen and be suitable with research questions. This chapter describes the research design of this dissertation. First, philosophical assumptions are discussed and after that, methodology, research design and analysis methods used in the research articles are presented.

3.1 Philosophical viewpoint of the research

For any research, theory is an essential concept. However, what is theory? Even though theory is vital in research, it is seldom defined. Gorelick (2011) defines theory as hypothesis formation and empirical work as hypothesis testing. Stewart, Harte and Sambrook (2010) analyse the definition of theory presented in dictionary. First, they state that "theory is an explanation offering or providing accounts how and why things are as they are". Second, theory intends to explain something. In this way, theory may be right or wrong. Third, word "something" implies that the phenomena being explained is independent of the theory. This definition leads to research processes in which theories are tested or developed. Articles in this dissertation do both: they test theory in various settings related to entrepreneurial intention and entrepreneurship education and develop theory further.

Research paradigms today can be listed in various ways. These include for example postpositivism, transformative, constructivism and pragmatism (Creswell 2014), or positivism, post-positivism, and constructivism (Girod-Séville & Perret 2001). The articles in this dissertation represent a positivist approach. It is assumed that the phenomenon being studied can be measured and supported by empirical evidence. From a methodological perspective, the use of quantitative methodology supports the requirements for universal principles and generalizability of the positivist approach. However, like in post-positivism, the researcher's background and values, and the effect of the human behavior in the research process are recognized (Onwuegbuzie, Johnson & Collins 2009). This means that the choices the researcher makes in different phases of the research process, may have an effect on the outcome. This is acknowledged in the limitations of the research.

In research process, the concepts of induction, deduction and abduction are important. Williams and May (1996: 22) define induction as "the derivation of a general principle (or possibly a law in science), which is inferred from specific

observations". This is the basis for justification in science and enables predictions. Williams and May (1996) state that three conditions needs to be satisfied in induction process: first, observations must be sufficiently large; secondly, observations must be repeated in various conditions; and thirdly, no conflicting observations with universal law can be present. Deductive logic on the other hand, depends on analytic truths, and conclusion follows from the premiss (Williams & May 1996). The truth of the conclusion lies on the truth of those premisses. In this way, hypothesis testing based on prior theories is the basis of scientific reasoning. Both induction and deduction are important in justification process. In addition, Perry (1998) includes abduction as a reasoning approach, which is defined as a continuous dialogue between theory and observations. Williams and May (1996) desribes a concencus that evolved concerning a model of scientific procedure adopting both induction and deduction. In the model, hypotheses are tested against the data (deduction) and the knowledge is based in existing scientific laws (induction). In this dissertation and research articles, this view of reasoning is adopted.

3.2 Requirements for quantitative research

All of the articles in this dissertation use quantitative approach. As presented in previous chapter, quantitative approach is related to positivist and post-positivist research paradigm. Hypotheses are derived from the theory and tested against the data. This chapter describes the basic assumptions and requirements of using quantitative methods.

In quantitative approach, it is essential to follow some principals. Dannels (2010) summarizes requirements for quantitative research as follows. First of all, the research design should follow the problem statement and there should be clear research questions. It is vital that the research problem is researchable, and the research design appropriately addresses the research problem. The research problem is the key in quantitative research. It can be demonstrated as research questions and with hypotheses, and connects the conceptual framework to appropriate methods serving as operational guide for the research (Fraenkel & Wallen 2006). Dannels (2010) states that research problem should a) identify the target population, b) identify the variables, c) describe relations between the variables, and d) give premiss for the data collection and analysis. In this way the research problem determines the research design; questions about cause and effect require an experimental design while questions about relations between variables may be studied with non-experimental design. The research designs of the articles in this dissertation are described more thoroughly in the next chapter.

In addition to research problem, the description of the participants and reliability and validity of research instruments are essential (Dannels 2010). If research uses a sample, the population should be identified and the sampling procedure should be specified with the justification of sample size. Campbell and Stanley (1963) identify internal validity and external validity in evaluating the adequacy of the research. Dannels (2010: 343) defines internal validity as "confidence that the specified causal agent is responsible for the observed effect on the dependent variable(s)", and external validity as "the extent to which the causal conclusions can be generalized to different measures, populations, environments, and times."

Knapp and Mueller (2010) remind that both reliability and validity are essential parts when evaluating the appropriateness of a measuring instrument. The reliability refers to the consistency of measurements, and validity to the extent to which the instrument actually measures what it is supposed to measure (Knapp & Mueller 2010). In any quantitative study, a full description of the instrument should be provided. This includes at the minimum the purpose, used items, and scales (that can be nominal, ordinal, interval, or ratio) (Knapp & Mueller 2010). Appropriate reliability indices should be reported including evidence of suitable validity. Finally, Dannels (2010) suggests that conclusions and generalizations are appropriate to the design, and the limitations of the design are identified.

The research design and survey instrument are described in detail in the following chapters.

3.3 Research design

In research articles of this dissertation, experimental designs are used. As Dannels (2010) states, the research questions determine the type of data, and the type of research design. Before describing the designs used, the variety of experimental designs are discussed.

Dannels (2010) argues that the types of experimental designs vary with the degree of the extent the research environment can be controlled. This refers to the controlling the selection of participants to groups; manipulation of the independent variables, measuring dependent variables; and timing of the measurements. There can be randomized designs (ability to assign participants randomly), and quasi-experimental designs (no randomly assigned participants). Pretest-posttest design, nonequivalent group designs, and combinations of these both are examples of quasi-experimental designs. One option is time-series analysis, which is appropriate for longitudinal research designs involving single subjects, pursuing to understand the pattern of change over time (Salkind 2010).

In addition, pre-experimental and pseudo-experimental designs are identified (Cook & Campbell 1979). For non-experimental designs, Fraenkel and Wallen (2006) identify two types: ex post facto, and causal-comparative. Ex post facto refers to retrospectively gathered data, and causal-comparative to studies in which data is gathered from groups without manipulating the independent variable (Busk 2017).

Articles 1 and 2 can be defined as quasi-experimental designs. Article 1 uses time-series design with three measurement waves. The first wave was implemented during the time of the study, the second 1-3 years after graduation and the third 6-8 years after graduation. The measurement was done with individual level. Likewise, article 2 uses time-series design with longitudinal follow-up of the same individual. The data was collected on yearly basis during three years of studies. Article 2 uses also equivalent group design (groups based on gender) and pretest-posttest design (pretest during the first year, posttests after one year and after two years of higher education).

Article 3 represents a quasi-experimental design with pretest-posttest design and nonequivalent group design. Pretest measurement was done during the first study year and post-test on third study year. In this design, measurement was on the individual level, which is more reliable than mere group-level (Dannels 2010). Individuals were compared in relation to participation in active-based entrepreneurship courses (participated or not). Article 4 is also a quasi-experimental design with similarly pretest-posttest and nonequivalent group designs. The pretest was measured during studies and posttest after graduation. Two groups were compared: those who participated in entrepreneurship courses and those who did not.

All of the articles use longitudinal research design. As Taris (2000) states, in longitudinal designs the data is collected for the same research units for more than one occasions allowing intra-individual comparison across time. A longitudinal research design require that it must enable the measurement of differences or changes in a variable from one time period to another (Menard 1991). Hassett and Paavilainen-Mäntymäki (2013) summarize that longitudinal research is applicable when examining change, development or process. Usually, longitudinal research aims to describe the association between pairs of variables in causal terms. According to Menard (1991), for causal relationship to occur, three requirements must be satisfied: 1) covariation of the variables in question, 2) non-spuriousness (the association between the variables must not be explained by the effect of other variables), and 3) temporal order of events.

There are several options for longitudinal research designs. It can be a simultaneous cross-sectional study, a trend study, time series analysis, an intervention study, a panel study or a retrospective study (Taris 2000). In this dissertation, time series analysis is used. This means that repeated measurements are taken from the same set of participants.

3.4 Survey instrument

As stated before, when quantitative methods are applied, it is essential to give full description of the survey instrument (Knapp & Mueller 2010). This chapter introduces the survey instrument used in all published research articles in this dissertation. This includes the purpose, items, scales and reliability indices.

In this research, survey instrument called "Entre Intention tool" is used. The instrument was developed in Seinäjoki University of Applied Sciences in 2008, and piloted with 12 Finnish UAS, 3 Finnish vocational schools and 6 foreign universities from Argentina, Spain, Holland, Germany and Italy. Through 2008 and 2014 over 10 000 students answered the questionnaire. The tool is continuously used in many Finnish UAS in developing entrepreneurship education.

The development of the tool was funded by European Regional Development Fund. The aim is to measure entrepreneurial intentions, attitudes towards entrepreneurship, perceived behavioral control, subjective norm, entrepreneurial skills and the impact of different entrepreneurship courses. It offers a tool to evaluate various factors affecting the development of entrepreneurial intention during studies longitudinally on individual level. By using the tool, universities can capture the current state of entrepreneurship education, and identify individuals with high entrepreneurial intention in order to support them through different educational ways.

The first part of the instrument includes questions concerning student's name, the study field and degree programme. After these basic questions, the following items measure entrepreneurial intention, attitudes towards entrepreneurial career, perceived behavioral control and subjective norm accordingly to Ajzen's (1991) Theory of Planned Behavior. The items and scales are strongly based on previous work of Kolvereid (1996) and Tkachev and Kolvereid (1999).

The reliability of the scales are presented in the following based on the data from year 2018. The questionnaires (first year and the follow-up) with all the items are presented in detail in Appendix 1. Most of the items use 7-point Likert scale and

measure concepts with multiple items. Multi-item measures are recommended instead of a single item, because individual items have proven to be unreliable with random measurement error (Nunnally & Berstein 1994). The second reason for using multi-item measures is that single items seldom fully represent a complex theoretical concept (McIver & Carmines 1981). Hence, it is wise to use multi-item scales and summated rating scores. The reliability of the scale can be evaluated by Cronbach's alpha reliability coefficient, which ranges between 0 and 1 (Nunnally 1978). The acceptable scale should be 0.7 or higher, and reliability coefficients above 0.9 are considered as excellent (George & Mallery 2003).

There are 555 answers in this data representing first year students studying in Seinäjoki University of Applied Sciences. Entrepreneurial intentions were measured with eight items. The Cronbach's alpha for entrepreneurial intentions was 0.89, which indicates a good reliability. Attitudes towards entrepreneurship were measured with nine items. The items include both instrumental (i.e. respected), experiential (i.e. interesting), and anticipated affect (oppressive) attitudes. The Cronbach's alpha for attitudes was 0.80 indicating a good reliability. Perceived behavioral control was measured with five items. The reliability of the scale was acceptable (Cronbach's alpha 0.78). Subjective norm was measured with two sets: the first one measured belief items (the support individual receives from the most important persons) and the second one motivation to comply items referring to each of the belief questions. Belief items were measured with three items and motivation to comply with three items using 7-point likert scale. In statistical analysis, the recommendation from Ajzen (1991) was followed: each normative belief item was multiplied by the person's motivation to comply item with the referent in question. Coding -3 to +3 were used and a subjective norm index (ranging from -63 to +63) was created. As a result, subjective norm is directly proportional to the sum of the resulting products across the salient referents. Cronbach's alpha for the scale was 0.80 indicating a good reliability.

In the last section of the survey instrument, there were questions concerning gender, age, entrepreneurial role models, previous education, previous work experience, entrepreneurial behavior, and earlier participation in entrepreneurship courses.

This survey instrument was used with the first year students. For the follow-up, some items were added in the instrument. These included questions about entrepreneurship courses (what kind of courses student had attended during his/her studies), academic performance, and work experience during studies.

3.5 Data collection and analysis methods

The data for the research articles has been gatherer during the years 2008 and 2018. Hence, the research covers ten years of work and gives opportunities for longitudinal design. This is rare in entrepreneurship research. The data comes from Finland and from the field of higher education. Data for the research articles 1, 3 and 4 was gathered from students studying in (and graduating from) Seinäjoki University of Applied Sciences. The data for the research article 2 was gathered from seven universities of applied sciences in Finland. All of the articles have individual-level longitudinal data. The data includes answers from students while they were studying but also from these same students after graduation and experiencing work life (the longest follow-up after eight years in work life).

The first research article has three data waves covering a ten-year period. The first data collection was done when students were studying in Seinäjoki University of applied sciences between years 2008 and 2012. All the students from different study fields studying at that time answered the questionnaire. Hence, the first data provides information about the study-time situation. The second data wave was conducted in 2013. The follow-up questionnaire was sent to students who had graduated between years 2009 and 2012. After that, data from the first and second wave was merged in order to find individual-level responses for these two data waves. This resulted 282 individual answers. The third data gathering was conducted for these same 282 individuals in 2018. This means that six to eight years had passed since graduation. The third data wave includes 89 responses from these 282 graduates. The data loss is problematic in longitudinal settings. However, this data is unique in entrepreneurial intention studies. The problems of data loss are discussed further in the research article.

The second research article has also three data waves. All the waves were gathered during study time. Hence, this data gives information about the development of entrepreneurial intention during studies. The first data wave was conducted in 2010, the second in 2011 and the third in 2012. This means that the development was measured on yearly basis. In this data there are students from seven different universities of applied sciences from Finland representing different study fields. The final data has 296 answers.

The third research article has two data waves and it was gathered from students studying in Seinäjoki University of Applied Sciences. The first data collection was done in 2008 and the second in 2010. Hence, the data gives information from the development of entrepreneurial intention from first study year to the third study year. The final data consists of 197 responses from the same individuals

representing six different study fields (business, culture, natural resources, social services and health, technology and tourism and catering).

The fourth article has two data waves. The first data wave gathered from students of Seinäjoki university of applied sciences while they were studying. These answers were collected during years 2008 to 2012. Hence, the first wave represents the study-time situation. The second wave was conducted in 2013 when these same students had graduated and experienced work life. Some of them has graduated one year previously (at a minimum) and some four years previously (at a maximum). The data from the first and second wave was combined in order to have two individual-level responses: one from time of the study and other from work life. This resulted 282 answers representing different study fields.

Table 4 three gives on overview of the data in research articles. It provides information about data waves, time span and the number of respondents in the final data.

Table 4. Articles, data waves, time span, number of respondents and research designs.

Article	Data waves	Time span	Number of respondents in the final data	Research design
1	First wave: years 2008-2012 Second wave: year 2013 Third wave: year 2018	6-8 years	After second wave 282 After third wave 89	quasi-experimental design, time-series design
2	First wave: 2010 Second wave: 2011 Third wave: 2012	3 years	296 answers	quasi-experimental design, time-series design, equivalent group design, pretest-posttest design
3	First wave: 2008 Second wave: 2010	2 years	197 answers	quasi-experimental design, nonequivalent group design, pretest-posttest design
4	First wave: 2008 - 2012 Second wave: 2013	1-4 years	282 respondents	quasi-experimental design, nonequivalent group design, pretest-posttest design

There are several analysis methods in this research. In quantitative research it is important to understand the requirements for different kind of analysis methods. The variables used (whether nominal, dichotomous, ordinal, interval or ratio) set constraints for the analysis (Cramer 2003). This research uses multiple linear regression analysis, logistic regression analysis, path analysis and latent growth curve modeling, which is one form of structural equation analysis. These different methods are discussed further in the following.

Multiple linear regression analysis is used in article 4. The main idea of multiple regression analysis is to determine what proportion of the variance of a continuous variable is associated with, or explained by, two or more other variables (Cramer 2003). It takes into account the associations between those explaining variables. Least squares estimation techniques are used (Hardy 1993). Cramer (2003) notes that the continuous variable being explained should be normally distributed. Likewise Hilbe (2009) reminds that the response and error terms should be normally distributed. In addition, several other assumptions should be satisfied. The expected value of error should be zero; the variance of the error term is the same, or constant, for all values of the independent variables (homoscedasticity); there is no correlation among the error terms (no autocorrelation); there should be no correlation between the error terms and the independent variables; and finally, there should be no multicollinearity (Menard, 2010).

The variable being explained is usually called response, predicted or dependent variable while explanatory variables are called regressors or independent variables (Seber & Lee 2003). In regression analysis, independent variables should be continuous. For dependent variables, continuous variables can be used, but also nominal or ordinal scales are suitable if they are converted to so called dummy variables (Hardy 1993). Dummy variable is a dichotomous variable that is constructed from an originally qualitative variable, i.e. gender. They are scored with zero and 1 (for example zero for women and 1 for male).

When using any statistical model it should be noted that it is not viewed as *a true* representation of reality but instead *a useful* representation of reality (Chatterjee & Simonoff 2013). Hence, a model can be used to explore different relationship between variables and the models can change based on analysis using current model and acquisition of new data. Chatterjee and Simonoff (2013) propose three purposes in using regression analysis: a) modeling the relationship between x and y, b) prediction of the target variable (forecasting), and 3) testing of hypotheses. In the research article 4, regression analysis is used to test hypotheses. In testing the hypothesis, the regression coefficients are of interest. First, there is a test of the overall significance of the regression (F-test) and second, t-test is used to test of

the significance of an individual coefficient by comparing it to a t-distribution on degrees of freedom (Chatterjee & Simonoff 2013). For evaluating the overall fit or the regression model to the sample data, R^2 is used (Hardy 1993). That is the square of the multiple correlation coefficient.

Sometimes the dependent variable may be dichotomous like starting a company or not. In this case, logistic regression analysis can be used. In article 1, the link between intention and behavior is tested with a logistic regression. Hilbe (2009) states that logistic regression analysis is one of the most used statistical procedures for analyzing binary data. Predictors (explanatory independent variables) may be continuous, categorical, or indicator/binary variables (Hilbe 2009). In logistic regression analysis, the interest is whether the classification of cases in to categories of the dependent variable can be predicted by the independent variable (Menard 2010). Logistic regression is used to predict the odds of being classified to case based on predictors. Strickland (2017: 34) defines odds as "the probability that a particular outcome is a case divided by the probability that it is a noncase". In logistic regression analysis the normal R^2 statistics is not appropriate for use. Instead, Pseudo-R^2 statistics may be used (Hilbe 2009). When assessing the model fit especially with small samples, Hosmer-Lemeshow test can be used (O'Connell 2006). In article 1, both Hosmer-Lemeshow test and Pseudo-R^2 statistics was used in assessing the model. In addition, Omnibus test of Model Coefficients was used in examining the statistical significance (see O´Connell 2006).

Path analysis was used in article 3. It was conducted to test a model in which the pedagogical choices in entrepreneurship education have influence on the changes in antecedents of intention (changes in attitudes, perceived behavioral control and subjective norm), and via these changes in antecedents, on the change of entrepreneurial intention. Path analysis is an extension of multiple regression analysis. It allows to test indirect effects, and chains of influence (Steiner 2005). Before conducting the path analysis, a difference score (the difference between wave 2 score and wave 1 score) was calculated for analyzing the change. Difference score is a common way to measure a change (Clarke 2004).

Path analysis is a statistical techniques which was developed to examine causal relationships between two or more variables (Olobatuyi 2006). The interest is in path coefficients and the use of multiplications rule to investigate the indirect effects of one variable upon another. As Shanthi (2019) states, path analysis has a substantial advantage over simple models because both direct and indirect causal effects can be estimated. There are several assumptions that should be satisfied when using path analysis: a) all relations are linear and additive, and causal assumptions are shown in the path diagram, b) the error terms are uncorrelated

with the variables in the model and with each other, c) the causal flow is one-way, d) the variables should be measured on interval scales of better, and e) the variables are measured without error (Shanthi 2019). Path analysis was conducted with Amos programme. It produces fit indices to evaluate the path model fit. Byrne (2010) suggests using following measures: acceptable model fit as X2 /degrees of freedom (df) ratios (CMIN/DF) less than 3.0, Comparative Fit Index (CFI) values greater than .90, Normal Fit Index (NFI) values greater than 0.95 and Root Mean Square Error of Approximation (RMSEA) values less than .08. These measures were used to assess the model fit.

Latent growth curve modeling with structural equation modeling was used in articles 1 and 2. In the first article, it was applied to analyze the temporal stability of entrepreneurial intention and in the second article, it was used to examine the development of entrepreneurial intention and effect of gender. Latent growth curve modeling is designed to investigating intra- and inter-individual variations (Byrne 2010). When examining individual change, the method gives many advantages. It allows to estimate growth trajectories of individuals; both the initial state and growth rate (McArdle & Nesselroade 2003). In latent growth curve modeling there are two parameters that are of interest. The first is an intercept parameter and the second is a slope parameter. Byrne (2010) states that an intercept parameter is the score at the initial state, and the slope parameter represents the rate of change at individual level. In the research articles, the intercept represents the initial state of entrepreneurial intention (intercept mean) and individual differences in the initial state (intercept variance). The slope factor describes the individual's rate of change (slope mean) and differences between individuals in growth (slope variance). When modeling the change over time, the factor loadings are fixed to correspond to a linear time scale (Byrne, 2010).

The model fit in article 2 was examined as suggested by Byrne (2010) and described earlier in this chapter. However in article 1, the small sample size sets restrictions. As Kenny, Kaniskan and McCoach (2015) argue, RMSEA is not a good index when using small samples. Hence, in article 1, the RMSEA was not used. Instead, Model Chi-Square, NFI, TLI and CFI was examined when assessing the model fit.

Sufficient sample size is important when using SEM. Mitchell (1993) recommends that a model should have at least 10 times as many observations as variables. This recommendation was followed in both articles.

4 SUMMARY OF THE RESEARCH ARTICLES

This chapter introduces the summary of the four research articles in this dissertation. Each article has its own research questions, which contribute to the three objectives of this dissertation presented in the introduction part. This chapter focuses on the objectives, research findings and contributions of each article.

4.1 Article 1: Do Intentions ever die? The temporal stability of entrepreneurial intention and link to behavior

Temporal stability of intention has gained wide interest in social psychology, but in entrepreneurial intention research the phenomena lacks research (Liñán, Rodriguez-Cohard & Guzmán 2011). The problem is that studying temporal stability requires years of research work and a follow-up of the same individual. This is demanding and data loss is problematic. Previous research has been able to track only three years while respondents were studying (Liñán, Rodriguez-Cohard & Guzmán 2011; Liñán & Rodriguez-Cohard 2015). Longer periods in examining the temporal stability of entrepreneurial intention do not exist. The objective of this article is to 1) examine the development and temporal stability of entrepreneurial intention, and 2) examine the link between entrepreneurial intention and actual start-up behavior. This study has a rare longitudinal setting of six to eight years tracking the development of entrepreneurial intention and behavior. There are three waves in the study: one from the time of which these individuals were studying in higher education, second 1-3 years after graduation (282 individuals reached) and finally the third 6-8 years after graduation (89 individuals reached). This article answers following research questions presented in the introduction part:

RQ 1: How entrepreneurial intention and its antecedents develop over time? Has TPB explanation power in a longitudinal setting?

RQ 3: What is the link between entrepreneurial intention and actual entrepreneurial behavior over time?

The article applies Theory of Planned behavior in explaining entrepreneurial behavior. The temporal stability of entrepreneurial intention is examined by using a latent growth curve modeling. The link between intention and behavior is tested with a logistic regression analysis. In the model, gender and role-models are used as control variables. This study contributes to entrepreneurial intention research

by providing new information on the stability of the construct in almost a ten-year period.

Results show, that entrepreneurial intention is a temporarily stable construct. The second contribution is verifying the entrepreneurial intention-action link in a longitudinal setting. Results show that entrepreneurial intention measured during study time is able to explain entrepreneurial behavior both after one to three years and six to eight years. Interestingly, perceived behavioral control did not have explanation value in predicting behavior in the long-term. Control variables (gender and role-models) proved to be significant predictors in the model. However, even though the variance explained by intention is statistically significant, it is still quite low in the third wave and higher in the second wave. This suggests, that TPB works better in short-term than long-term prediction. Table 5 summarizes the findings and answers to research questions.

Table 5. Findings of the first research article.

Research question	**Results**
RQ 1: How entrepreneurial intention develops over time? Has TPB model explanation power in a longitudinal setting?	Entrepreneurial intention is a temporarily stable construct. The growth rates of intention are quite same for individuals with a high level of entrepreneurial intention and individuals with a low level of entrepreneurial intention. The initial state of entrepreneurial intention is not related to the growth rate. Entrepreneurial intention measured during studies is able to predict entrepreneurial behavior in a long-term. However, the variance explained by intention is quite low in the data where 6-8 years has passed after graduation. Having a father as an entrepreneur and being a male have more explanation power than entrepreneurial intention measured during studies. Intention works better in a short-term than in a long-term prediction of action. In contrast to the assumptions of TPB-model, perceived behavioral control did not explain the behavior.
RQ 3: What is the link between entrepreneurial intention and actual entrepreneurial behavior over time?	There exists a link between intention and action both after 1-3 year and 6-8 years after graduation. This verifies the value of intention measures during studies.

4.2 Article 2: Development of entrepreneurial intention in higher education and the effect of gender – a latent growth curve analysis

Longitudinal aspect in individual level development of entrepreneurial intention is lacking from prior research. In addition, gender has gained wide interest in entrepreneurship, but the effect of gender in temporal development of entrepreneurial intention is unexplored. Most studies suggest that females have lower level of entrepreneurial intention and they start businesses less often than men do (Zhao et al. 2005; Yordanova & Tarrazon 2010; Lee et al. 2011). However, earlier research has not shown how entrepreneurial intention develops over time in the context of higher education with different genders. Some studies suggest that higher education may decrease entrepreneurial intentions of students (Wu & Wu 2008; Nabi et al. 2010), while also opposite findings have been reported (Ertuna & Gurel 2011; Zhang et al. 2014). The objective of this study is to (1) to analyze the development of intentions of individuals over time; (2) to explore potential gender differences in intention development; and (3) to analyse the relatedness of the initial level and development of the antecedents of intentions to the initial level and the development of intentions. There are three waves in this study: the first wave is from the year 2010, the second wave from a year after and the third from the year 2012. Hence, the study tracks individual level change in entrepreneurial intention and its antecedents in three-year period while students are engaged in higher education studies. This article answers following research questions presented in the introduction part:

RQ 1: How entrepreneurial intention and its antecedents develop over time?

RQ 2: What are the possible gender differences in the development of entrepreneurial intention over time?

As in Article 1, this study also applies the Theory of Planned Behavior by Ajzen (1991) in examining the individual level development of entrepreneurial intention and its antecedents, and the effect of gender. The initial level and the development of entrepreneurial intention, perceived behavioral control, attitudes and subjective norm are examined using latent growth curve analysis with structural equation modeling. First, individual growth trajectories in entrepreneurial intention are analyzed and after that, gender is added as a person covariate to the model. Third, the relatedness of the initial level and development of attitudes, subjective norm and perceived behavioral control to the initial level and the development of intentions are tested.

Results show that during higher education entrepreneurial intentions of students decrease. The initial state of intention is not related to the development of intention. There is a strong gender difference both in the initial level of entrepreneurial intention and in the development of that intention over time. Men have higher level of entrepreneurial intention in the beginning and their intention development is more positive than the intention development of women. In particular, the intention level of men does not decrease as it does with women. The findings of the study gives support for the Theory of Planned behavior in a longitudinal setting. Results verify that the initial level of entrepreneurial intention is related to the initial level of attitudes and perceived behavioral control. Likewise is the change in attitudes and the change in perceived behavioral control related to the change in entrepreneurial intentions. However, subjective norm was not related to the initial state nor the change in entrepreneurial intention. This study suggests that gender effect should be acknowledged in higher education. The time spent in higher education studies decrease more the entrepreneurial intention of women than of men. If society wants to support women in higher education to pursue entrepreneurial career, then higher education institutes should develop pedagogy to influence especially women's attitudes and perceived behavioral control related to entrepreneurship. Table 6 summarizes the findings and answers to research questions.

Table 6. Findings of the second research article.

Research question	Results
RQ 1: How entrepreneurial intention and its antecedents develop over time?	Entrepreneurial intention of higher education students decrease during studies. The growth trajectories of students with different initial levels are quite same. This means that the initial level of entrepreneurial intention is not related to the development of entrepreneurial intention with time. Attitudes towards entrepreneurial career develop in a negative direction during studies. Perceived behavioral control also has some negative development. Subjective norm remains at the same level during studies. The initial levels of attitudes and perceived behavioral control are related to the initial level of entrepreneurial intention. Also the change in attitudes and the change in perceived behavioral control is related to the change in entrepreneurial intention. However, subjective norm is not related to the initial level of intentions nor the change in intentions.
RQ 2: What are the possible gender differences in the development of entrepreneurial intention over time?	There are gender differences in the initial level of entrepreneurial intention and in the growth trajectories of entrepreneurial intention. Women have lower entrepreneurial intention in the beginning of studies and their level of entrepreneurial intention decrease more during studies than of men.

4.3 Article 3: The development of entrepreneurial potential among higher education students

One of the reasons why entrepreneurial intentions interest higher education institutes, is that the main purpose of entrepreneurship education is to affect the development of these intentions. Hence, many entrepreneurship education studies measure the impact of entrepreneurship education on entrepreneurial intention (Longva & Foss 2018). Article 3 examines how changes in entrepreneurial intentions are affected by the changes in perceived behavioral control, attitudes

and subjective norm in the individual level. Hence, Theory of Planned Behavior is applied in the research. In addition, article 3 increases understanding on the impact of entrepreneurship education on the development of entrepreneurial intentions during higher education studies. It contributes to entrepreneurial intention research by applying Theory of Planned Behavior in a longitudinal three year period, and providing new information on the impact of entrepreneurship education.

There has been an ongoing debate about the relationship between education and entrepreneurship. Some studies suggest that entrepreneurship education can have a positive influence on entrepreneurial intentions and its antecedents (Zhao et al. 2005; Jones et al. 2008; Wilson et al. 2009). However, also negative relationships have been found (Oosterbek et al. 2010). More research is needed to understand what kind of entrepreneurship education may have influence and is this influence positive or negative. Hence, pedagogical choices can play a role in the relationship between entrepreneurship education and the development of entrepreneurial intentions. Active, learning-by-doing pedagogies are suggested to be more effective than passive pedagogies (Henry & Treanor 2012; Van Gelderen 2010). However, more comparative and longitudinal studies are needed (Pittaway & Cope 2007). The objective of this study is to examine the impact of different pedagogical approaches on the development of personal attributes and perceived skills related to entrepreneurship, and the impact of such development on entrepreneurial potential among higher education students. This article answers following research questions presented in the introduction part:

RQ 1: How entrepreneurial intention and its antecedents develop over time? Has TPB explanation power in a longitudinal setting?

RQ 4: How the choices of entrepreneurship pedagogy effect the development of entrepreneurial intention?

The data for this research was gathered in two waves. The first data gathering was conducted in year 2008 from first year higher education students. All the students were studying in Seinäjoki University of Applied Sciences. 534 responses were received. The second data gathering was implemented in 2010 from these same students. Hence, they were studying their third year at the university. 197 responses from these same individuals were received. The changes in entrepreneurial intentions, the changes in antecedents of intentions and the impact of pedagogical choices in entrepreneurship education were investigated with these 197 individual using path analysis. Path analysis is an extension of multiple regression analysis, which enables the examination of several dependent

variables and chains of influence (Steiner 2005). Gender was used as a control variable.

Results show that in general, entrepreneurial intentions of students decrease during three years of higher education studies. However, those individuals who participate in active-based entrepreneurship courses do not decrease their entrepreneurial intentions in contrast to those individuals, who participate only in lecture-based entrepreneurship courses. Hence, active-based entrepreneurship courses somehow protect the entrepreneurial intentions of students. Lecture-based entrepreneurship courses do not have this same influence. In addition, results show that this impact of active-based courses is indirect and is mediated by attitudinal change. This attitudinal change has an effect on perceived behavioral control. Hence, the active-based entrepreneurial courses had indirect effect on the change in perceived behavioral control. Interestingly, the model was better with male students than with female students. This suggest that there is a gender difference in how different pedagogical choices of entrepreneurship education impact on the development of entrepreneurial intentions. Men and women may have different learning styles. This study contributes to entrepreneurship education research by suggesting the importance of the pedagogical aspect.

Results also showed, that high entrepreneurial intentions decreased while low entrepreneurial intentions increased during studies. This suggests that higher education seem to equalize entrepreneurial interest of students. In addition, results verified that changes in perceived behavioral control and changes in attitudes explain the changes in entrepreneurial intentions like Ajzen's (1991) theory suggests. However, the changes in subjective norm did not have any influence on the changes in entrepreneurial intentions. Table 7 summarizes the findings and answers to research questions.

Table 7. Findings of the third research article.

Research question	Results
RQ 1: How entrepreneurial intention and its antecedents develop over time? Has TPB explanation power in a longitudinal setting?	Higher education in general decreases entrepreneurial intentions. High entrepreneurial intentions decrease most. Ajzen's theory of planned behavior is suitable in studying the change in intentions: the changes in perceived behavioral control and the changes in attitudes have an effect on the changes in entrepreneurial intentions. However, subjective norm does not have explanation power.
RQ 4: How the choices of entrepreneurship pedagogy effect on the development of entrepreneurial intention?	Active-based pedagogies are more effective in protecting entrepreneurial intentions than are lecture-based pedagogies of entrepreneurship courses. Active-based pedagogies applied in entrepreneurship courses has an effect on the attitudinal change. Attitudinal change mediates the effect of active-based pedagogies of entrepreneurship courses on the change in entrepreneurial intentions. This chain of influence is more prominent with men.

4.4 Article 4: A long-term effect of entrepreneurial education on entrepreneurial intention and TPB in a longitudinal setting

Research on the effect of entrepreneurship education on entrepreneurial intentions has produced different kind of results. The effect may be positive (Jones et al. 2008; Wilson et al. 2009; Bae et al. 2014) or negative (Oosterbeek, van Praag & Ijsselstein 2010). However, a long-term effect of entrepreneurship education has not received attention even though the impact of entrepreneurship programs may not be instant (Fayolle, Gailly & Lassas-Clerc 2006). Block and Stumpf (1992) call for studies measuring delayed effects of entrepreneurship education. There is a saying: "You understand love songs when you fall in love". Likewise it may be that entrepreneurship education received during studies become useful after being some time in working life. Article 4 examines the long-term effect of entrepreneurship education on entrepreneurial intentions after graduation. In

addition, this article contributes to entrepreneurial intention research by testing the long-term effect of attitudes, perceived behavioral control and subjective norm on entrepreneurial intentions after graduation. The paper tests a model where entrepreneurial attitudes, perceived behavioral control, subjective norm and participation in entrepreneurship courses during studies explain entrepreneurial intentions after graduation. Gender and individual's work situation are used as control variables. This article answers the following research questions presented in the introduction part:

RQ 1: Has TPB model explanation power in a longitudinal setting?

RQ 5: What are the possible delayed effects of entrepreneurship education on entrepreneurial intention over time?

The data for this research was collected in two waves. The first data collection took place in years 2008 – 2012. The questionnaire using the measurement instrument based on Ajzen´s (1991) TPB model was sent every year to all students studying in Seinäjoki University of Applied Sciences. The first data collection provided information about student's attitudes towards entrepreneurial career, perceived behavioral control and subjective norm. In addition, participation in entrepreneurial courses during studies was asked. The second data collection was a follow-up study and a questionnaire was sent to all students that had graduated in years 2009 – 2012. Hence, some of the students had graduated one year previously at a minimum and others four years previously at a maximum. In the analysis, two data collection waves was merged in order to find two measurement waves for each student. In the final data there are 282 individuals with these two measurement waves.

The data was divided in two samples in the analysis phase. The model was tested separately for these samples to see, has time some effect on the results. In the first sample there are respondents that had graduated on year previously and in the second sample respondents that had graduated 2-4 years previously. Linear regression analysis was used in testing the model.

Results show that there exists a delayed effect of entrepreneurship education on entrepreneurial intentions. This effect was not found year after graduation but with individuals that had graduated two to four years previously, the effect was significant. Further investigation showed that the effect of entrepreneurship education is more over preservative. Those individuals who had participated in entrepreneurial courses had same entrepreneurial intention level than measured during studies. The level of entrepreneurial intention has decreased with those individuals who did not participate in entrepreneurship courses during their

studies. What is most interesting, participation in entrepreneurship courses was the most significant factor explaining entrepreneurial intentions with individuals that had graduated 2-4 years previously. Based on the results it can be argued that the impact of entrepreneurship education can be strong, but this impact is not apparent right after the courses are completed. Fayolle, Gailly and Lassas-Clerc (2006) argue the same.

Results also show that there is a gender effect on the development of entrepreneurial intention. Men have higher entrepreneurial intentions than women when examining the sample that graduated 2-4 years previously. Work life seems to encourage men more than women in pursuing entrepreneurial career. Second control variable in the model was respondent´s present work situation (employed or outside working life). This however did not have an effect on the results.

The second objective of this paper was to examine the explanation power of attitudes, perceived behavioral control and subjective norm (measured during studies) in explaining entrepreneurial intentions after a long time (measured after graduation). Results varied between the two samples. After a short time (one year) had passed after graduation, attitudes and PBC explained significantly entrepreneurial intentions after graduation. However, when a longer time (2-4 years) had passed, only attitudes had explanation power. It may be that attitudes don´t change so quickly than perceived behavioral control, which can develop after acquiring work experience. Attitudes endure over time and that is why it is important to foster positive attitudes towards entrepreneurship during higher education. Table 8 summarizes the findings and answers to research questions.

Table 8. Findings of the fourth research article.

Research question	**Results**
RQ 1: Has TPB model explanation power in a longitudinal setting?	In short term, yes. Both attitudes and PBC explain entrepreneurial intention even though attitudes and PBC was measured few years before measuring entrepreneurial intention. In a long term, only attitudes have explanation power.
RQ 5: What are the possible delayed effects of entrepreneurship education on entrepreneurial intention over time?	Delayed effects of entrepreneurship education can be found over time. Individuals who participated in entrepreneurship courses had higher entrepreneurial intentions years after graduation than those individuals who did not. The effect of entrepreneurship education was the most significant factor explaining entrepreneurial intentions in a long-term. However, this effect was not found in a short-term. The effect of entrepreneurship education is preservative. Individuals, who did not participate in entrepreneurship courses, had lower entrepreneurial intention level after graduation than during studies. Those individuals who did participate in entrepreneurship courses, retained their intention level.

5 CONCLUSIONS

This dissertation brings new knowledge about the TPB in the context of entrepreneurship. The focus is especially on the impact of the time element on the predictive power of TPB. Individuals in this research are students and graduates. This group is really important when studying entrepreneurial intentions and behavior in a long term. The entrepreneurial process can start already at the time of studies and when time passes, intentions may lead to action. This research provides new knowledge how entrepreneurial intention and its antecedents develop over time, what are the possible gender effects, what is the link between entrepreneurial intention and action over time, and finally – what are the effects of entrepreneurial education.

This part introduces conclusions based on the four research articles. First, answers for the research questions are provided. Secondly, practical implications are presented, and finally, limitations of the study and further research are discussed.

5.1 A longitudinal view on entrepreneurial intentions and behavior

The focus of this dissertation has been in longitudinal study of entrepreneurial intentions. Like Krueger (2000) suggests, entrepreneurial research needs to develop, and longitudinal designs should provide information how the changes in antecedents of intentions influence on the changes in entrepreneurial intention. This dissertation fills this gap in research by providing data from almost ten-year period follow-up allowing examination of the whole TPB-model in a longitudinal setting. In addition, this dissertation verifies the delayed effects of entrepreneurship education on entrepreneurial intentions, and provides new information about the overall effects of entrepreneurship education. Next, the results of this dissertation are discussed in relation to three objectives presented in the introduction part.

Entrepreneurial intention development over time and TPB in a longitudinal setting

The first objective was to analyze the entrepreneurial intention development and TPB model in a longitudinal setting. The first research questions were: How entrepreneurial intention and its antecedents develop over time? Has TPB explanation power in a longitudinal setting? The results of this dissertation show, that entrepreneurial intention is a quite stable construct in a long term: from time of the study until years in working life. This result verifies the findings of

Rodriguez-Cohard and Guzmán (2011), who examined the temporal stability of entrepreneurial intention in a much shorter term. This dissertation shows that the temporal stability of the construct is found even many years after graduation. This suggests that like attitudes, intentions may relate to person's self-concept and identity (see Katz 1960). Hence, in a long term they don't change. However, in a short term, the situation is a bit different. Results of this dissertation show, that at study time, the entrepreneurial intentions decrease from first study year to the third study year. This means that when students start their studies, they are more likely to answer that they may become entrepreneurs in some time of their career. However, when they graduate, their intentions of becoming an entrepreneur are lower than in the beginning of the studies. This result is in line with the findings of Wu & Wu (2008). They found that individuals with a postgraduate degree were less interested in entrepreneurship than individuals with lower educational level.

However, the results of this dissertation show, that after graduation entrepreneurial intention will remain at the same level than at the end of studies: high entrepreneurial intentions are still high after many years in working life, and low levels are still low. This suggests, that during studies, individuals become more realistic about entrepreneurial career. It could be that in the time individual is graduating, he/she is forming a more stable self-concept. This includes perceptions about entrepreneurship as a career choice.

Interestingly, the idea about the relationship of self-concept and career choice is not new. Super (1953: 189) stated almost over seventy years ago following: "The process of vocational development is essentially that of developing and implementing a self-concept: it is a compromise process in which the self-concept is a product of the interaction of inherited aptitudes, neural and endocrine make-up, opportunity to play various roles, and evaluations of the extent to which the results of role playing meet with the approval of superiors and fellows." Later, much of the research on self-concept theory focused on self-concept and occupational roles and choices (Betz 1994). Entrepreneurship is one form of an occupational role. Hence, it could be argued that entrepreneurial intention is strongly related to individual's self-concept and is therefore quite stable construct. This self-concept is forming during higher education studies: from first year to the last year. This implicates that the time individual spends in higher education is crucially relevant if we want to influence entrepreneurial intentions. Prior research has already demonstrated that entrepreneurial intention is related to Bandura's (1988) conception of self-efficacy (Zhao et al. 2005; Lans et al. 2010). However, more research is needed to understand the interplay of self-concept (cognitions capturing one's definition of oneself), self-efficacy and entrepreneurial intention.

This study shows, that antecedents of intention also develop during studies. Attitudes towards entrepreneurial career develop in a negative direction, likewise perceived behavioral control. However, subjective norm remains in the same level in the beginning of the studies and while graduating. The changes in attitudes and perceived behavioral control have an effect on the changes in entrepreneurial intention. This verifies the assumption that study time is very important when forming attitudes and self-concepts. Subjective norm relates more to other people: what they would think if individual would become an entrepreneur. As such, it would be reasonable to assume that subjective norm does not change during studies and hence, it does not relate to the forming of self-concept as much as do attitudes and perceived behavioral control. Results implicate that the change in entrepreneurial intentions can be obtained by changing individual's attitudes towards entrepreneurship into more positive direction and boosting individual's self-esteem in a way that he/she believes that succeeding as an entrepreneur would be easy. This will affect the forming of intentions as part of a self-concept. It is interesting, that Obschonka et al. (2015) found that self-identity predicted entrepreneurial intentions, above and beyond the effect of the TPB variables.

TPB has some explanation power in a longitudinal setting. When examining a longitudinal effect of attitudes, subjective norm and PBC on intentions, this study shows that in a shorter period both attitudes and PBC have explanation power. Attitudes and PBC measured in the time the individual were studying, were able to explain entrepreneurial intentions even after graduation. However, when time passes (2-4 years), only attitudes explain entrepreneurial intentions. This is quite interesting, and suggests that attitudes are more enduring antecedent of intentions. Katz (1960) and Smith, Bruner and White (1956) argue that attitudes relate closely to person's self-concept and identity. This may explain the fact that they manage to explain entrepreneurial intention in a long term. In addition, this finding supports the idea that entrepreneurial intention is also partly related to individual's self-concept. The importance of attitudes was also found by Bogatyreva et al. (2019) when examining the entrepreneurial intention-action link. The significant positive impact of attitude towards entrepreneurship had a direct impact on entrepreneurial behavior even after controlling for its indirect impact through intentions.

Second research question related to possible gender differences and gender effects in the development of entrepreneurial intention over time. Results verify that gender differences are apparent in a longitudinal development of entrepreneurial intention. In the beginning of the studies, women have lower entrepreneurial intentions than men do. In addition, intentions of female students decrease more than intentions of male students. These findings are in line with previous research

demonstrating gender differences in the initial level of entrepreneurial intention (Zhao et al. 2005; Sequeira et al. 2007). The results also supports the findings of Bogatyreva et al. (2019) who found that gender plays an important role also in the entrepreneurial intention-action link, as women were 57 % less likely to start a business.

The development of entrepreneurial intention in a longitudinal setting is interesting. Entrepreneurial intentions of male students do not decrease while intentions of female students do. The reasons for this require more research. Díaz-García and Jiménez-Moreno (2010) suggest that masculine traits and characteristics are more valued than feminine ones causing women to perceive their know-how and opportunities in entrepreneurial environment lower than men. They also found that those men who perceive higher congruence between entrepreneurial attributes and masculine traits are more likely to have a stable entrepreneurial intention. In addition, Shinnar, Giacomin and Jansen (2012) show that compared to men, women are more afraid of failure and perceive their competence and expertise in less favorable light. The cultural context may have an effect. Bogatyreva et al. (2019) found that masculinity as a cultural feature strengthens the intention-action translation.

It is interesting that entrepreneurial intention of women decrease more during higher education. It could be assumed that higher education would increase the perceived competence and expertise of women, and in turn, would affect the self-confidence in succeeding related to entrepreneurship. However, it seems that higher education strengthens other career choices and identities of female students causing entrepreneurship to be less desirable. A recent Finnish barometer of entrepreneurial intentions among higher education students (Suomen Yrittäjät 2019) shows that 16 % of women students and 23 % of men students were likely to be entrepreneurs, compared with 18 % for women and 25 % for men in 2014. This indicates that the gap between men and women has even increased. In addition, 74% of women felt that entrepreneurship is not an appealing option for them while with men the corresponding percent was 57. This result indicates that higher education has not been able to strengthen the entrepreneurial intentions of women. More research is needed to understand the deeper mental models of women related to entrepreneurship.

Link between entrepreneurial intention and action over time

The second objective relates to the link between entrepreneurial intention and actual start-up behavior. The research question was that what is the link between entrepreneurial intention and actual entrepreneurial intention over time. This study sheds light to this question in a longitudinal setting. It seems that

entrepreneurial intention has explanation power in a long term. Entrepreneurial intention measured during study time does explain start-up behavior even after 6-8 years from graduation. The link can be found in a shorter (1-3 years from graduation) and in a longer term (6-8 years from graduation). However, the explanation power of intention is higher in a shorter term. This is the first study made from intention-behavior link in such a long term in the area of entrepreneurship. The results are in line with prior research that has examined the link in shorter periods. The positive link between entrepreneurial intention and start-up behavior has also been found by Shirokova, Osiyevskyy and Bogatyreva (2016), Kibler, Kautonen and Fink (2014), Kautonen, van Gelderen and Fink (2015), van Gelderen, Kautonen and Fink (2015, Liñán and Rodriguez-Cohard (2015), and Bogatyreva et al. (2019). This research brings new knowledge about the intention-action link in a longer term.

The results of this study verify Ajzen's (1991) suggestion that intention explains behavior. However, Ajzen himself argued that there should not be a long time between the measurements of intention and behavior. Weiss et al. (2019) argue the same thing. This study shows that in fact, in the area of entrepreneurship, there can be a quite long time between these measures, and still intention can explain behavior. However, Weiss et al. (2019) suggest that the time lag between intention and action measurements should not be too long to maintain the predictive power of intentions. This study verifies that shorter time lag is better. However, some predictive power remains even after a longer time.

This study did not examine possible mediators or moderators in intention-behavior link. The findings of Shirokova et al. (2016) suggest several moderators for the intention-behavior link, such as family entrepreneurial background, gender, age, university entrepreneurial environment and uncertainty avoidance. Other studies in the area of health behavior show that detailed action planning, perceived self-efficacy, and self-regulatory strategies can mediate the intention-behavior link (Sniehotta, Scholz & Schwarzer 2005). These same factors may also serve as mediators in the linkage of entrepreneurial intention and entrepreneurial behavior. In addition, Bogatyreva et al. (2019) argue that entrepreneurial intention-action link is context-specific. They found that national culture has effects on this relationship. Hence, further research is needed.

The effect of entrepreneurship education on entrepreneurial intention over time

The third objective was related to entrepreneurship education and its impact on entrepreneurial intentions. Two research questions related to this objective; 1) how the choices of entrepreneurship pedagogy effect the development of entrepreneurial intention, and 2) what are the possible delayed effects of

entrepreneurship education on entrepreneurial intention over time? The choices of entrepreneurship pedagogy make a difference. Active-based pedagogy has more influence on entrepreneurial intentions than basic lectures. This research demonstrated that this kind of pedagogy can preserve entrepreneurial intentions that otherwise would decrease. Interestingly, in this study the direct effect of active-based entrepreneurship pedagogy was on attitudes, which mediated the effect both on perceived behavioral control and on entrepreneurial intentions. This effect was found especially with men students, but not with females. This is in line with Walter, Parboteeah and Walter (2013) who found that entrepreneurship education and industry ties were related to entrepreneurship intentions of male students but not of female students. However, other study of Joensuu et al. (2014) showed that with female students, active-based entrepreneurship pedagogy has direct effect on perceived behavioral control. Based on these findings this dissertation proposes that active-based pedagogy is important for both genders: with male students, it has an effect on entrepreneurial attitudes, and with female students, it has an effect on perceived behavioral control. Hence, entrepreneurship education makes a difference. Other studies have also provided promising results; e.g. Morris, Shirokova and Tsukanova (2017) found a positive relationship between students' involvement in entrepreneurship related curricular programs and start-up activities.

Finally, active-based entrepreneurship pedagogy has an indirect effect on entrepreneurial intentions operating as a preservative element. The findings of this study support previous research. Walter et al. (2013) also found that active-based pedagogies have more effect on entrepreneurial intentions than reflective modes of entrepreneurship education. Mwasalwiba (2010) conclude that entrepreneurship education has positive effects; it affects i.e. entrepreneurial intentions, attitudes and increased level of confidence. This study brings more light to this relationship. First, it shows that the effect is more likely to be indirect on intentions mediated by attitudes (with men) or by perceived behavioral control (with women). Second, it demonstrates that the mode of pedagogy has a role – basic lectures are not enough in order to change attitudes or influence the level of confidence.

The second research question related to possible delayed effects of entrepreneurship education on entrepreneurial intention over time. The results of this dissertation are promising: the efforts put in entrepreneurship education while university studies will have an effect on entrepreneurial intentions in a long term. In fact, taking entrepreneurship courses in university had stronger effect on entrepreneurial intentions after 2-4 years after graduation than entrepreneurial attitudes or perceived behavioral control. This suggests that entrepreneurship

education during higher education studies has delayed effects on entrepreneurial intention. Hence, entrepreneurship education has indirect effects on entrepreneurial intentions in a short term, but direct effect in a long term. Closer examination shows that the positive effect is preservative in nature; individuals that participated in entrepreneurship courses during studies maintain their intention level while entrepreneurial intentions decrease significantly with other individuals.

The delayed effects of entrepreneurship education suggests that the value of entrepreneurial competence becomes more apparent with more work experience. This supports the idea of Fayolle, Gailly and Lassas-Clerc (2006) of the importance of time when evaluating the impact of entrepreneurship education. Block and Stumpf (1992) proposed this same argument a long ago; however, this is the first study to examine the delayed effects of entrepreneurship education. The results are significant since the effectiveness of entrepreneurship education has been under a debate (Maas & Jones 2015). This dissertation shows that when measuring the effects of entrepreneurship education especially on entrepreneurial intention, time is an important variable. This creates challenges for educators, academics and policy makers, because longitudinal individual level studies are difficult to implement. However, in this dissertation the impact was measured using entrepreneurial intentions as an outcome variable; there are several other variables that could be used as Longva and Foss (2018) argue. It could be assumed that the impact on cognitive aspects such as comprehension about entrepreneurship or business basics would be measureable in a short term. However, the conative (entrepreneurial intentions) and behavioral (venture creation) will require longer time scale when measuring the impacts of entrepreneurship education.

Figure 3 presents the main findings of this dissertation. The left box presents the long term effects that occur during the years in higher education (approximately 3 years). The right box presents the long term effects after graduation. The time span is 1-8 years after graduation. It should be noticed that subjective norm was not significant factor explaining entrepreneurial intentions, and therefore it was omitted from the figure. All the arrows represent a positive effect.

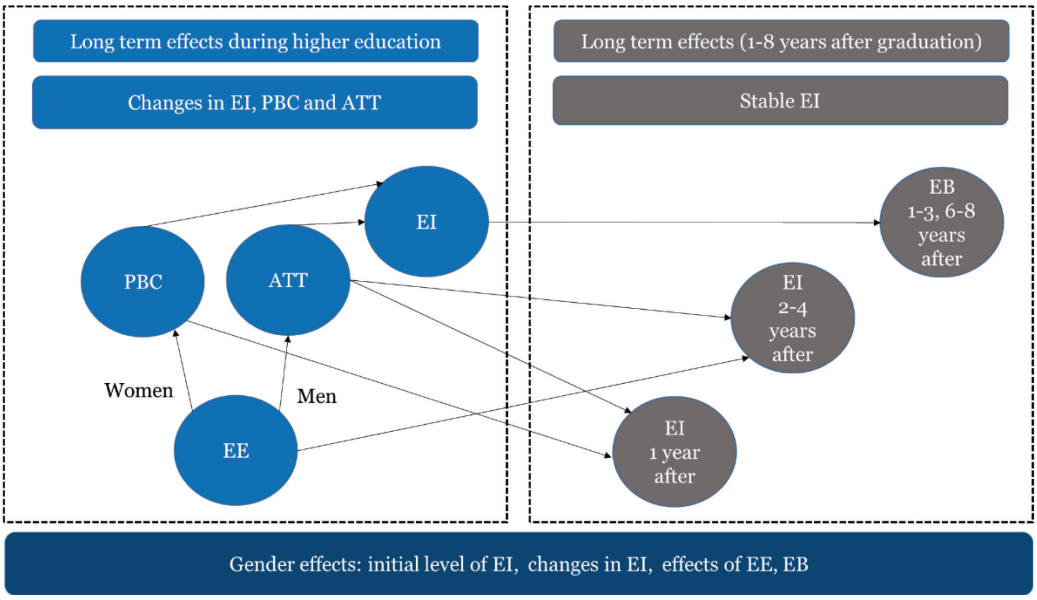

Figure 3. Time-bound effects on entrepreneurial intention and behavior in TPB framework. EI=entrepreneurial intention, PBC=perceived behavioral control, ATT=attitudes, EE=entrepreneurship education, EB=entrepreneurial behavior. Arrows represent a positive effect.

The focus of this dissertation has been in longitudinal study of entrepreneurial intention, behavior and the effect of entrepreneurship education. Table 9 summarizes the main propositions of this dissertation.

Table 9. The main propositions of the dissertation.

Theme	**Proposition**
Entrepreneurial intention as part of self-concept and identity	Entrepreneurial intention relates to person's self-concept and identity and therefore the concept is stable over time.
Importance of higher education studies and time perspective	Higher education is crucial time in forming one's self-concept. Therefore entrepreneurial intentions are best influenced during higher education studies; after that, intention level remains quite stable.
Decreasing of entrepreneurial intentions	Entrepreneurial intentions usually decrease during higher education studies – however, entrepreneurship education can act as a preservative.
Attitudes and PBC as antecedents	Entrepreneurial attitudes and perceived behavioral control are both important factors explaining the development of entrepreneurial intentions. The effect of subjective norm is questionable.
Explanation power of TPB over time	TPB works in a longitudinal setting in respect to explanation power of attitudes and perceived behavioral control. Both explain entrepreneurial intentions in a short term. In a long term, only attitudes have explanation power.

Theme	**Proposition**
Link between entrepreneurial intentions and actions over time	TPB works in a longitudinal setting in respect to link between entrepreneurial intentions and entrepreneurial behavior. Entrepreneurial intentions measured during higher education studies do explain entrepreneurial behavior after graduation both in a short and in a long term.
Entrepreneurship and gender effect	Entrepreneurship is strongly gendered. Women have lower entrepreneurial intentions than men do and women's intentions decrease more than entrepreneurial intentions of men. Higher education strengthens other than entrepreneurial career choices of women.
Impact of entrepreneurship education over time	Entrepreneurship education makes a difference. During studies, it has an indirect effect on entrepreneurial intention. In addition, it has a delayed and direct effect on entrepreneurial intention in a long term.
Pedagogical issues in entrepreneurship education	Active-based pedagogy works best. It has an effect on entrepreneurial attitudes with men. Other study (Joensuu et al., 2014) also showed that with women, it has an effect on perceived behavioral control.
Entrepreneurship education as a preservative	Entrepreneurship education works as a preservative both in a short and in a long term.

Theme	Proposition
Measuring the effects of entrepreneurship education	Measuring the effects of entrepreneurship education requires time. There are delayed effects that may come apparent after many years have passed.

5.2 Practical implications

The context of this dissertation is higher education in Finland. Entrepreneurship is a central factor in creating economic growth and well-being in Finnish society. The majority of Finnish enterprises are small (98 percent), and majority of the new jobs are created by SMEs (Official Statistics of Finland 2016). Therefore the Ministry of Education and Culture in Finland has put major emphasis on entrepreneurship education through all educational levels publishing guidelines to promote entrepreneurship both in 2009 and 2017 (Ministry of Education 2009; Ministry of Education and Culture 2017). In addition, the council of rectors of Finnish Universities of Applied Sciences (*Arene*) has published instructions on entrepreneurship education (Arene 2015). This dissertation brings some practical ideas for implementing entrepreneurship education in higher education.

First, there is a need to identify different groups of students. One group are those students who have high entrepreneurial intentions in the beginning of studies. This group is more likely to experience a major decrease in entrepreneurial intentions. However, entrepreneurship education can influence this group in a way that high intentions remain high through studies. This group is more likely to become entrepreneurs in some time of their career. That is why this group needs entrepreneurship education concentrating on skills development but also self-concept. Other group is students that have low level of entrepreneurial intention in the beginning of studies. For this group, entrepreneurship education can concentrate more on the knowledge about entrepreneurship and forming positive attitudes.

Second, if entrepreneurial intention relates to one's self-concept and identity, this should be taken into account in designing entrepreneurship education. Self-concept is formed by individual's self-schemas (Markus 1977), therefore these

schemas should be addressed with different rehearsals. Schemas reflect individual's construal of some event or object and are derived from experience (Hastie 1981). As such, reflection should be an important part of entrepreneurship education. Markus, Cross and Wurf (1990) argue that if possible selves are linked to an existing self-schema, this will strongly guide behavior. In entrepreneurship education, the reflections on possible selves could be important. Entrepreneurship education could benefit from Social Cognitive Theory. Like Wood & Bandura (1989) state, the beliefs about self can be strengthened by mastery experiences, modeling, social persuasion, and physiological states. In entrepreneurship education, these mastery experiences of succeeding in entrepreneurial tasks and modeling through successful entrepreneurs could be used even more. Social persuasion may occur through team experiences related to entrepreneurship.

Third, the methods used in entrepreneurship education should be various. Basic lectures are not effective in influencing students' entrepreneurial intentions, attitudes or perceived behavioral control. Teachers need competence in implementing methods that develop risk-taking abilities, self-confidence, creativity and entrepreneurial skills. Different project works, entrepreneurial role-models, and different enterprise activities can be beneficial. However, in the same time efforts should be put to cognition and affections. Teachers should have training to implement various methods in entrepreneurship education.

Fourth, entrepreneurship education should be gender sensitive. Men and women experience entrepreneurship quite differently, and somehow higher education is able to decrease the entrepreneurial intentions of women even more. Why? Is entrepreneurship depicted as masculine? In Scandinavia, the start-up genre is dominated by men. Lappalainen (2019) writes in Talouselämä, that in the Nordic countries, 88% of the $ 2.3 billion start-up pot went exclusively to men's teams. It may be that the image of entrepreneurship is masculine and therefore it attracts more men. If we want to limit this segregation, we need gender sensitive guidance instead of gender neutrality. This dissertation shows, that the focus in entrepreneurship education with men should be on entrepreneurial attitudes. Other study (Joensuu et al. 2014) revealed that with women, the focus should be on perceived behavioral control. Teachers should design entrepreneurship education in a way that this difference would be taken into account.

Fifth, the impact of entrepreneurship education may require time. This is why higher education institutes should put efforts in entrepreneurship education. The results for the society may come apparent after many years. Longitudinal designs are important when measuring the impact of entrepreneurship education. This requires interaction between higher education and alumni.

5.3 Validity and reliability of the research

The validity and reliability should be discussed in every research. Validity is concerned with the research components, as they should measure what they intend to measure (Drost 2011). The operationalization of the constructs should have a strong theoretical base. In the research articles of this dissertation, validated and tested instruments were used. Internal validity refers to the fact that the observed effect on the dependent variable is caused by the specified causal variable, and external validity refers to the generalizability of the results (Dannels 2010). This dissertation included different research articles with longitudinal designs. In longitudinal designs it is really demanding to control every factor that could have an effect on the dependent variable in different time intervals. Hence, there may be other factors with effects that were not controlled in the studies. However, different control variables were used to increase the internal validity. The question of external validity is always difficult. The generalizability of the results would require several replications of the research in different contexts. In this dissertation, the results of the different research articles give support to each other. Hence, some kind of generalizability can be argued to exist. However, the data comes from one country, which creates limitations for international generalizations.

According to Knapp and Mueller (2010) the reliability refers to the consistency of measurements. According to Nunnally (1978), reliability is defined as the consistency of measurement, where the same results should be obtained over a variety of conditions (Nunnally 1978). Heale and Twycross (2015) identify three types of reliability: 1) homogeneity, which refers to internal consistency of the measurement, 2) stability, which can be tested using test-retest and parallel or alternate form testing, and 3) equivalence, which refers to inter-rater reliability. The internal consistency of the measurements in the research articles were assessed with Cronbach's alpha. The alphas were acceptable with all variables used in the research. Stability can be evaluated with test-retest or using parallel-form. In this dissertation, test-retest evaluation were used; the same participants answered the same questions in different times. The correlation for the scores were high; hence, stability requirement is satisfied. However, it should be noted that in longitudinal research the issue of data loss is problematic. This was recognized as a challenge to reliability and recommended procedures were followed. Equivalence can be evaluated through inter-rater reliability. This means that different researchers evaluate the relevancy of each item in an instrument. In instrument development phase, several researchers participated in the process in order to increase reliability.

5.4 Limitations and further research

All research has limitations. In this dissertation, the limitation is mainly related to the context. All the data was gathered from Finnish Universities of Applied Sciences. Hence, the results should be verified in intercultural context. In addition, longitudinal designs are really demanding. The data loss is problematic and can cause shortages in reliability. However, the validity and reliability of the research articles presented in this dissertation were carefully analyzed and the possible issues addressed.

In addition, longitudinal study means that the world changes while the research is implemented. When the first study of this dissertation was started, the state of entrepreneurship education in higher education was quite different than it is now. Today entrepreneurship education is mandatory in many universities while it was not so in the past. Of course, this brings some limitations for the conclusions. However, this dissertation was able to show the longitudinal development of entrepreneurial intentions and the delayed effects of entrepreneurship education.

This study is positivist in nature, and the shortcomings of the positivist approach are identified as a limitation of the research. The choices in research process may affect the results, and when studying human nature, the one and only truth is seldom found.

Several suggestions can be made for further research. In this research, the same individuals were followed almost ten years. It would be interesting to track these same individuals after fifteen or twenty years and see if entrepreneurial intentions are still on the same level, and have these intentions lead to entrepreneurial behavior. In addition, longitudinal designs examining the development of entrepreneurial intentions should be replicated in an international context.

The effect of gender is important factor in entrepreneurship research. More information is needed to understand why men and women are so different when it comes to entrepreneurial intentions and entrepreneurial education. What factors explain these differences? Could it be motivation? Or are there gendered constructions in entrepreneurship? Is there a socially-constructed assumption that women are less entrepreneurial than men? Henry, Foss and Ahl (2016) found in their systematic literature review of gender and entrepreneurship that studies focusing on male/female comparisons provide only little information about sampling methods and feminist critique is missing from majority of the studies. Hence, research needs to develop.

Finally, the idea of self-concept and identity in relation to entrepreneurial intentions could be used in further studies. Entrepreneurial intention research could benefit from applying i.e. the schema model of the self-concept developed by Markus (1977) and Markus and Wurf (1987). It is based on cognitive approach and therefore could shed more light to the process of forming entrepreneurial intentions. Self-schemas has been used in other disciplines (see i.e. Stein & Corte 2008; Esplen et al. 2009; Cherry & Lumley 2019). It could be assumed that self-schemas explain both entrepreneurial intentions and entrepreneurial behavior. In addition, the interplay of self-schemas and self-efficacy could be researched in the context of entrepreneurial intentions.

This dissertation has been a journey to the hearts and minds examining how entrepreneurial intentions develop over time, the link between intentions and action, and the effect of entrepreneurship education on entrepreneurial intentions. The longitudinal aspect of this research brings new light to entrepreneurial intention research filling the research gap identified by scholars in the field (i.e. Krueger 2009; Liñán & Fayolle 2015).

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Appendices

Appendix 1

Survey instrument for first year students

Dear student,

We kindly ask for your participation in a research survey aimed at developing our teaching content and methods. The survey deals with beliefs, attitudes and future aims related to entrepreneurship.

Please read the questions carefully and choose your answer or the alternative closest to your opinion.

Example: After I have graduated I will be doing ...

outdoor work 1 2 3 4 5 6 7 indoor work

If you think you will be doing outdoor work, answer 1 (=certainly), 2 (=quite probably) or 3 (=maybe). If you think you will be doing indoor work, answer: 5 (=maybe), 6 (=quite probably) or 7 (=certainly). If you really have no idea, answer 4 (=neutral).

In the questionnaire we also ask for your name and email. This is only for the purpose of carrying out a later survey to same individuals. Please note that all the information given by you is strictly confidential; we will never disclose individual students' replies. All replies will be analyzed anonymously.

SeAMK complies fully with EU standards regarding processing of personal data and privacy. If you have any
questions about how we handle personal data, please contact our data protection office Mr. Jarmo Jaskari
(jarmo.jaskari@seamk.fi).

Thank you for your participation and contribution to the development of our teaching content and
methods!

Background information

Your first name
Your family name
Your official email address (not hotmail, gmail or another private email address)

Your field of study

Humanities and Education
Culture
Natural Sciences

Natural Sources and the Environment
Tourism, Catering and Domestic Services
Social Services, Health and Sports
Technology, Communications and Transport
Social Sciences, Business and Administration

Your Faculty
School of Business and Culture
School of Food and Agriculture
School of Health Care and Social Work
School of Technology

Your Degree Programme _____

Think your future career after graduation, to what extent do the following issues correspond to your own expectations and plans.

How likely are you to continue your career employed by another (i.e. in salaried work) after graduation?
very unlikely 1 2 3 4 5 6 7 – very likely

How likely are you to start your own business and work as an entrepreneur after graduation (or while still studying)?
very unlikely 1 2 3 4 5 6 7 very likely

I believe that my closest family members think I 1 should not - 7 should strive to start my own business and to work as an entrepreneur after graduation.
should not 1 2 3 4 5 6 7 should

How much attention do you pay to what your closest family members think if you strive to start your own business and to work as an entrepreneur after graduation?
not at all 1 2 3 4 5 6 7 very much

If you were supposed to choose between salaried work and entrepreneurship after graduation, which one would you choose?
salaried work 1 2 3 4 5 6 7 entrepreneurship

If I established a business and started to work as an entrepreneur after graduation, my chance of success would be
very slim 1 2 3 4 5 6 7 very good

I believe that my best friends think I should not 1 - 7 I should strive to start my own business and to workvas an entrepreneur after graduation
should not 1 2 3 4 5 6 7 should

How much attention do you pay to what your best friends think if you strive to start your own business and to work as an entrepreneur after graduation?
not at all 1 2 3 4 5 6 7 very much

If I really wanted to, I could easily start a business and work as an entrepreneur after graduation.
disagree completely 1 2 3 4 5 6 7 agree completely

How likely is it that you will be employed for most of your career by a company or public organization (without any connection to entrepreneurship)?
very unlikely 1 2 3 4 5 6 7 very likely

I believe that my significant others think I should not 1 - 7 I should strive to start my own business and to work as an entrepreneur after graduation.
should not 1 2 3 4 5 6 7 should

How much attention do you pay to what your significant others think if you strive to start your own business and to work as an entrepreneur after graduation?
not at all 1 2 3 4 5 6 7 very much

There are 1 very few - 7 numerous things that are beyond my own control but could prevent me from starting my own business and working as an entrepreneur after graduation.
very few 1 2 3 4 5 6 7 numerous

How strong is your intention to embark on entrepreneurship at some point of your professional career?
no intention 1 2 3 4 5 6 7 very strong

For me, starting my own business and working as an entrepreneur after graduation would be...
very easy 1 2 3 4 5 6 7 very difficult

If you were supposed to choose between unemployment and entrepreneurship after graduation, which one you choose?
unemployment 1 2 3 4 5 6 7 entrepreneurship

If I established my own business and started to work as an entrepreneur after graduation, my risk of failure would be...
very small 1 2 3 4 5 6 7 very big

How likely are you to end up as an entrepreneur through succession or transfer of ownership after graduation (or while still studying)?
very unlikely 1 2 3 4 5 6 7 very likely

How likely are you to embark on an entrepreneurship after you have gathered a sufficient amount of work experience?
very unlikely 1 2 3 4 5 6 7 very likely

To what extent do the following attributes correspond to your perceptions of entrepreneurship (i.e. establishing a business and working as an entrepreneur)? Scale 1-7, 1=not at all - 7=completely.

Interesting
Esteemed
Dishonest
Worth pursuing
Boring
Fascinating
Despised
Good income level
Oppressive

Gender
Female
Male
Other

Year to birth _____

Nationality _____

Domicile _____

What was your latest education before starting your current studies?
Vocational education
Upper secondary school
Douple Degree
Another Academic Degree
Something else, specify what? _____

Do you have any new idea or innovation in your mind at the moment (related to a product, service or process), which might be worth a new business venture?
Yes
No

Are you currently starting your own business (e.g. you are working on a business idea or other plans or finding out about different things in order to establish an enterprise)?
Yes
No

Have you started your own business before?
Yes
No

If you have started your own business before, how was the experience?
very negative – very positive

Have you embarked on an entrepreneurship before through succession or transfer of ownership?
Yes
No

If you embarked on entrepreneurship before through succession or transfer of ownership, how was the experience?
very negative 1 2 3 4 5 6 7 very positive

Are there any people in your close family (parents, sisters, etc.) who have started their own business and worked as entrepreneurs?
Yes
No

If your answer to the above question was yes, who was this person? You can choose more than one, if necessary.
Sister/brother
Parent/parents
Grandparent/grandparents
Cousin/other relative
Co-habiting partner/spouse

Have you attended an entrepreneurship-related course or training before (before your current studies)?
Yes
No

If you attended an entrepreneurship-related course or training before, how general was its content?
very general 1 2 3 4 5 6 7 customized to meet my needs

Have you been in working life (in traineeship, employment, etc.) for more than 6 months before (before your current studies)?
Yes
No

Which one of the following alternatives describes best the key content of your mother's professional career?
Salaried work employed by another
Self-employment or entrepreneurship
Not in working life

Something else, specify what? _____

Which one of the following alternatives describes best the key content of your father's professional career?

Salaried work employed by another
Self-employment or entrepreneurship
Not in working life
Something else, specify what?
_____

Do you want the person in charge of entrepreneurship in your Degree Programme to contact you to discuss your own business idea and/or the other entrepreneurship-related options provided by your school?

Yes
No

Appendix 2

Survey instrument for follow-up

Dear student,

You have previously participated in a survey on entrepreneurship and beliefs and attitudes related to it. We now kindly ask you to answer a follow-up survey. In order for us to be able to develop our educational supply, it is most important that you spend a moment to complete this follow-up questionnaire. It is of paramount importance that you write your name on the questionnaire, because this is the only way for us to relate your present replies to your previous ones. All the information given by you will be strictly confidential; we will not disclose the replies of individual students.

Thank you in advance for your participation and contribution to the development of our educational supply!

K1. Your first name:_____

K2. Your family name: _____

(If your family name has changed during the last two years, what was your previous family name?_____)

K3. Your official email address (not Hotmail, Gmail, or another private email address but e.g. seamk.fi)

_____**@**_____

K4. Your field of study:

1 – Humanities and Education
2 – Culture
3 – Natural Sciences
4 – Natural Sources and the Environment
5 – Tourism, Catering and Domestic Services
6 – Social Services, Health and Sports
7 – Technology, Communications and Transport
8 – Social Sciences, Business and Administration

K5a. Your Degree Programme:

_____

K5b. Your year of study

2nd year
3rd year
4th year

K6. Your university of applied sciences:

_____

If you think of your future career after graduation, to what extent do the following issues correspond to your own expectations and plans.

K7. How likely are you to continue your career employed by another (i.e. in salaried work) after graduation?

very 1 2 3 4 5 6 7 very
unlikely likely

K8. How likely are you to start your own business and work as an entrepreneur after graduation (or while still studying)?

very 1 2 3 4 5 6 7 very
unlikely likely

K9. I believe that *my closest family members* think I

should not 1 2 3 4 5 6 7 should

strive to start my own business and to work as an entrepreneur after graduation.

K10. How much attention do you pay to what your closest *family members* think if you strive to start your own business and to work as an entrepreneur after graduation?

not at all 1 2 3 4 5 6 7 very much

K11. If you had to choose between entrepreneurship and salaried work after graduation, which one would you choose?

salaried work 1 2 3 4 5 6 7 entrepreneur-ship

K12. If I established a business and started to work as an entrepreneur after graduation, my chance of success would be

very slim 1 2 3 4 5 6 7 very good

K13. I believe that *my best friends* think I

should not 1 2 3 4 5 6 7 should

strive to start my own business and to work as an entrepreneur after graduation.

K14. How much attention do you pay to what *your best friends* think if you strive to start your own business and to work as an entrepreneur after graduation?

not at all 1 2 3 4 5 6 7 very much

K15. If I really wanted to, I could easily start a business and work as an entrepreneur after graduation

disagree completely 1 2 3 4 5 6 7 agree completely

K16. How likely is it that you will be employed for most of your career by a company or public organization (without any connection to entrepreneurship)?

very unlikely 1 2 3 4 5 6 7 very likely

K17. I believe that *my significant others* think I

should not 1 2 3 4 5 6 7 should

strive to start my own business and to work as an entrepreneur after graduation.

K18. How much attention do you pay to what *your significant others* think if you strive to start your own business and to work as an entrepreneur after graduation?

not at all 1 2 3 4 5 6 7 very much

K19. There are

very few 1 2 3 4 5 6 7 numerous

things that are beyond my own control but could prevent me from starting my own business and working as an entrepreneur after graduation.

K20. How strong is your intention to embark on entrepreneurship at some point of your professional career?

no intention 1 2 3 4 5 6 7 very strong

K21. For me, starting my own business and working as an entrepreneur after graduation would be

very easy 1 2 3 4 5 6 7 very difficult

K22. If you had to choose between entrepreneurship and unemployment after graduation, which one would you choose?

unemployment 1 2 3 4 5 6 7 entrepreneurship

K23. If I established my own business and started to work as an entrepreneur after graduation, my risk of failure would be

very small 1 2 3 4 5 6 7 very big

K24. How likely are you to end up as an entrepreneur through succession or transfer of ownership after graduation (or while still studying)?

very unlikely 1 2 3 4 5 6 7 very likely

K25. How likely are you to embark on entrepreneurship after you have gathered a sufficient amount of work experience?

very 1 2 3 4 5 6 7 very

unlikely likely

In the following, you will find a list of things often associated with entrepreneurship and business skills. Please assess your own current <u>abilities</u> in regard to these things.

K26. I am able to make important decisions even if there are uncertainty factors present

disagree 1 2 3 4 5 6 7 agree
completely completely

K27. It is easy for me to produce new ideas

disagree 1 2 3 4 5 6 7 agree
completely completely

K28. I often find more alternative solutions to problems than others do

disagree 1 2 3 4 5 6 7 agree
completely completely

K29. I am able to question habitual practices

disagree 1 2 3 4 5 6 7 agree
completely completely

K30. I always strive to find better ways to do things

disagree 1 2 3 4 5 6 7 agree
completely completely

K31. I am able to engage others in an activity

disagree 1 2 3 4 5 6 7 agree
completely completely

K32. I am able to organize a group's activities and tasks

disagree 1 2 3 4 5 6 7 agree
completely completely

To what extent do the following attributes correspond to your perceptions of entrepreneurship (i.e. establishing a business and working as an entrepreneur)?

	not at all						completely
K33. Interesting.....	1	2	3	4	5	6	7
K34. Esteemed.....	1	2	3	4	5	6	7
K35. Dishonest.....	1	2	3	4	5	6	7
K36. Worth pursuing.....	1	2	3	4	5	6	7
K37. Boring..... .	1	2	3	4	5	6	7
K38. Fascinating.....	1	2	3	4	5	6	7
K39. Despised	1	2	3	4	5	6	7
K40. Good income level.....	1	2	3	4	5	6	7
K41. Oppressive.....	1	2	3	4	5	6	7

A few questions about your background:

K42. Gender: 1– female 2 – male

K43. Year of birth: _____

K44. Nationality: _____

K45. Domicile: _____

K46. What is your basic education before starting your current studies?

1 – vocational education
2 – upper secondary school
3 – double degree
4 – something else, specify what: _____

K47. Do you have any new idea or innovation in your mind at the moment (related to a product, service or process), which might be worth a new business venture?

1 – yes 2 – no

K48. If your answer to the above question was yes, that is, you have a new idea or innovation in your mind, where does that idea come from?

1 - It is essentially related to the introduction of an innovative

and new kind of product/service/process on the market
2 - It is essentially related to the satisfaction of a need existing in the market with a product/service/process of some kind

K49. Are you currently starting your own business? (E.g. you are working on a business idea or other plans or finding out about different things in order to establish an enterprise)

1 – yes 2 – no

K50. If you are currently starting your own enterprise, for how many months have you been *actively* engaged in the start-up process?

_____ months

K51. If you are currently starting your own business, how many months do you expect it will take until the business is in full operation?

_____ months

K52. Which one of the following alternatives describes best the *key* content of your mother's professional career? (Choose only one alternative)

1 – salaried work employed by another
2 – self-employment or entrepreneurship (incl. agricultural entrepreneurship)
3 – unemployed
4 – disability pension
5 – housewife
6 – something else, specify what: _____

K53. Which one of the following alternatives describes best the *key* content of your father's professional career? (Choose only one alternative)

1 – salaried work employed by another
2 – self-employment or entrepreneurship (incl. agricultural entrepreneurship)
3 – unemployed

4 – disability pension
5 – house husband
6 – something else, specify what: _____

The following questions relate to the progress and content of your studies.

K54. How actively did you take part in your last year's studies?

very little 1 2 3 4 5 6 7 very actively

K55. How many credits do you estimate you earned last year?

1 – less than 45 credits
2 – about 45 to 60 credits
3 – more than 60 credits

K56. What do you estimate the average grade of the courses you took last year to be?

1 – lower than 2
2 – about 2 to 3
3 – about 3 to 4
4 – about 4 to 5

K57. Did you, during last academic year, complete studies that included themes/parts related to entrepreneurship and business start-up?

1 – yes. For how many credits?_____

How many of them did you earn last academic year? _____

2 – no

K58. <u>If</u> you completed entrepreneurship-related studies during last academic year, were they compulsory or optional?

1 – compulsory
2 – optional
3 – both compulsory and optional

K59. <u>If</u> you completed entrepreneurship-related studies last academic year, how was this entrepreneurship training implemented? (you can choose more than one option)

1 – traditional course (lectures, exercises, exam, etc.)
2 – project-type course, including cooperation with
a real entrepreneur, enterprise or another outside actor
3 – practice enterprise activities (or other virtual business activities) or Young Entrepreneurship activities
4 – I joined a business incubator (business clinic,
enterprise team, pre-incubator, etc.)
5 – making a business plan
6 – company visits or visits by entrepreneurs at the university
7 – participation in a business competition
8 – I completed studies through a cooperative or another company
9 – something else, please specify what:

_____

K60. Did you meet a real entrepreneur in your own field or visit a company of your own field as part of your studies last academic year?

1 – yes 2 – no

K61. Were you active in the Student Union, mentor activities or another kind of student activities during your last academic year?

1 – yes 2 – no

K62. Did you take concrete steps to set up your own company during your last academic year?

1 – yes 2 – no

K63. Did you work while studying during your last academic year?

1 – yes 2 – no

K64. <u>If</u> you worked during your last academic year, was your work regular or irregular?

1 – regular
2 – irregular (i.e. every now and then)

K65. My studies so far have given me tools to embark on entrepreneurship

disagree completely	1	2	3	4	5	6	7	agree completely

K66. My Degree Programme encourages an *entrepreneur-like way of action*

disagree 1 2 3 4 5 6 7 agree
completely completely

K67. Are you able to mention any single event or thing related to your studies from last academic year that has had an influence on your attitudes towards an entrepreneurial career?

1 - Yes. Please specify in your own words what.

_____

_____

_____

2 - No.

K68. Has any other extracurricular thing (e.g. related to your family, friends, hobbies) had a notable effect on your attitudes towards an entrepreneurial career?

1 - Yes. Please specify what.

_____

_____

_____

2 - No.

ARTICLES

Article 1

DO INTENTIONS EVER DIE? THE TEMPORAL STABILITY OF ENTREPRENEURIAL INTENTION AND LINK TO BEHAVIOR

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Abstract

Purpose

This study contributes to entrepreneurial intention research by examining the Theory of Planned Behavior model in a longitudinal follow-up of the same individuals from a point at which they were studying until six to eight years after graduation and the link between entrepreneurial intention and actual behavior. The objectives of the paper are as follows: 1) to examine the development and temporal stability of entrepreneurial intention, and 2) to examine the link between entrepreneurial intention and actual start-up behavior in a longitudinal setting.

Methodology

The data for this research originate in Finland and consists three data collection waves between years 2008 and 2018. In the second wave 282 respondents were reached and in the third wave 89. For examining the stability of entrepreneurial intention, a latent growth curve modeling was used. In addition, a logistic regression analysis was conducted to examine the link between intention and behavior.

Findings

The results suggest that entrepreneurial intention is a stable construct over time. High and low levels of entrepreneurial intention remain quite stable. Entrepreneurial intention measured during study time significantly explains entrepreneurial behavior both after one to three years (Exp (B) 2,069***), and after six to eight years (Exp (B) 1,830*). Gender and role models are significant factors in predicting entrepreneurial behavior.

Value/Originality

This study provides new information on the stability of entrepreneurial intention in a rare longitudinal setting. The study verifies the value of intention measures in predicting entrepreneurial behavior in the long term.

Keywords: Theory of Planned Behavior, entrepreneurial intention, entrepreneurial behavior

Introduction

Entrepreneurial intention has gained wide interest in entrepreneurship research (Kolvereid, 1996; Krueger and Carsrud, 1993; Fayolle and Liñán, 2013; Kautonen, van Gelderen and Fink, 2015). The majority of the entrepreneurial intention research is based on the Theory of Planned Behavior (TPB) developed by Ajzen (1991). TPB suggests, that intention to perform a certain behavior can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control; and intention accounts for considerable variance in actual behavior (Ajzen, 1991).

Maalaoui et al. (2018) propose three major types of entrepreneurial intentions research: The first comprises studies exploring the antecedents of intention; the second attempts to explain how entrepreneurial intention can be put into action; and the last develops TPB by extending it with additional dimensions. New research agendas in entrepreneurial intention research are e.g. implementation intention (Schjoedt, 2018), collective intentions (Brännback, Carsrud and Krueger, 2018) and the influence of culture (Liñán and Jaén, 2018) but it is clear more research is still merited. There are only few studies examining the intention-behavior link (e.g. Kautonen, van Gelderen and Fink, 2015) and a longitudinal follow-up on intention development is restricted usually to only a few years and data is gathered usually with two waves (e.g. Liñán and Rodriguez-Cohard, 2015). Hence, the previous research lacks a wider longitudinal aspect, even though

Sheeran and Webb (2016) argue that forming intention can be crucial to securing long-term goals.

Entrepreneurial intention is a construct that is widely used in assessing the impacts of entrepreneurial education (Longva and Foss, 2018). In addition, Global Entrepreneurship Monitor (GEM) uses the construct of entrepreneurial intention in providing research data on entrepreneurship for key international organisations like the United Nations, World Economic Forum, World Bank, and the Organisation for Economic Co-operation and Development (see https://www.gemconsortium.org/). Hence, it is important both for scholars and for policy makers to understand how temporarily stable the construct of entrepreneurial intention is and whether it explains entrepreneurial behavior in the long term.

Temporal stability of intention has been examined in other fields than entrepreneurship (Conner, Sheeran, Norman and Armitage, 2000; Conner and Godin, 2007). Temporal stability refers the extent to which a variable remains unchanged over time despite other factors (Sheeran, Orbell and Trafimow, 1999). Stable intentions are stronger predictors of behavior and even capable of overcoming one's past behavioral tendencies (Conner, Norman and Bell, 2002; Sheeran, Norman and Orbell, 1999; Conner and Godin, 2007). Therefore, it is important to investigate the temporal stability of entrepreneurial intention.

This study contributes to entrepreneurial intention research by examining the TPB model in a longitudinal follow-up of the same people from a point at which they were studying (here referred to as study time) until six to eight years after graduation and the link between entrepreneurial intention and actual behavior. This kind of longitudinal setting is rare in entrepreneurship research. The objectives of the paper are as follows: 1) to examine the development and temporal stability of entrepreneurial intention measured at the time of studies until years after graduation (three waves), and 2) to examine the link between study-time entrepreneurial intention and actual start-up behavior after graduation in a longitudinal setting.

Theoretical framework and hypothesis development

Entrepreneurial intention and Theory of Planned Behavior

Different definitions of entrepreneurial intention have been proposed in previous research. Krueger, Reilly and Carsrud (2000, 420) define intention as "the target

behaviors of starting a business." Entrepreneurship is moreover a process (Gartner et al., 1994; Liñán and Chen, 2009), in which entrepreneurial intention is the first step (Lee and Wong, 2004). In this study, entrepreneurial intention refers to the commitment to starting a new business (Krueger and Carsrud, 1993) after a student graduates.

TPB suggests that intention is influenced by attitudes, social norms, and perceived behavioral control and that intention is an antecedent of behavior (action) (Ajzen, 1991, 188). Ajzen (1991, 188) defines three conceptually independent determinants as follows: "The first is the attitude toward the behavior and refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question. The second predictor is a social factor termed subjective norm; it refers to the perceived social pressure to perform or not to perform the behavior. The perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior of interest."

The TPB model has been widely applied in entrepreneurship research (Maalaoui et al., 2018; Liñán and Fayolle, 2015). However, there is a research gap concerning the stability of entrepreneurial intention over the long term and the link between intention and actual behavior. There are only few studies examining the individual-level development of entrepreneurial intention in a longitudinal setting. Liñán, Rodriguez-Cohard and Guzmán (2011) were the first to analyse temporal stability of entrepreneurial intention in a longitudinal study. They concluded that entrepreneurial intention is a quite stable construct. However, they had only two data waves and a three-year time period in their study. Varamäki, Joensuu and Viljamaa (2015) showed that the entrepreneurial intentions of students in higher education decreased over time. Intention decreased particularly noticeably for those whose level of intention was initially high, whereas the group whose intention increased rose from a low to a neutral level of intention. However, that study only examined the development of intentions during the period of studying. Liñán and Rodriguez-Cohard (2015) had also a three-year time period while examining the stability of entrepreneurial intention with graduates. Hence, no research of longer time periods examining the stability of entrepreneurial intention exists.

Ajzen (1996) argues that intention should be reasonably stable over time in order to predict behavior. This is the basic assumption of Theory of Planned Behavior. In addition, Bratman (1992) argues that the concept of intention stability is important for the theory of action and stability of prior intentions lies in the rational resistance to reconsideration. In the light of earlier research of Liñán and

Rodriguez-Cohard (2015) and arguments of Bratman (1992), we hypothesize entrepreneurial intention to be stable over time.

The link between intention and behavior

The correlation between intention and behavior has been reported to be as high as 0.9–0.96 (Ajzen et al., 2009). As Sheeran and Webb (2016) demonstrate, numerous correlational studies indicate that intention predicts behavior and offers superior prediction of behavior compared to other cognitions including attitudes, norms, self-efficacy, and perceptions of risk and severity. In the context of entrepreneurial intention, Liñán and Rodriguez-Cohard (2015) showed that entrepreneurial intention significantly explain start-up behavior over a three-year time period. However, Kautonen, van Gelderen and Fink (2015) argue that despite the predictive accuracy of self-reported entrepreneurial intention, in some cases entrepreneurial behavior can occur without such intention. Entrepreneurship can emerge in surprising situations; in fact, as Varamäki et al. (2014) show, some students went on to become entrepreneurs even though they initially had weak entrepreneurial intention. This should be taken into account when examining the link between entrepreneurial intention and entrepreneurial behavior. More research on intention-behavior link is required as very few attempts have been made (Liñán and Rodriguez-Cohard, 2011; Schlaegel and Koenig, 2014).

In addition to intention, perceived behavioral control (PBC) may have an effect on actual behavior. Ingram et al. (2000) found that PBC has a direct effect on start-up behaviors (see also Townsend et al., 2010). In addition, Kautonen, van Gelderen and Tornikoski (2013) found that PBC contributes to the prediction of behavior over and above its mediated influence via intention. In fact, Ajzen (1991) suggests that PBC has a double role in the TPB: to the extent that PBC is realistic, that is, the subject's perceptions are realistic, PBC also predicts the actual behavior instead of full mediation via intention. Ajzen (1991) also emphasizes that the relative importance of intention and PBC in the prediction of behavior may vary across situations and different behaviors. If a person has complete control over behavioral performance, intention alone should be sufficient to predict behavior, and thus, the importance of PBC increases as volitional control over the behavior declines (Ajzen, 1991).

Examining the link between study-time entrepreneurial intention and actual behavior after graduation can be problematic, since Ajzen (1991) argues that intention must remain stable in the interval between its assessment and observation of the behavior. As time passes, several factors can affect the stability of intention; for example, intervening events or new information can change intentions. In addition, as the time of actual behavior approaches, habitual

behavioral patterns can lead to an outcome other than that intended. Kiriakidis (2015) argues that in general, the practical utility of the intention–behavior model is significant when the intention–behavior relationship is stable. However, Ajzen (1985) suggests that the predictive accuracy of the model could be valid for long-term prediction as well, if the prediction is at the aggregate level and not at the individual level. Aggregate intention is assumed to be more stable over time than individual intention. Despite these restrictions, it is interesting to examine the predictive value of study-time entrepreneurial intention on entrepreneurial behavior after graduation. Kautonen, van Gelderen and Fink (2015) demonstrated the relevance of TPB in the prediction of business start-up intention and behavior (intention and PBC explained 31 % of the variation in behavior), albeit their research covers only a one-year period. Liñán and Rodríguez-Cohard (2015) also demonstrated a link between intention and actual start-up in a three-year study, despite the fact that the degree of start-up variance explained by EI was limited (12.8 percent). However, studies investigating longer periods between entrepreneurial intention and actions are nonexistent.

Other factors affecting the development of entrepreneurial intention

Numerous studies have demonstrated that gender has an effect on the formation of entrepreneurial intention and actual start-up behavior (Liñán and Chen, 2009; Yordanova and Tarrazon, 2010; Joensuu et al., 2013). Men have a stronger entrepreneurial intention and start businesses more often than women do. Another important factor affecting entrepreneurial intention and behavior is a role model, a factor that previous research shows has a positive effect on entrepreneurial intention and actual start-up behavior (Liñán and Chen, 2009; Prodan and Drnovsek, 2010; Engle et al., 2010).

Theoretical model and hypothesis development

Hence, based on the previous literature on entrepreneurial intention and the TPB model, we propose the following hypotheses:

H1: Entrepreneurial intention is stable over time.

H2: Entrepreneurial intention explains entrepreneurial behavior both in the short and long term.

As gender and role models have been proven to have an effect on entrepreneurial intention in numerous studies, we add these as control variables in our study when

examining the link between entrepreneurial intention and entrepreneurial behavior.

Figure 1 presents the conceptual model for hypothesis 2. The model will be tested separately in the short term (1-3 years after graduation) and in the long term (6-8 years after graduation).

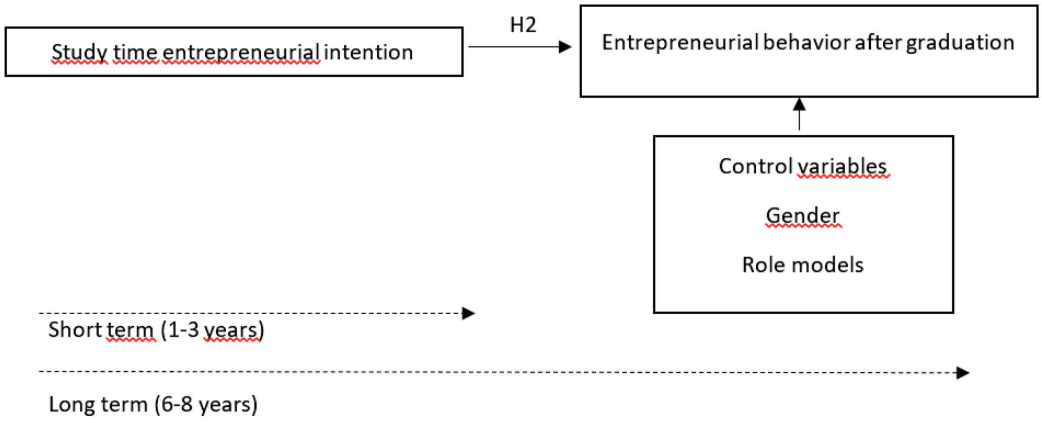

Figure 1. Conceptual model for testing the link between entrepreneurial intention and entrepreneurial behavior.

Methodology

Data gathering

The data for this research originate in Finland. The first data collection was conducted between 2008 and 2012 and involved all the students studying at the Seinäjoki University of Applied Sciences during that period. Students answered the Entre Intention questionnaire (presented below) each year they were enrolled at the university. The follow-up data collection (second wave) was conducted in 2013. The follow-up questionnaire was sent to students who had graduated in the years 2009 to 2012 inclusive. This means that at the time of the data collection, some of the students had graduated one year previously and some four years previously. The data collection process elicited 1 045 responses in total. In the next stage the research team merged the data from the first data collection (taken during study time) and the second wave. The purpose was to find two measurement waves for each student (values for the same student from the study time and after graduation). A measurement result from the study time was found for 282 graduates. None of those students had graduated in the year 2009, thus

for the relevant respondents, between one and three years had passed since graduation. A total of 64 percent of the respondents had graduated a year before the second wave measurement; 32 percent two years previously; and four percent three years previously.

A third data gathering round (the third wave) was conducted for these same 282 graduates in 2018 when between six and eight years had passed since they graduated. The third round elicited 89 responses from the 282 graduates approached (a response rate of 32 %). Of those respondents, 64 percent had graduated six years prior to the third measurement wave; 30 percent had graduated seven years previously; and six percent eight years previously.

The issue of data loss in longitudinal settings is a well-known one. To examine the differences between the second and third wave measurements, we compared the demographics of the respondents between these data sets. In the second wave (282 respondents) 73 percent of the respondents were women and 27 percent men. Of the respondents, 19 percent had a mother working as an entrepreneur and 37 percent a father working as an entrepreneur. Most of the respondents had graduated in social services or health and sports (40 percent), followed by social sciences and business and administration (23 percent), and then by technology, communications and transport (17 percent). In addition, 14 percent had graduated with degrees in fields related to culture and six percent in fields related to natural resources and the environment. As in the second wave, the third wave (89 respondents) featured more women (67 percent) than men (33 percent). Of those 89 respondents, 14 percent had a mother working as an entrepreneur and 32 percent had a father working as an entrepreneur. Most of the respondents had graduated with degrees in the fields of social services or health and sports (39 percent). A further 19 percent had obtained degrees in the field of social sciences and business and administration, and 16 percent in the fields of technology, communications and transport. A few respondents had graduated in the fields of culture (12 percent), natural resources and the environment (8 percent), natural sciences (3 percent) or from the fields of tourism, catering, and domestic services (2 percent). Given no statistically significant differences concerning study field, gender or level of parental entrepreneurship between the second and third waves, selective attrition did not appear to be affecting this longitudinal data.

However, it is impossible to compare these waves to the first data collection, because it consists of answers from different years (from the year 2008 to the year 2012). For some description, in year 2012 there were 1 522 answers of which 56 percent were from women. 17 percent had mother working as an entrepreneur and 37 had father working as an entrepreneur. Most of the respondents studied in the

field of social services, health and sports (24 percent), in the field of technology (23 percent) and in the field of social sciences, business and administration (22 percent). 13 percent studied in the field of culture, 13 percent in the field of natural sources and the environment, and 6 percent in the field of tourism, catering and domestic services. When considering response bias, the first data presents quite well the basic student population in regard to gender and study fields. However, we do not have data concerning parental level of entrepreneurship from the students who did not reply.

The data from the second and third wave represent quite well the basic student population, except that there are more women among the respondents. This should be noted when considering the limitations of the study.

Measurement instrument and variables

The data were gathered via the Entre Intention measurement instrument. This instrument was developed in Finland and is based on the TPB model measuring entrepreneurial intention, attitudes to an entrepreneurial career, the subjective norm, and PBC. In addition, there are questions concerning entrepreneurship studies and background variables. The scales are largely based on the work of Kolvereid (1996) and Tkachev and Kolvereid (1999). All the items used in this research are presented in Appendix 1. In the following, the estimates from the third data wave (year 2018) are presented.

- Entrepreneurial Intention was measured with a 7-point Likert scale. An index of entrepreneurial intention was created by averaging six items (min=1.2, max=7.0, mean=3.5, sd=1.5). The reliability of the scale was good (Cronbach's alpha=0.91).

- Entrepreneurial behavior (start-up behavior) was measured through a dichotomy (1=working as an entrepreneur, 2=other). In the analysis phase, we combined full-time and part-time entrepreneurs, as we classified part-time entrepreneurship as being entrepreneurial behavior.

- Gender was operationalized as zero for women and one for men.

- To operate logistic regression analysis, we differentiated the entrepreneurial role models of the mother and father as having a mother working as an entrepreneur (coded 1) or not (coded zero) and having a father working as an entrepreneur (coded 1) or not (coded zero).

First factor analysis was used to assess unidimensionality of the entrepreneurial intention scale. Factor analysis was appropriate for the data according to Kaiser-

Meyer-Olkin measure (.86). From the six items measuring entrepreneurial intention, one single factor was extracted. This factor accounted 71 percent of the variance of entrepreneurial intention with eigenvalue 4.248. All factor loadings were above .50. Hence, we conclude that entrepreneurial intention measure is reliable.

Methods of analysis

To analyze the stability of entrepreneurial intention, we used latent growth curve modeling with Amos (SEM). Latent growth curve modeling is a suitable method when examining intra- and inter-individual variations (Byrne, 2010). In this research the development of entrepreneurial intention of the same individual is analyzed with three data waves. Latent growth curve modeling estimates growth trajectories of individuals, enabling the evaluation of initial state and growth rate (McArdle and Nesselroade, 2003). Latent growth curve model has two parameters: 1) an intercept parameter and 2) a slope parameter. The intercept parameter represents an individual's score of entrepreneurial intention at the initial state and the slope parameter represents the individual's rate of change over the time (Byrne, 2010). In this research there are three measurement waves obtained from 89 individuals. Two-factor latent growth curve modeling was used to examine the growth of entrepreneurial intention. The Intercept describes the initial level of entrepreneurial intention (intercept mean) and individual differences in initial level (intercept variance). The factor loadings for intention were set at 1 for each time (intercept is a constant for the individual). The second factor is the Slope factor, which describes the rate of change (slope mean) and individual differences in growth patterns (slope variance). For testing a linear growth model, these factor loadings were fixed to correspond to a linear time scale in order to test the growth model with structural equation modeling.

There are several goodness of fit indices that can be evaluated. Byrne (2010) suggests the Model Chi-Square, in which the p-value should be above 0.05; Normed Fit Index (NFI), which is an incremental measure of fit and should be above 0.90; Comparative Fit Index (CFI), which is a revised form of NFI but not so sensitive to sample size and should be above 0.90; TLI, which should be above 0.95; and RMSEA, which is an absolute measure of fit and is based on the non-centrality parameter. For RMSEA, MacCallum, Browne and Sugawara (1996) suggest cutoff value of 0.08 for mediocre fit. However, RMSEA is not a good index for small samples as Kenny, Kaniskan and McCoach (2015) argue. They show that there is a greater sampling error for small degrees of freedom and small sample size models, which produces artificially large values of the RMSEA. They suggest that for small samples and with low df, RMSEA should not be computed. For this

research, as suggested for small sample size of 89 individuals and low df (2), we used the fit indices of Model Chi-Square, NFI, TLI and CFI. For evaluating the sufficient sample size using SEM, the recommendation of Mitchell (1993) was followed. Hence, a model should contain at least 10 times as many observations as variables. Our model has eight variables and 89 observations, hence the sample size is large enough for using latent growth curve modeling.

To examine the link between entrepreneurial intention as expressed during the time of studying and entrepreneurial behavior after graduation, we used logistic regression analysis. Logistic regression analysis is suitable in situations where the dependent variable is dichotomous (working as an entrepreneur or not). The logistic regression analysis differentiated the entrepreneurial role models of a mother and father (see variable coding above). The link between entrepreneurial intention and behavior was tested with two time frames: the first period was from time of the study until one to three years after graduation and the second was from time of the study until six to eight years after graduation.

Results

For examining the stability of entrepreneurial intention, a latent growth curve model was examined as presented in Figure 2. The model of growth produced a good fit: Model Chi-Square: 7.713 with a non-significant p-value of 0.052, NFI: 0.930, CFI: 0.956, TLI: 0.956.

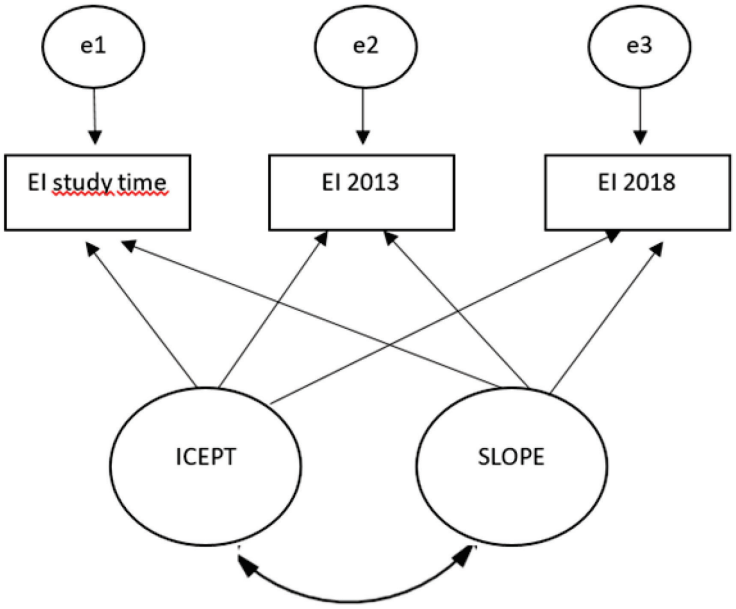

Figure 2. Latent growth curve model for examining the stability of entrepreneurial intention.

Table 1 presents the estimates of the growth parameters. The estimated mean for intercept is 3.3. This means that at the beginning of the studies, the mean value of entrepreneurial intention is 3.3. The mean estimate for the slope mean is 0.05. This indicates a slightly positive growth rate. However, p-value (p>.05) is not significant. This reveals the stability of entrepreneurial intention in 6-8-year time period. The covariance between the initial state and growth rate is 0.055. P value (p>.05) is not significant, which shows that initial level is unrelated to the rate of change. This can be interpreted that individuals with low and high initial level of entrepreneurial intention experience similar growth trajectories. As the growth rate (slope) was not significant, low and high levels of entrepreneurial intention of individuals are stable across time. Hence, hypothesis 1 is supported. Entrepreneurial intention is stable over time. The variance related to intercept is significant. This means that there are strong inter-individual differences in initial scores of entrepreneurial intention. The variance related to slope is not significant. This reveals that there are no inter-individual differences in the growth trajectories of entrepreneurial intention.

Table 1. Estimates of the growth parameters of the linear model.

	Estimate	SE	CR	*p*
Means				
ICEPT	3.323	0.126	26.428	***
SLOPE	0.053	0.026	2.022	–
Covariances				
ICEPT ←→ SLOPE	0.055	0.038	1.464	–
Variances				
ICEPT	0.822	0.227	3.629	***
SLOPE	0.011	0.012	0.886	–
E1	0.636	0.096	6.633	***
E2	0.636	0.096	6.633	***
E3	0.636	0.096	6.633	***

Note: *** indicates significance at the 99% level

We used logistic regression analysis to examine the link between entrepreneurial intention at the time of study and actual start-up behavior after graduation in a longitudinal setting. The conceptual model was tested separately for the second wave and for the third wave to discern if there were differences with these time intervals.

In the second wave (1–3 years after graduation, n=282), 17 graduates had become entrepreneurs. We tested a model where entrepreneurial intention at the time of study, gender (male), and role models (mother's and father's entrepreneurial

career) explain entrepreneurial behavior (part- or full-time entrepreneurship). Gender and role models are categorical variables in the model. The results of the analysis are presented in Table 2. Gender (male) explains entrepreneurial behavior significantly (Exp (B) 4,400**). The results reveal that a male is 4.4 times more likely to embark on entrepreneurial behavior than a female is. Study-time entrepreneurial intention is also significant in the model (Exp (B) 2,069***); however, role models do not explain entrepreneurial behavior one to three years after graduation. The test developed by Hosmer and Lemeshow produces a non-significant chi-square (5.908) which indicates that the data fits the model well. Moreover, the Omnibus Tests of Model Coefficients produce a significant chi-square (29,571***), which shows that the overall model predicts the dependent variable. The model classifies 99 percent correctly those students who do not start a firm but only 12 percent correctly the students who do. The problem is usual in situations where the occurrence of the dependent variable is rare, as is the case here (17 out of 282). The Nagelkerke R2 value is .24. Even though the R2 value is not very high, Omnibus test verifies that the model can predict the dependent variable. However, other factors not included in this model may exist that also explain entrepreneurial behavior. This model only verifies the fact that entrepreneurial intention has some predictive value.

Table 2. Logistic regression analysis on entrepreneurial behavior 1-3 years after graduation (n=282).

	B	SE	Wald	Significance	Exp(*B*)
Study-time entrepreneurial intention	0.727	0.227	10.289	***	2.069
Entrepreneurial role model (mother)	−0.725	0.715	1.028	0.311	0.484
Entrepreneurial role model (father)	0.328	0.575	0.326	0.568	1.389
Gender (male)	1.482	0.527	7.912	**	4.400
Constant	−5.792	0.888	42.514	***	0.003

Note: **, *** indicates significance at the 95% and 99% level, respectively

The third wave (6–8 years after graduation, n=89) captures the data on 13 entrepreneurs. The mean value of entrepreneurial intention of these entrepreneurs was 5.1 during their study time, which contrasts markedly with that of the other respondents, whose mean value was 3.2. That difference in the mean values is significant (p=.000). Logistic regression analysis verifies that entrepreneurial intentions measured six to eight years previously do significantly explain entrepreneurial behavior in the year 2018 (Exp (B) =1,830*) (see Table 3). In addition, gender (Exp (B)=12,339**) and role models (father as an entrepreneur, Exp (B)=14,147**) had value in the model. The results reveal that the odds of entrepreneurial behavior are as much as 12 times higher for male respondents than for female respondents and 14 times higher for respondents

whose father is an entrepreneur. The tests of Hosmer and Lemeshow (non-significant chi-square 12,991), and Omnibus (20,715***) provide good values for the model. The Nagelkerke R2 value is .37. There is the same problem on rare occasions in this analysis as there was with the second wave; the model is able to correctly classify 23 percent of the respondents who become entrepreneurs and 99 percent of those who do not.

As Ajzen's TPB-model suggests, PBC can have a direct effect on behavior. Hence, we tested another logistic regression model adding the variable of PBC in the model. However, the effect of PBC was not significant, and adding it to the analysis weakened the whole model. Hence, PBC was not included in the final model.

Table 3. Logistic regression analysis on entrepreneurial behavior six to eight years after graduation (n=89).

	B	SE	Wald	Significance	Exp(*B*)
Study-time entrepreneurial intention	0.605	0.315	3.688	*	1.830
Entrepreneurial role model (mother)	−0.480	0.978	0.241	0.623	0.619
Entrepreneurial role model (father)	2.650	1.046	6.417	**	14.147
Gender (male)	2.513	0.992	6.419	**	12.339
Constant	−6.225	1.672	13.864	***	0.002

Note: *, **, *** indicates significance at the 90%, 95% and 99% level, respectively

Hypothesis 2 is supported in that entrepreneurial intention measured in the course of a person's studies explains entrepreneurial behavior both one to three years after graduation and six to eight years after graduation. Gender (male) as a control variable has an effect on start-up behavior. Having an entrepreneurial parent as a role model did not explain entrepreneurial behavior one to three years after graduation but after six to eight years, the importance of a father's entrepreneurial career was significant.

Discussion

The first objective of this paper was to examine the development and temporal stability of entrepreneurial intention over time from the time of studying until six to eight years after graduation. The results show that in general, entrepreneurial intention level slightly increases after studies are completed. However, this change is not significant as the results of the latent growth curve model showed. This means that the strong entrepreneurial intention evident during study time remains visible after six to eight years. In addition, low entrepreneurial intentions measured during study time are still low six to eight years after graduation. This

result suggests that entrepreneurial intention is a quite stable construct. The temporal stability of entrepreneurial intention has not been investigated much in previous research except for the study by Liñán, Rodriguez-Cohard and Guzmán (2011). Their sample provided evidence of the existence of a long-term relation even though their time period was significantly shorter than in this research. Hence, their findings give support for the suggestions of this research.

The second objective of this study was to examine the link between study-time entrepreneurial intention and actual start-up behavior after graduation in a longitudinal setting. Entrepreneurial intention measured during study time significantly explains entrepreneurial behavior even after six to eight years. There is a link between intention and behavior both after a few years and after several years. This shows the value of intention measures in predicting entrepreneurial behavior in the long term. Liñán and Rodríguez-Cohard (2015) also conducted a longitudinal study to examine the link between entrepreneurial intention of final year students and actual start-up behavior after three years. They also found that entrepreneurial intention significantly explains actual start-up behavior. The results of the present study confirm the findings of Liñán and Rodríguez-Cohard (2015) in a much longer time frame. In addition, this present study provides three time-waves, which makes possible to use latent growth curve analysis to add new knowledge about the stability of entrepreneurial intention. In addition, we tested the link between PBC and entrepreneurial behavior in a longitudinal setting as suggested by the TPB. This link proved to be non-significant, hence it was not included in the final model. This result supports the findings of Liñán and Rodríguez-Cohard (2015), who similarly found the path from PBC to start-up behavior to be non-significant.

Ajzen's (1991) TPB model has predictive value in explaining entrepreneurial behavior in a longitudinal setting. This is interesting, because Ajzen (1991) argues the importance of stability of intention and PBC in the interval between their assessment and observation of the behavior. It seems likely that many other factors can affect the entrepreneurial intention of individuals over a six to eight-year time interval. However, the results from this study show that high and low levels of entrepreneurial intention remain quite stable, which verifies the applicability of the TPB model in explaining entrepreneurial behavior in a longitudinal setting.

The temporal stability of intention has been studied also in fields other than entrepreneurship. Conner, Sheeran, Norman and Armigate (2000) showed that when intentions were stable, they were stronger predictors of behavior in the field of health research. It could be argued that since entrepreneurial intention proved to have temporal stability, it also has stronger predictive power.

A second interesting issue is Ajzen's (1985) assumption that for long-term prediction, aggregate intention could be more accurate than individual intention. In this study, individual intention did explain entrepreneurial behavior in the long term. However, the predictive value of the model decreases over time. In the data measuring entrepreneurial behavior one to three years after measuring intention, the significance of entrepreneurial intention was higher than when entrepreneurial behavior was measured six to eight years after the measurement of intention; nevertheless, in both cases entrepreneurial intention has some predictive value. Results suggest that TPB works better in a short time span. The longer the time between intention measure and actual behavior, the weaker is the explanatory power of intention measure. Interestingly, six to eight years after graduation the predictive values of gender and a father working as an entrepreneur (serving as a role model) in explaining entrepreneurial behavior are extremely high even though role models did not explain entrepreneurial behavior one to three years after graduation.

Ajzen (1991) also suggests that if a person has complete control over behavioral performance, intention alone should be sufficient to predict behavior. It could be argued that a person does not have complete control over entrepreneurial behavior, because entrepreneurship requires other factors than intention, such as resources and market opportunities. Hence, intention alone should not be sufficient in predicting the behavior. Interestingly, this was not the case in this research. In the data collected one to three years after graduation, mere intention significantly explained entrepreneurial behavior. This could be interpreted as support for the argument that, in the case of entrepreneurial behavior, entrepreneurial intent is in fact more important than, for example, opportunities offered by the environment. However, it should be remembered that entrepreneurial behavior does not require previous entrepreneurial intention in all cases. Katz (1989) found that many business founders did not have a strong entrepreneurial intention a few years before they started their business. There are also some individuals in our data set that started a business after graduation although they had a low entrepreneurial intention at the time of their study.

Entrepreneurial intention does not always lead to immediate action. Carsrud and Brännback (2011) highlight the importance of the effect of time. This research shows that intention can indeed lead to entrepreneurial behavior after several years. Carsrud and Brännback suggest that motivation may be the spark that transforms a latent intention into real action and therefore, the missing link between intention and action. This is also an area of further research.

This study confirms that measuring entrepreneurial intention during study time is relevant. Individuals with high levels of entrepreneurial intention can be identified and offered special support. The study contributes to research in the field by presenting an analysis of an extraordinary dataset, allowing follow-up of individual students until several years after graduation. Individual-level longitudinal follow-up studies are rare. The results demonstrate the relevance of students' entrepreneurial intentions and their antecedents for actual entrepreneurial behavior. Further research following the same individuals to measure whether high-level entrepreneurial intention is still evident after tens of years would be interesting. In addition, it would be interesting to test the full TPB model in a longitudinal setting. This research showed that PBC measured years before entrepreneurial behavior did not have a direct effect on the behavior in contrast to TPB. Liñán and Rodríguez-Cohard (2015) did not find a direct effect of PBC on intentions either. However, they found a mediating effect of PBC via intentions. This should be tested in a longer time span.

There are some limitations to this research. First, the data come from one country and from one region, which can affect the results. Second, the three-wave dataset is quite small and only a few respondents had become entrepreneurs. This limits the generalizability of the results. In addition, there are more women in the data than in the student population as a whole. This can have an effect on the results. Hence, we can summarize that this research is exploratory in nature and further studies are needed. However, longitudinal data gathering is demanding, and we believe this study brings new knowledge despite these restrictions.

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Appendix 1. Variables and their items.

Variable (all measured on a 7-point Likert scale; translated from Finnish)

Entrepreneurial intention

How likely are you to continue your career employed by another (i.e., in salaried work) after graduation)? (1=very unlikely ----- 7=very likely)

If you were to choose between entrepreneurship and salaried work after graduation, which would you choose? 1=salaried work ----- 7=entrepreneurship

How strong is your intention to embark on entrepreneurship at some point of your professional career? 1=no intention -----7=very strong

How likely are you to embark on entrepreneurship after you have gathered sufficient work experience? (1=very unlikely ----- 7=very likely)

How likely is it that you will be employed for most of your career by a company or a public organization (without any connection to entrepreneurship)? (1=very unlikely ----- 7=very likely)

If you were to choose between entrepreneurship and unemployment after graduation, which would you choose? (1=unemployment ----- 7=entrepreneurship)

Article 2

DEVELOPMENT OF ENTREPRENEURIAL INTENTION IN HIGHER EDUCATION AND THE EFFECT OF GENDER

– A LATENT GROWTH CURVE ANALYSIS

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INTRODUCTION

A dynamic business environment requires a constant input of new start-ups, preferably innovative high growth start-up firms. At the same time, in developed countries with high general levels of education, there seems to be a lack of entrepreneurial drive (e.g. Xavier *et al.,* 2012). As societies struggle to find a continuous supply of new entrepreneurs to fuel economic growth and to maintain or increase the level of education needed in a high-tech world, the question of how higher education affects formation of entrepreneurial intentions is becoming a crucial one.

Entrepreneurial intentions refer to the commitment of starting a new business (Krueger and Carsrud, 1993) by a graduate, either directly after graduation or in the future. Some studies suggest that higher education reduces the likelihood of entrepreneurship (Kangasharju and Pekkala, 2002; Henley, 2007; Pihkala 2008; Wu and Wu, 2008; Nabi *et al.*, 2010) while others suggest the opposite (Blanchflower and Meyer, 1994; Ertuna and Gurel, 2011; Lanero *et al.*, 2011; Zhang et al., 2013).

Reasonable arguments exist in favour of both views. On one hand, participating in higher education gives a person a resource advantage which may enable a successful career in entrepreneurship; on the other hand, with a higher education degree a person becomes a more desirable employee and may view salaried employment a more attractive alternative than entrepreneurship.

Another intriguing issue relates to how higher education and gender impact entrepreneurial intentions. In Finland, 25 % of men and 31 % of women have a higher education degree; while, only a third of entrepreneurs are female (Suomen virallinen tilasto 2013). It would be simplistic to argue that higher education is to blame for the low proportion of female entrepreneurs. The differences suggest that gender differences in the development of entrepreneurial intentions in higher education deserve attention.

The development of entrepreneurial intentions has been extensively studied, but the overwhelming majority of studies have been cross-sectional, comparing e.g. students in different age cohorts or different fields of study. Longitudinal studies are challenging from the point of view of data collection (e.g. Harte and Stewart, 2010), and few exists (e.g. Matlay and Carey, 2007) to help us create an understanding of how an individual's intentions develop over time spent in higher education.

This research paper presents the results of tracking the changes in entrepreneurial intentions of students during their higher education studies in Finland. The objectives of this study are threefold: (1) to analyze the development of intentions of individuals over time; (2) to explore potential gender differences in intention development; and (3) to analyse the relatedness of the initial level and development of the antecedents of intentions to the initial level and the development of intentions. The analysis of change on multi-wave panel data is done using latent growth curve analysis with structural equation modeling.

The remainder of the paper is organized as follows. The following section will present our theoretical model. Thereafter we discuss our methodological choices before presenting the statistical analysis. Lastly, we discuss the implications of our study.

REVIEW OF LITERATURE AND THEORETICAL MODEL

Intentions and their antecedents

In order to study the development of intentions, we will adopt an existing intention model, namely the Theory of Planned Behavior by Ajzen (1991), which has become one of the most widely used psychological theories to explain and predict human behavior (Kolvereid, 1996; Tkachev and Kolvereid, 1999). The Theory of Planned Behavior (TPB) suggests that intention is the immediate antecedent of behaviour and, thus, the stronger the intention to engage in a specific behaviour, the more likely its actual performance should be (Ajzen, 1991). The linkage between intentions and actual behavior has received support in the entrepreneurial context (e.g. Kautonen, van Gelderen and Tornikoski, 2013). The core of the TPB is the idea that intentions have three conceptually independent determinants, which are are attitude towards the behavior, perceived behavioral control and subjective norm (Ajzen, 1991, p. 188).

The degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question is defined *as attitude* towards the behavior. A positive perception regarding the outcome of starting a business (see e.g. Shapero & Sokol, 1982; Autio *et al.*, 1997; Krueger *et al.*, 2000; Segal *et al.*, 2005; van Gelderen and Jansen, 2006; Pruett *et al.,* 2009) leads to the a more favourable attitude towards the behavior. This, in turn, should lead to increased intention to go ahead and start a business.

Subjective norm refers to the perceived social pressure to perform or not to perform a behavior (in this case, starting a business). Subjective norm is based on individual's beliefs whether the behavior is approved or disapproved by important referent individuals or groups, and to what extent this approval or disapproval matters to the individual (Ajzen, 1991, p. 195). Generally speaking, the more the opinion and the encouragement for starting a business of referent group or individual matters to the individual the stronger should be the individual's intention to enterprising activity. Cialdini and Trost (1998) suggested that social norms have the greatest impact when conditions are uncertain. Pruett et al. (2009) operationalized social norms as family experience and support in addition to knowledge of others who had started businesses.

Perceived ease or difficulty of performing the behavior is referred as *Perceived behavioral control.* It is based on beliefs regarding the presence or absence of requisite resources and opportunities for performing a given behaviour (see Bandura *et al.,* 1980; Swan *et al.,* 2007). In general, the higher the perceived behavioural control perceived by the individual, the higher the individual's

intention to start up a business should be. According to Ajzen (1991) this is most compatible with Bandura's (1982) concept of perceived self-efficacy.

According to Ajzen and Fishbein (2004), the three theoretical antecedents should be sufficient to predict intentions, but only one or two may be necessary. In other words, the Theory of Planned Behavior posits that the relative importance of the three factors can vary from one context to another. In most of the studies the best predictor of intentions has been perceived behavioral control (Shapero and Sokol, 1982; Boyd and Vozikis, 1994; Krueger *et al.*, 2000; Autio *et al.,* 2001; Melin, 2001; Kristiansen and Indarti, 2004; Linan, 2004; Henley, 2005; Segal *et al.,* 2005; Urban, 2006; Sequeira *et al.*, 2007; Wilson *et al.*, 2007; Prodan and Drnovsek, 2010; Chen and He, 2011; Drost and McGuire, 2011; Finisterra Do Paco *et al.*, 2011; Lee *et al.*, 2011; Lope Pihie and Bagheri 2011). The second-most common predictor has been attitudes (Zampetakis *et al.*, 2009; Moi *et al.*, 2011) followed by subjective norm (Aizzat *et al.*, 2009; Lope, *et al.,* 2009; Engle *et al.*, 2010; Siu and Lo, 2013).

Although there are very few previous longitudinal studies of changes in entrepreneurial intentions in higher education over time, we claim that changes in perceived behavioral control, in attitudes, and in subjective norm are the key ingredients in understanding the development of entrepreneurial intentions in higher education. As such, our theoretical model will reflect this emphasis on changes in these central antecedents of intention formation and development.

Gender

As both existing enterprise statistics and research on intentions (e.g. Crant, 1996; Kourislky and Walstad, 1998; Shay and Terjesen, 2005; Wilson *et al.*, 2004; Wang and Wong, 2004; Sequeira *et al.* 2007; Linan, and Chen, 2009; cf. Pruett *et al.*, 2009; Yordanova and Tarrazon, 2010; Kautonen *et al.,* 2010; Lee *et al.*, 2011; Zhang *et al.,* 2013) have shown that women have less desire to start a new businesses than men, *gender* is included in our theoretical model as a factor influencing the initial level of entrepreneurial intentions and the development of intentions. Also and Isaksen (2012) found that among female Norwegian pupils at upper secondary school, youth enterprise experience had an indirect positive effect on entrepreneurial intentions through its effect on subjective norm and perceived behavioral control. A recent European Commission (2012) study on alumni of entrepreneurship programs found that female alumni score lower on entrepreneurial self-efficacy than their male counterparts, but higher than the control group (cf. Wilson et al. 2007; Kickul et al. 2008). In Zhao et al's (2005) study, gender was not related to entrepreneurial self-efficacy but was directly related to entrepreneurial intentions. In their study women also had lower entrepreneurial intentions than men. Yordanova and Tarrazon (2010) found that

gender effect on entrepreneurial intentions is fully mediated by perceived behavioral control and partially mediated by perceived subjective norms and attitudes. Zhang et al.'s study (2013) also offers evidence that if both men and women receive entrepreneurship education, men have a higher log-chance of entrepreneurial intentions than females. Some earlier studies have also found differences in learning styles between men and women (Gallos, 1993; Kaenzig *et al.*, 2007; Varamäki *et al.,* forthcoming). According to these studies, women are not as happy with group work or active-based pedagogies as men are.

Impact of education on intention development

The impact of education on entrepreneurial intentions has been studied by Lee *et al.* (2011), Wilson *et al.* (2007), Sandhu *et al.* (2011), Millman *et al.* (2010), Nabi *et al.* (2010), Henley (2005), Franco *et al.* (2010), Fayolle *at al.* (2005), Blanchflower and Meyer (1994), and Kristiansen and Indarti (2004). Generally, some studies suggest that higher education reduces the likelihood of entrepreneurship (Henley, 2007; Pihkala 2008; Wu and Wu, 2008; Nabi *et al.*, 2010). Others studies seem to show the opposite effect. For example, Lanero *et al.* (2011) observed among Spanish university students that education had a positive effect on perceived entrepreneurship feasibility. This in turn affected entrepreneurial intention and behavior. In Zhang et al.'s (2013) study students from technological universities reported cross-sectionally higher entrepreneurial intentions, and if all students would have received entrepreneurship education, students from technological universities had a higher log-chance of entrepreneurial intentions than those from other universities. Blanchflower and Meyer (1994) found that additional years of schooling had a positive impact on the probability of being self-employed in the USA but not in Australia. Turkish senior students are more likely to have entrepreneurial intentions than freshmen (Ertuna and Gurel, 2011).

Instead of general impact of education, more effort has been put towards understanding the effects of entrepreneurship education in particular (Matlay and Carey, 2007; Mwasalwiba, 2010; Zhang *et al.*, 2013). Studies show positive impacts of entrepreneurship education on intentions, attitudes and self-efficacy (e.g. Zhao *et al.*, 2005; Souitaris *et al.*, 2007; Jones *et al.*, 2008; Wilson *et al.*, 2009; Zhang *et al.*, 2013), but negative impacts have also been reported (e.g. Pihkala and Miettinen, 2004; Oosterbek *et al.*, 2010; Walter *et al.,* 2011).

The Intention Development model

Based on the above review, we built a structural intention model for empirical exploration. Figure 1 presents the conceptual model of our study.

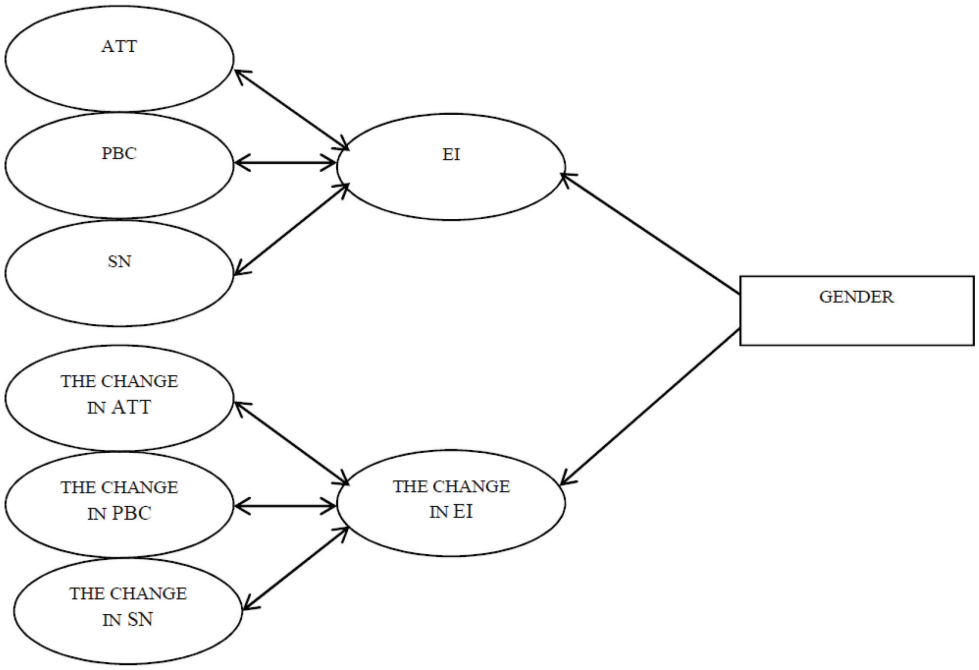

FIGURE 1. The Theoretical Intention Development model (ATT=Attitudes, SN=Subjective Norm, PBC=Perceived Behavioral Control, EI=Entrepreneurial Intentions).

METHODOLOGY

Instrument and data collection method

The instrument used in this study has been developed and piloted in Finland. The scales are largely based on Kolvereid (1996). The data was collected using a self-administered questionnaire in the autumn of 2010, 2011 and 2012. Students from seven different universities of applied sciences representing seven different study fields were administered the questionnaire. There is always difficulty with data loss in longitudinal studies. For the analysis we accepted those individuals who had answers for at least two waves. In our data there are 192 individuals with all three measurement waves and 104 individuals with two measurement waves. We compared those students with all waves to those who were missing one wave on demographic variables (age, gender, mother's or father's professional background as an entrepreneur). Given no statistically significant differences between the groups, selective attrition did not appear to be operating in this longitudinal data. For missing data we used estimation of means and intercepts with Amos. Respondents who had already begun preparing for a business venture of their own before the first survey were excluded from the final data, because their

entrepreneurial intentions had already been realized in preparatory actions before the follow-up. In the final analysis there were 296 responses. 60 percent of the respondents were female. The mean age for the respondents was 21 in year 2010.

Variables

Entrepreneurial Intentions. An index of entrepreneurial intention was created by averaging eight items.

Subjective Norm. The variable Subjective Norm has three items. Originally each item had a seven point scale from 1-7. For the statistical analysis the scales were transformed to a -3 - +3 scale. In addition, motivation to comply was measured by three items (seven-point scale from 1 to 7) referring to each of the aforementioned belief questions. The belief based items (coded as ranging from -3 to 3) and the corresponding motivation to comply items (coded as ranging from 1 to 7) were multiplied, and then added to create an index of Subjective Norm.

Perceived Behavioral Control. An index of Perceived Behavioral Control was created by averaging five item scores.

Attitudes towards entrepreneurship. An index of Entrepreneurial Attitude was created by averaging nine item scores.

All the variables and their items are presented in Appendix 1. Table 1 presents Cronbach´s alphas, minimum and maximum scores, means and standard deviations for the scales (EI=entrepreneurial intentions, SN=subjective norm, PBC=perceived behavioral control, ATT=attitudes).

TABLE 1. Cronbach´s alpha, minimum and maximum scores, means and standard deviations for the scales.

	Cronbach's α	Minimum	Maximum	Mean	SD
EI 2010	0.86	1.0	6.8	3.3	1.1
EI 2011	0.89	1.0	6.6	3.2	1.2
EI 2012	0.88	1.0	6.8	3.0	1.2
SN 2010	0.76	−63	45	−2.0	15.8
SN 2011	0.74	−63	34	−3.1	14.1
SN 2012	0.70	−54	36	−3.8	14.8
PBC 2010	0.74	1.0	7.0	4.0	1.0
PBC 2011	0.73	1.0	6.0	3.9	0.9
PBC 2012	0.78	1.0	6.6	3.9	1.1
ATT 2010	0.75	1.8	6.9	4.9	0.8
ATT 2011	0.80	2.4	6.9	4.8	0.8
ATT 2012	0.82	1.0	7.0	4.7	0.9

Common method variance

We tested the possible effects of common method variance for the variables collected using Harman's one factor test (Harman, 1976). If common method variance was a serious problem in the study, we would expect a single factor to emerge from a factor analysis or one general factor to account for most of the covariances in the independent and dependent variables (Podsakoff and Organ, 1986). All the items used to create the main variables, a total of 29 items, were factor analysed using principal axis factoring where the unrotated factor solution was examined, as recommended by Podsakoff *et al.* (2003, p. 889). Kaiser's criterion for retention of factors was followed. The sample size seemed to be large enough for the factor analysis, at least based on the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.88).

Factor analytic results indicated the existence of nine factors with eigenvalues greater than 1.0. The seven factors explained 62 percent of the variance among the 29 items, and the first factor accounted for 29 percent of the variance. Since several factors, as opposed to one single factor, were identified and since the first factor did not account for the majority of the variance, a substantial amount of common method variance does not appear to be present. Thus, we conclude that common method variance bias is not a threat to the validity of the results. One should bear in mind though that this procedure does nothing to statistically control for the common method effect: it is just a diagnostic technique (Podsakoff *et al.*, 2003, 889). Hence, the possibility of common method issues cannot be fully discarded.

RESULTS

Latent Growth Analysis

Latent growth curve modeling (LGC) was utilized to test the model of development of entrepreneurial intent. LGC is a useful analytic tool for analyzing longitudinal data, because in addition to means, it accounts for both within person and between person variance in the statistical model. Multiwave data allows for more effective testing of systematic inter-individual differences in change. The model includes two growth parameters: a) an intercept parameter representing an individual´s score on the outcome variable at the initial state, and b) a slope parameter representing the individual´s rate of change over the time period of interest. (Byrne 2010, 305.) In this study we used 3 measurement waves at 1-year intervals.

First we focused on modeling individual differences in growth. In order to examine growth of entrepreneurial intentions, a 2-factor Latent Growth Model (LGM) was used. The Intercept factor describes the initial level of entrepreneurial intention

(intercept mean) and individual differences at the initial level (intercept variance). The factor loadings for intentions were set at 1 for each time because the intercept is a constant for individuals across time. The Slope factor represents the rate of change (slope mean) and individual differences in growth patterns (slope variance). For testing a linear growth model, these factor loadings were fixed to correspond to a linear time scale (0, 1, 2).

The parameters of growth were estimated using structural equation modeling with Amos 19. The goodness of fit is presented with the following indices: X2 value, p value, the Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI) and Comparative Fit Index (CFI). The basic linear model of growth produced an excellent fit: X2 =0.024, p=0.877, RMSEA=0.000, NFI=1.000, CFI=1.000.

Characteristics of Latent Curve of Intentions

The estimates of growth parameters of the linear model are presented in table 2 (Icept, Slope and Error terms). The estimated mean for intercept is 3.3, which is the mean estimate for entrepreneurial intention at the beginning of studies. The mean estimate for the slope mean is -0.103. That indicates a negative and a significant growth rate. Covariance between the initial state and growth rate (-0.020) was not significant, which indicates that initial level is unrelated to the rate of change. The variance related to intercept is significant. The finding reveals strong inter-individual differences in initial scores. The variance related to slope is not significant. There are no inter-individual differences in growth trajectories.

TABLE 2. Estimates of growth parameters of the linear model.

	Estimate	SE	CR	*p*
Means				
ICEPT	3.255	0.064	51.137	***
SLOPE	−0.103	0.022	−4.588	***
Covariances				
ICEPT ↔SLOPE	−0.020	0.051	−0.386	0.700
Variances				
ICEPT	1.039	0.126	8.246	***
SLOPE	0.084	0.047	1.781	0.075
E1	0.169	0.094	1.808	0.071
E2	0.280	0.053	5.240	***
E3	0.093	0.100	0.928	0.354

Note: ***$p < 0.001$

Effect of gender on Latent growth curve

Gender (male) was used as a person covariate in the model. The model with standardized regression weights is presented in figure 2. Gender has a significant effect on both the intercept and the slope parameters. For male students the initial level of intention is higher. Gender (if male) also has a positive effect on the development of intentions over three years. The estimates of growth parameters of the linear model are presented in table 3. The model produced an excellent fit: X2=1.098, p=0.578, RMSEA=0.000, NFI=0.998, CFI=1.000.

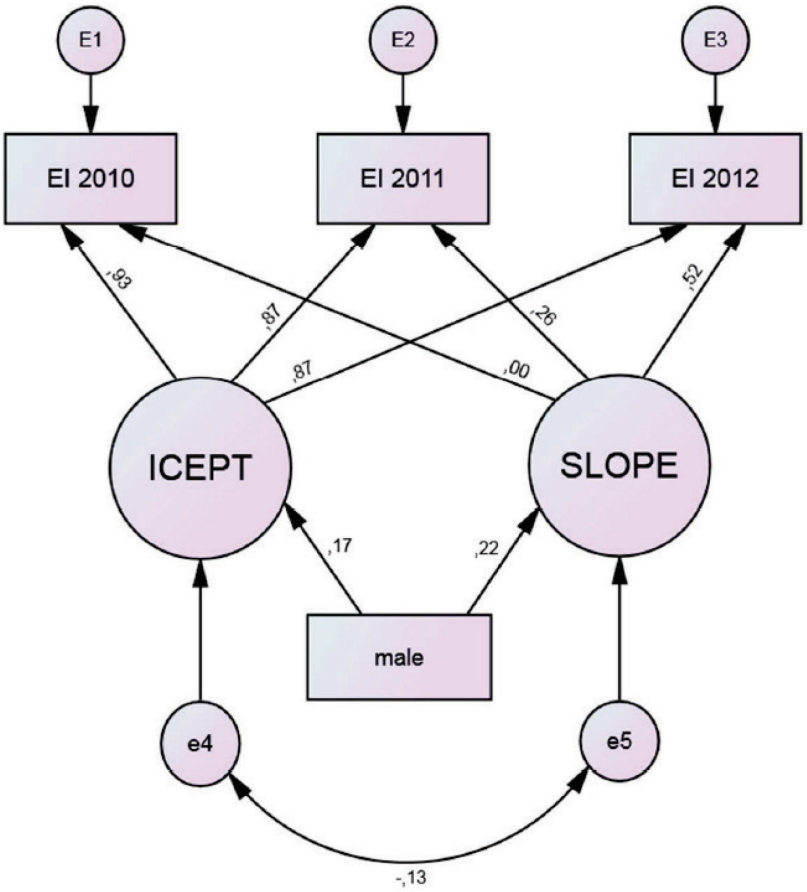

FIGURE 2. Gender (male) effect on latent growth curve of entrepreneurial intentions (standardized regression weights).

TABLE 3. Estimates of growth parameters with gender.

	Estimate	SE	CR	*p*	Standardized regression weight
ICEPT ← male	0.366	0.130	2.817	**	0.174
SLOPE ← male	0.136	0.046	2.970	**	0.214

Note: $^{**}p < 0.01$

There is a strong difference between male and female students in the development of intentions. Female students' mean estimate for the initial state is 3.1, the following year 3.0 and the third year 2.8. Estimates for the male students over the same time period are 3.5, 3.4 and 3.4. Male students have a higher initial level and intentions do not decrease as much as with the female students. The result supports our theoretical model with gender effect on the initial level and the development of entrepreneurial intentions.

Means, covariance structures and variances between intention, attitudes, subjective norm and perceived behavioral control

We tested the relatedness of the initial level and development of attitudes, subjective norm and perceived behavioral control to the initial level and the development of intentions. A multi-domain LGC model was created for testing (see Appendix 3). As Willet and Sayer (1996) suggest, covariation among the growth parameters across domains was included. Table 4 presents the results related to entrepreneurial intention development. Other covariance structures are presented in Appendix 4. The mean estimates for slopes show that attitudes develop significantly in a negative direction. Also perceived behavioral control has a small negative development. Subjective norm remains almost at the same level during studies. Covariance structures reveals that intercept of attitudes and perceived behavioral control are strongly related to the intercept of intentions. This means that the initial level of intentions is related to the initial level of attitudes and perceived behavioral control. Individuals with high values in entrepreneurial intentions also have high values in attitudes and perceived behavioral control. The initial level of subjective norm, however, does not seem to be related to the initial level of intentions; nor is the development of subjective norm related to the development of entrepreneurial intentions. The slope of attitudes and the slope of perceived behavioral control are strongly related to the development of entrepreneurial intentions.

This result indicates that as students´ perceptions of their entrepreneurial ability and attitudes towards entrepreneurship undergo a moderate increase, so do their entrepreneurial intentions as well. Variances show that there are strong inter-

individual differences in the initial level of attitudes, subjective norm and perceived behavioral control. There are no inter-individual differences in the growth trajectories related to attitudes, subjective norm and perceived behavioral control.

TABLE 4. Estimates of intercept and slope factors related to attitudes (ATT), subjective norm (SN) and perceived behavioral control PBC); and covariances with entrepreneurial intentions (EI).

	Estimate	SE	CR	*p*
Means				
ATT ICEPT	4.876	0.043	113.378	***
ATT SLOPE	−0.072	0.022	−3.293	***
SN ICEPT	−2.061	0.893	−2.307	*
SN SLOPE	−0.866	0.491	−1.763	0.078
PBC ICEPT	4.030	0.055	73.023	***
PBC SLOPE	−0.065	0.028	−2.341	*
Covariances				
ATT ICEPT ↔ EI ICEPT	0.471	0.055	8.639	***
ATT SLOPE ↔ EI SLOPE	0.049	0.009	5.413	***
SN ICEPT ↔ EI ICEPT	1.574	0.983	1.601	0.109
SN SLOPE ↔ EI SLOPE	0.292	0.190	1.536	0.125
PBC ICEPT ↔ EI ICEPT	0.589	0.070	8.471	***
PBC SLOPE ↔ EI SLOPE	0.048	0.011	4.317	***
Variances				
ATT ICEPT	0.348	0.061	5.755	***
ATT SLOPE	0.041	0.027	1.551	0.121
SN ICEPT	135.230	28.569	4.733	***
SN SLOPE	11.662	12.815	0.910	0.363
PBC ICEPT	0.567	0.089	6.367	***
PBC SLOPE	0.044	0.037	1.209	0.227

Notes: *$p < 0.05$; ***$p < 0.001$

The tested model produced a good fit: RMSEA=0.072, NFI=0.95, CFI=0.97. Although the fit statistics with X2 distribution (86.720, p=0.000) is not good, the problems with X2 statistics is widely known when the sample size is large (Byrne 2010, 76). The results give support for the hypothesized model except for the relatedness of subjective norm with entrepreneurial intentions. The initial level with subjective norm and the development of subjective norm seems to be unrelated to the initial level and the development of entrepreneurial intentions.

DISCUSSION

We have made an attempt in this study to increase our understanding about the development of entrepreneurial intentions during 1st to 3rd year university studies and the role of gender. Our empirical sample consisted of a unique panel data from seven different universities of applied sciences in Finland and students representing seven different study fields. The analysis of change on multi-wave panel data was conducted using latent growth curve analysis with structural equation modeling.

In summary, our empirical results are threefold. First, entrepreneurial intentions of higher education seem to decrease during their studies. Second, there is a gender difference in the initial level of entrepreneurial intentions and how intentions develop over time. Third, the initial level of intentions does not affect the future development of intentions. Below we comment on each of these findings, relate them to the existing literature, and propose avenues for future research.

Intentions decrease during studies. The first objective of our study was to analyze the development of intentions of individuals over time. Our empirical observations over two and a half years confirm that, generally speaking, entrepreneurial intentions of a student of higher education institute seem to decrease. This observation is in line with earlier empirical studies concerning student populations (e.g. Fayolle *et al.,* 2005; Henley, 2007; Pihkala, 2008; Wu & Wu, 2008; Nabi *et al.*, 2010). Based on our study, it seems that individuals at the beginning of their studies seem to have greater self-confidence and will in starting their own businesses than they do after studying two and a half years. It is, however, quite typical that people overrate their intention to perform a distant action. Hence, in the beginning of their studies a student may overrate their intent to start a business after graduation, whereas, by the time of graduation the student is more realistic about their own competencies, the requirements of starting their own businesses and other career options. More interestingly, people have a tendency to rate temporally distant actions based on positive aspects (pros), and temporally near actions based on negative aspects (cons) (Eyal *et al.,* 2004). When students start their studies, the entrepreneurial act is temporally distant, so it is evaluated based on pros, therefore more positive intentions towards entrepreneurship. When the students are about to graduate, however, the probable entrepreneurial action is temporally closer. In these situations, students are more attached to the cons than pros, therefore, entrepreneurial intentions decrease compared to the initial level. Future studies could explore this phenomenon by comparing the kinds of attributes student attach to entrepreneurship and how these attributes, potentially, change during the studies.

The non-importance of initial intention level. According to empirical observations the initial level of intentions does not influence the development of intentions over three years of study (see also Pihkala, 2008). That is, the initial level of intentions does not condition the subsequent development of intentions. This is contradictory to some other studies (e.g. Varamäki *et al.,* forthcoming). There are no significant differences between individuals in intention development. However, strong inter-individual differences can be found in the initial level of intentions.

Females have a lower level of initial intentions, and intentions decrease more than among males. The second objective of our study was to explore potential gender differences in intention development. Our empirical observations clearly demonstrate a gender difference in both initial level of intentions and the way in which intentions evolve over time. Indeed, male students seem to have higher intentions to begin with (see also Wang and Wong, 2004; Zhao *et al.*, 2005; Sequira *et al.* 2007; Linan and Chen, 2009; cf. Lee *et al.* 2011). More interestingly, the level of intentions among male students does not seem to decrease as much as the intentions of female students. Similar results have been observed earlier by other scholars (e.g. Zhang *et al.,* 2013; cf. Wilson *et al.,* 2009; Also and Isaksen, 2012). While it was out of the scope of our study, future studies could explore why the level of intentions among women decreases more than males. It might well be that there are difference in the way women and men learn in the higher educational setting. In some earlier studies differences in learning styles between men and women have been found. For example, women might react differently to pedagogical methods than males. As such, there might be differences in learning styles between men and women (Gallos, 1993). Also, the effectiveness and value of team-based pedagogical exercises for women students has been called into question, because women seem to be less happy with team-based exercises in business classes (e.g. Kaenzig *et al.,* 2007). We encourage future studies to pay attention to learning styles of individuals to discover whether the differences observed in this study can be attributed to difference in learning styles of individuals.

The change in antecedents is related to the change in intentions. The third objective of our study was to analyse the relatedness of the initial level and development of the antecedents of intentions to the initial level and the development of intentions. The results show that the initial level of intentions is related to the initial level of attitudes and perceived behavioral control but not to the initial level of subjective norm. Moreover, the change in attitudes and perceived behavioral control is related to the change in intentions. Once again, the change in subjective norm has no effect on the change in intentions.

These results mean that our empirical observations also seem to confirm the validity of the intention model put forward by Ajzen. More particularly, the model seems to have predictive relevance when the development of intentions is examined over time. While the model has been tested extensively, most empirical studies have been cross-sectional. Our three-point data supports the model as a whole, and identifies the non-significant role of subjective norm on the development of entrepreneurial intentions, conforming to some earlier studies (e.g. Zhang *et al.*, 2013; cf. e.g. Siu and Lo, 2013; Engle *et al.*, 2010; Aizzat *et al.*, 2009).

Limitations and conclusion

While we believe that the results presented herein add to our understanding of the role of entrepreneurship education in the development of entrepreneurial intentions in higher education contexts, we acknowledge that the present research is not entirely beyond reproach. From a theoretical standpoint, we limited our efforts to investigate the effect of higher education in general in entrepreneurial intentions and role of gender in this process. We do acknowledge that entrepreneurial education may have an impact on intention development during higher education studies although the earlier results are controversial. An interesting extension of our study would be to investigate whether participation in entrepreneurship education and different entrepreneurial pedagogy have effects on students' entrepreneurial intentions. Furthermore, we limited our focus on one intention model when other possible approaches could have been available to study the development of entrepreneurial intentions. Again, future scholarly work could complement our results by investigating the same phenomenon through other theoretical lenses.

From an empirical standpoint, our sample was limited to higher education students in one country. Increasing our knowledge of the potential effects of the general environmental and cultural contexts on the formation of entrepreneurial intentions requires further research using versatile samples comprising university students in other countries. In addition, longitudinal designs are always demanding. The loss of data is problematic as seen in our study with three-point data collection during three years' time. The missing data can bias conclusions drawn from the study and the obvious disadvantage in the loss of information resulting from the reduced sample size. On the other hand, longitudinal panel data are very rare. The strength of our data is its longitudinal nature and the fact that we were able to follow the development of entrepreneurial intentions at the individual level. There is, however, an opportunity for someone to improve data

collection methods to minimize the loss of respondents between subsequent data collection phases.

In conclusion, we believe that our study makes an important contribution to the field of entrepreneurial education by concluding that intention development in higher educational context is not a simple matter, but rather complicated process during which young people can realize their true potential vis a vis entrepreneurial opportunities. From an educators' point of view such realization generally means a decrease in an individual's entrepreneurial intentions, which is a phenomenon that does not provide much encouragement for educators. On the other hand, one of the aims of any entrepreneurship education is to give younger people a more realistic picture about entrepreneurship. When someone is willing to start a new business in this kind of context, we as educators can be a degree more confident that such an individual is not launching his/her venture because of idealistic dreams. By using a longitudinal design, our study is one of the first to provide empirical evidence about the intention of development over time. Ultimately, we hope to have added richness to the continuing discussion among academics and educators alike regarding the importance of intention development in entrepreneurship education.

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Appendix 1. Variables and their items.

Variable (all measured on a 7-point Likert scale; translated from Finnish)

Entrepreneurial intention

How likely are you to start your own business and work as an entrepreneur after graduation (or while still studying)?

If you were supposed to choose between entrepreneurship and salaried work after graduation, which one would you choose?

How strong is your intention to embark on entrepreneurship at some point of your professional career?

How likely are you to embark on entrepreneurship after you have gathered a sufficient amount of work experience?

If you were supposed to choose between entrepreneurship and unemployment after graduation, which one would you choose?

Subjective norm*

I believe that *my closest family members* think I should not/should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your closest *family members* think if you strive to start your own business and to work as an entrepreneur after graduation?

I believe that *my best friends* think I should not / should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what *your best friends* think if you strive to start your own business and to work as an entrepreneur after graduation?

I believe that *my significant others* think I should not / should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what *your significant others* think if you strive to start your own business and to work as an entrepreneur after graduation?

Perceived behavioural control

If I established a business and started to work as an entrepreneur after graduation, my chance of success would be (good / bad).

If I really wanted to, I could easily start a business and work as an entrepreneur after graduation.

There are very few / numerous things that are beyond my own control but could prevent me from starting my own business and working as an entrepreneur after graduation.

For me, starting my own business and working as an entrepreneur after graduation (very easy / very difficult).

If I established my own business and started to work as an entrepreneur after graduation, my risk of failure would be (very small / very big).

Attitudes towards entrepreneurship

To what extent do the following attributes correspond to your perceptions of entrepreneurship (i.e. establishing a business and working as an entrepreneur)? (not at all - completely)

Interesting

Esteemed

Worth pursuing

Boring

Fascinating

Despised

Good income level

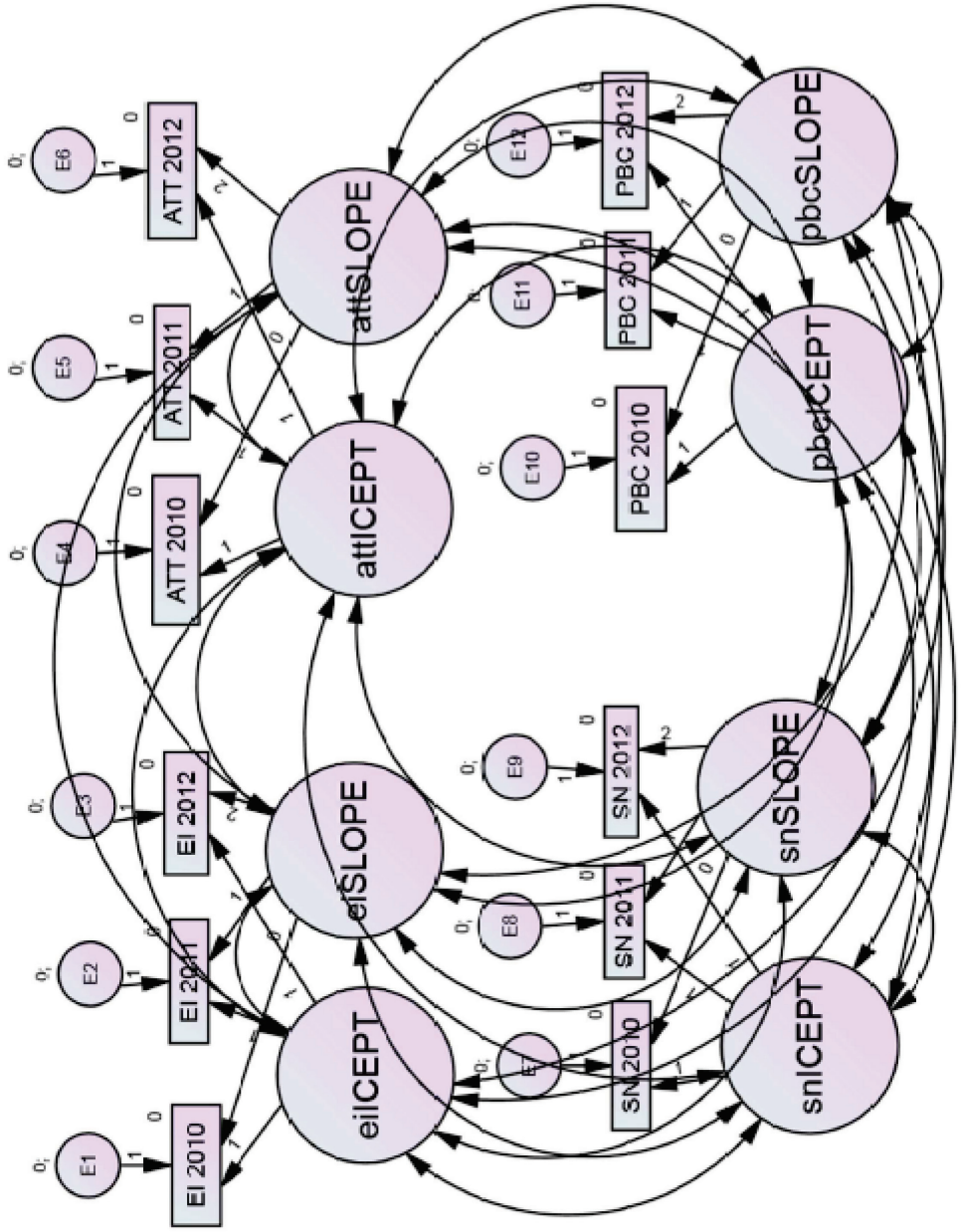
* For the statistical analysis the scales were transformed to -3 - +3 scale. In addition, motivation to comply was measured by three items (seven-point scale from 1 to 7) referring to each of the aforementioned belief questions. The belief based items (coded as ranging from -3 to 3) and the corresponding motivation to comply items (coded as ranging from 1 to 7) were multiplied, and then added to create an index of Subjective Norm

Appendix 2. Correlations (Pearson) between the main variables.

		EI 2010	SN 2010	PBC 2010	ATT 2010	EI 2011	SN 2011	ATT 2011	PBC 2011	EI 2012	SN 2012	PBC 2012	ATT 2012	gender
EI 2010		1												
SN 2010	Pearson Correlation	,090	1											
	Sig. (2-tailed)	,122												
PBC 2010	Pearson Correlation	,561**	-,046	1										
	Sig. (2-tailed)	,000	,429											
ATT 2010	Pearson Correlation	,544**	,008	,496**	1									
	Sig. (2-tailed)	,000	,886	,000										
EI 2011	Pearson Correlation	,795**	,036	,501**	,509**	1								
	Sig. (2-tailed)	,000	,625	,000	,000									
SN 2011	Pearson Correlation	,138	,516**	-,002	-,059	,144	1							
	Sig. (2-tailed)	,058	,000	,973	,421	,048								
ATT 2011	Pearson Correlation	,488**	-,037	,430**	,592**	,637**	,121	1						
	Sig. (2-tailed)	,000	,608	,000	,000	,000	,098							
PBC 2011	Pearson Correlation	,490**	-,066	,671**	,456**	,624**	-,016	,528**	1					
	Sig. (2-tailed)	,000	,363	,000	,000	,000	,831	,000						
EI 2012	Pearson Correlation	,771**	,107	,526**	,424**	,835**	,171	,495**	,583**	1				
	Sig. (2-tailed)	,000	,067	,000	,000	,000	,019	,000	,000					
SN 2012	Pearson Correlation	,040	,400**	-,044	,004	,089	,462**	,004	,010	,133	1			
	Sig. (2-tailed)	,495	,000	,453	,945	,223	,000	,958	,889	,023				
PBC 2012	Pearson Correlation	,449**	-,009	,557**	,278**	,484**	,055	,382**	,699**	,578**	-,020	1		
	Sig. (2-tailed)	,000	,872	,000	,000	,000	,453	,000	,000	,000	,738			
ATT 2012	Pearson Correlation	,490**	,023	,464**	,595**	,564**	,121	,705**	,468**	,567**	,060	,444**	1	
	Sig. (2-tailed)	,000	,690	,000	,000	,000	,096	,000	,000	,000	,309	,000		
Gender	Pearson Correlation	,170**	-,107	,226**	,045	,191**	-,048	,041	,248**	,268**	-,013	,252**	,055	1
	Sig. (2-tailed)	,004	,069	,000	,445	,009	,515	,574	,001	,000	,829	,000	,350	

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.01 level (2-tailed).

Appendix 3. The multi-level LGC model for Entrepreneurial Intentions, Attitudes, Subjective Norm and Perceived Behavioral Control.



Appendix 4. The covariances and variances of the multi-level LGC model for Entrepreneurial Intentions, Attitudes, Subjective Norm and Perceived Behavioral Control.

COVARIANCES			Estimate	S.E.	C.R.	P
eiICEPT	<-->	eiSLOPE	,040	,041	,987	,324
eiICEPT	<-->	attICEPT	,471	,055	8,639	***
eiICEPT	<-->	attSLOPE	,014	,024	,587	,557
eiICEPT	<-->	snSLOPE	-,305	,539	-,566	,572
eiICEPT	<-->	pbcICEPT	,589	,070	8,471	***
eiICEPT	<-->	pbcSLOPE	-,037	,031	-1,200	,230
eiSLOPE	<-->	attICEPT	-,038	,017	-2,266	,023
eiSLOPE	<-->	attSLOPE	,049	,009	5,413	***
eiSLOPE	<-->	snSLOPE	,292	,190	1,536	,125
eiSLOPE	<-->	pbcICEPT	,005	,021	,248	,804
eiSLOPE	<-->	pbcSLOPE	,048	,011	4,317	***
attICEPT	<-->	attSLOPE	,030	,029	1,008	,313
attICEPT	<-->	snICEPT	,020	,659	,031	,975
attICEPT	<-->	snSLOPE	-,011	,363	-,029	,977
attICEPT	<-->	pbcICEPT	,377	,046	8,149	***
attICEPT	<-->	pbcSLOPE	-,066	,021	-3,146	,002
attSLOPE	<-->	snICEPT	,274	,340	,807	,420
attSLOPE	<-->	snSLOPE	,147	,187	,785	,432
attSLOPE	<-->	pbcICEPT	,010	,021	,487	,626
attSLOPE	<-->	pbcSLOPE	,040	,011	3,682	***
snICEPT	<-->	snSLOPE	-20,397	15,697	-1,299	,194
snICEPT	<-->	pbcICEPT	-,736	,847	-,869	,385
snICEPT	<-->	pbcSLOPE	,357	,429	,833	,405
snSLOPE	<-->	pbcICEPT	,234	,466	,501	,616
snSLOPE	<-->	pbcSLOPE	-,073	,235	-,308	,758
pbcICEPT	<-->	pbcSLOPE	,007	,043	,152	,879
eiICEPT	<-->	snICEPT	1,574	,983	1,601	,109
eiSLOPE	<-->	snICEPT	,240	,345	,695	,487

VARIANCES	Estimate	S.E.	C.R.	P
eiICEPT	,946	,111	8,497	***
eiSLOPE	,027	,034	,791	,429
attICEPT	,348	,061	5,755	***
attSLOPE	,041	,027	1,551	,121
snICEPT	135,230	28,569	4,733	***
snSLOPE	11,662	12,815	,910	,363
pbcICEPT	,567	,089	6,367	***
pbcSLOPE	,044	,037	1,209	,227
E1	,298	,070	4,252	***

Article 3

THE DEVELOPMENT OF ENTREPRENEURIAL POTENTIAL AMONG HIGHER EDUCATION STUDENTS

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INTRODUCTION

In current societies, especially in Western countries, a large number of initiatives to promote entrepreneurial actions have been introduced in order to respond to different societal challenges (such as aging population, regional inequalities, etc.). To this end, education is one of the more common ways through which entrepreneurial potential is promoted and hence one of the key areas where we should investigate the impact of entrepreneurship initiatives at individual level. Longitudinal studies on the subject, however, are relatively few (Matlay and Carey, 2007), and pose formidable data collection challenges (e.g. Harte and Stewart, 2010).

As an interesting contribution to this discussion, Jones and Iredale (2010) distinguish between enterprise education with focus on personal attributes and skills that can be used in a variety of contexts and entrepreneurship education with focus on starting and running a business. Some scholars seem to opt for the latter approach. For example, it has been argued that research on impacts of entrepreneurship training should extend to longitudinal studies that examine actual venture formation (Matlay, 2005; Pittaway and Cope, 2007). For the development of entrepreneurial potential through educational programs, it has to be noted, however, that not all such initiatives aim to 'producing' new entrepreneurs, e.g. individuals who would actually start their own business during the initiative or right after it. Indeed, there is an on-going debate on the proper aims and scope of entrepreneurship education (e.g. Gibb, 2002; Mwasalwiba, 2010).

In this study we adhere to the principles of enterprise education in which the focus is on the development of personal attributes and perceived skills related to entrepreneurship, rather than on the final act of starting a business. Our choice is motivated by the fact that the actual rate of startup creation is influenced also by factors outside the scope of educational institutions (e.g. economic downswings); an individual's attributes and perceived skills related to entrepreneurship are something that education can reasonably aim to influence.

Furthermore, our study is motivated by two issues. First, scholars do not seem to agree whether there is a positive or negative relation between education and the development of personal attributes and perceived skills related to entrepreneurship. For example, some scholarly work found evidence that entrepreneurship related education has a positive influence, for example, on intentions, attitudes and self-efficacy (e.g. Zhao et al., 2005; Souitaris et al., 2007; Jones et al., 2008; Wilson et al., 2009). Other scholars however have observed a negative relationship between enterprise education and entrepreneurial attributes and skills (e.g. Pihkala and Miettinen, 2004; Oosterbek et al., 2010). As such, it is not clear what kind of link is there between getting a higher education diploma and the development of entrepreneurial potential.

Second, the choice of a particular pedagogy inside an educational program can also have an impact on the development of entrepreneurial potential, besides the mere fact that someone would participate in higher education program in general. So, as a micro perspective in entrepreneurship education, we should pay attention to the particular ways we teach and deliver entrepreneurship related programs. Previous research suggests that entrepreneurship teaching should by based on more active, learning-by-doing pedagogies rather than passive pedagogies dependent on books and lectures, in order to develop students' competence and confidence in their skills as individuals (e.g. Henry and Treanor, 2012; Neck and Greene, 2011; van Gelderen, 2010; Walter et al., 2010; Bennett, 2006; Dana, 1987). Yet, for example Pittaway and Cope (2007) call for comparative studies, over time, to evaluate pedagogies in relation to alternatives. More research is needed in this respect to better understand the micro-dynamics of effective entrepreneurship pedagogy.

So far we have not identified longitudinal studies on individual level comparing the impacts of different pedagogical approaches (i.e. active-based and lecture-based teaching) on personal attributes and perceived skills related to entrepreneurship, and whether these in turn lead to increased entrepreneurial potential. Therefore, in this study we aim to make a contribution to this direction. The overall purpose of our study is to increase our understanding about the

usefulness of enterprise education in general, on the one hand, and different pedagogical approaches, on the other hand, on the development of entrepreneurial potential among higher education students. The more specific objective of our study is to investigate the impact of different pedagogical approaches on the development of personal attributes and perceived skills related to entrepreneurship, and the impact of such development on entrepreneurial potential among higher education students.

While our study is not the first to investigate the role of higher education in the development of entrepreneurial potential, we make a systematic effort to follow the development of an individual's personal attributes and perceived skills during his/her studies. The timeline of our study is three years, and we follow the same individuals, not a cohort of individuals. As such, the overall contribution of our study is related to the systematic study of the development of entrepreneurship related personal attributes and perceived skills during three-year studies in the Finnish higher education system.

The rest of the paper is organized as follows. In the next section, we will propose a conceptual model for the development of entrepreneurial potential. The model is largely inspired by the literature related to the development of (entrepreneurial) intention. We will explicate why it is important to focus on intention as a proxy for the development of entrepreneurial potential. We will also specify the personal attributes and perceived skills important for the development of entrepreneurial intention. Finally, we integrate a new conceptual piece to the model in the form of entrepreneurship pedagogy. In the section that follows the conceptual model, we discuss our methodological choices and the statistical methods before presenting the empirical results. In the last section, we discuss the implications of our study.

A CONCEPTUAL MODEL OF ENTREPRENEURIAL POTENTIAL

Intention as proxy for entrepreneurial potential

In this study we adopt the standpoint that personal attributes and perceived skills are suitable for examining and comparing educational endeavors and their impact on the development of entrepreneurial potential of individuals. Indeed, one of the central objectives of entrepreneurship related programs is to develop entrepreneurial potential, i.e. the degree to which an individual possesses entrepreneurial qualities (Thompson, 2004; Raab et al., 2005), and the number of individuals that possess them, and through this development, increase the number of potential new business creators in the future.

We focus on the concept of entrepreneurial intention –defined as the commitment to starting a new business (Krueger and Carsrud, 1993) after graduation directly or later in the career– as a proxy to indicate whether entrepreneurial potential has indeed been developed. We offer two reasons for this particular focus on entrepreneurial intention.

First, because entrepreneurial potential "is latent and is causally and temporally prior to intentions" (Krueger and Brazeal, 1994, 91), it makes sense to focus on entrepreneurial intention as an outcome of entrepreneurial potential. That is, if entrepreneurial potential has increased, then it should show in increase in entrepreneurial intention. Second, the decision to focus on intention, as a proxy to entrepreneurial potential, is also motivated by its close linkage to realized behavior. Indeed, the intention to perform a behavior has been described as the best single predictor of an individual's actual behavior (Fishbein and Ajzen, 1975; Bagozzi et al., 1989; Krueger and Carsrud, 1993). As such, entrepreneurial intention is the best available measure of entrepreneurial potential, because it directly precedes a decision to start a business. Recent empirical evidence confirms that entrepreneurial intentions seem to predict well future start-up behavior (e.g. Kautonen, van Gelderen, Tornikoski, in press), and as such, offers strong validity to the decision to use entrepreneurial intention as a proxy of entrepreneurial potential.

Antecedents of intentions: personal attributes and perceived skills

In order to understand how entrepreneurial intentions are formed –that is, what personal attributes, skills, and other self-perceived mental positions are connected to intention formation– we start by adopting the Theory of Planned Behavior (TPB) developed by Ajzen (1991). We choose TPB because of its detailed and consistent theoretical specification and the great amount of cross-disciplinary research devoted to testing, advancing and criticizing the intention model (Armitage and Conner, 2001; Sheeran, 2002). In addition, the TPB has been regarded particularly appropriate for the evaluation of entrepreneurship related programs (e.g. Fayolle, 2005; Nabi et al., 2010), which is why it has been widely used not only amongst older people (e.g. Tornikoski & Kautonen, 2009), but also amongst younger individuals.

As examples, Krueger (1993) and Krueger, Reilly and Carsrud (2000) looked at the entrepreneurial intentions of US university business students, whereas Fayolle, Gailly and Lassas-Clerc (2005) focused on students in a French elite business school. Kolvereid (1996) investigated the employment status choice intentions of Norwegian undergraduate business students, Tkachev and Kolvereid (1999) studied the entrepreneurial intentions of Russian students and Autio et al. (2001) Scandinavian and US students (see also Devonish et al., 2010). As such, the applicability of the TPB model to the study of the development of entrepreneurial intentions, and therefore entrepreneurial potential, among young people spans multiple contexts.

The idea of the TPB is that intentions have three conceptually independent determinants. These are attitudes towards the behavior, subjective norm and perceived behavioral control (Ajzen, 1991, p. 188). Attitude towards the behavior refers to person's evaluation of the behavior in question; the evaluation can be favorable or unfavorable. The more positive an individual's perception is regarding the outcomes of entrepreneurship (see e.g. Shapero & Sokol, 1982; Autio et al., 1997; Krueger et al., 2000; Segal et al., 2005; Van Gelderen and Jansen, 2006; Pruett et al., 2009) the more favourable their attitude towards that behaviour should be. This in turn should lead to stronger intention to start a business. In our study, we take entrepreneurial attitude as a personal attribute that can be influenced during an educational program.

Subjective norm refers to the perceived social pressure of important referent individuals or groups to perform or not to perform a specific behavior. It is based on beliefs concerning the approval or disapproval of those important others if person establishes a business, and to what extent this approval or disapproval matters to that person (Ajzen, 1991, p. 195). The more the opinion of important

others matters to the individual and the more support the individual thinks he/she would get for enterprising activity, the stronger should be the entrepreneurial intention. In our study, we take subjective norm as a personal attribute that can be influenced during an educational program.

Perceived behavioral control refers to the difficulty or easiness of the given behavior. It is based on beliefs about the required resources and opportunities for performing the behavior (see Bandura et al., 1980; Swan et al., 2007). In general, the higher this perceived behavioural control, the stronger the individual's intention. Perceived behavioural control is most compatible with Bandura's (1982) concept of perceived self-efficacy (Ajzen, 1991). In our study, we take perceived behavioral control as a perception of skills that can be influenced during an educational program.

To predict intentions, these three theoretical antecedents should be sufficient (Ajzen and Fishbein, 2004). However, in any given application, only one or two may be necessary. Hence, the relative importance of the antecedents in TPB-model can vary from one context to another. When using these three antecedents of entrepreneurial intentions to understand whether education impacts entrepreneurial intentions, and hence entrepreneurial potential of an individual, we acknowledge that the results we get are always context dependent.

As a sum, in this study we try to understand the development of entrepreneurial potential using an intention model, which is based on three personal attributes and perceived skills, namely perceived behavioral control, entrepreneurial attitudes, and subjective norm (see Figure 1).

Education in general and intentions

There are several studies related to the impact of education on entrepreneurial intentions (see Lee et al., 2011; Wilson et al., 2007; Sandhu et al., 2011;, Millman et al., 2010; Nabi et al., 2010; Henley, 2005, Franco et al., 2010; Fayolle at al., 2005; Blanchflower and Meyer, 1994; Kristiansen and Indarti, 2004). Other studies suggest that the likelihood of entrepreneurship is reduced by higher education (Henley, 2007; Pihkala, 2008; Wu and Wu, 2008; Nabi et al., 2010), and others show the opposite. For example, education had a positive effect on perceived entrepreneurship feasibility among Spanish university students, which in turn affected entrepreneurial intention and behavior (Lanero et al., 2011). Blanchflower and Meyer (1994) showed that the probability of being self-employed was positively affected by additional years of schooling. However, this impact was found in the USA but not in Australia. Ertuna and Gurel (2011) found that Turkish senior students are more likely to have entrepreneurial intentions than freshmen.

Considerable research effort has also been put to understanding the effects of entrepreneurship education in particular (Matlay and Carey, 2007; Mwasalwiba, 2010). Matlay (2008) shows students with entrepreneurial intent can benefit from entrepreneurship education, but results for more general student populations remain equivocal. Studies show positive impacts of entrepreneurship education on intentions, attitudes and self-efficacy (e.g. Zhao et al., 2005; Souitaris et al., 2007; Jones et al., 2008; Wilson et al., 2009), but also negative impacts have been reported (e.g. Pihkala and Miettinen, 2004; Oosterbek et al., 2010). Packham et al. (2010) found an entrepreneurship course to have positive attitudinal effects for Polish and French students but negative effects for German students, with further differences between genders. Drost and McGuire's (2011) study of Finnish business students finds that entrepreneurship education (measured as students' self-reported learning on specific skills) has a positive impact on entrepreneurial intent, but the effect is mediated by entrepreneurial self-efficacy. In Pihkala's (2008) study entrepreneurial education decreased entrepreneurial self-efficacy, which is related to perceived behavioral control. Hytti et al. (2010) suggest that the effectiveness of entrepreneurship courses may vary depending on the motivation of the students taking part. Fayolle et al. (2005) examined the effect of three day seminar on entrepreneurship among college students. They found a positive impact of this program on perceived behavioral control and subjective norms, but only for students not previously exposed for entrepreneurship in their family context.

In this study we try to understand the development of entrepreneurial potential while an individual is participating in an educational program. Intuitively we join those who question the positive impact of higher educational program on an individual's entrepreneurial potential in general: there are relatively little reasons to believe that an educational program as such would automatically increase the entrepreneurial potential of individuals. A more intriguing question is whether the type of pedagogy used in entrepreneurship courses would have an impact on entrepreneurial potential.

Entrepreneurship pedagogy and intentions

The final piece of our conceptual model of entrepreneurial potential is related to entrepreneurship pedagogy. Although many higher education institutes aim to encourage the development of entrepreneurial behavior of their students, it is not unreasonable to expect that the way we teach entrepreneurship could also have particular effects on the participants and their entrepreneurial potential.

Bennett (2006) distinguishes between skills training approach and attribute development approach in entrepreneurship education. The former is more focused on management skills while the latter emphasizes attitudes, self-determination and innovativeness. Mwasalwiba's (2010) analysis shows that entrepreneurship education is shifting towards emphasis on attitudes; there is a fair level of agreement on that students who will in the future be self-employed need a more action-based approach (see also Gibb, 2002; Gibb, 1996). Previous research suggests that entrepreneurship education should not be promoting passive reception of information, and that enabling students to "learn by doing" is more effective on skills and attitudes (e.g. European Commission, 2012; Henry and Treanor, 2012; Neck and Greene, 2011; Walter et al., 2010; Dana, 1987). Hence, it is tempting to argue that active-based pedagogy in entrepreneurship courses is more likely to influence students' entrepreneurial potential in a positive manner compared to lecture-based pedagogy.

As a result of this discussion, we propose that the way we teach entrepreneurs (entrepreneurship pedagogy) has an impact on the three antecedents of entrepreneurial intentions, namely entrepreneurial attitudes, perceived behavioral control, and subjective norm (see Figure 1). Based on the above conceptual development, the following Figure 1 presents our conceptual model of entrepreneurial potential.

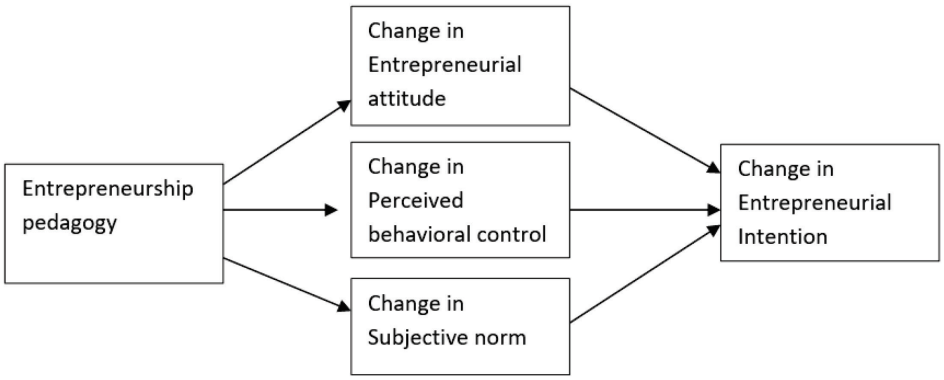


Figure 1. The Conceptual Model of Entrepreneurial Potential.

METHODOLOGY

The empirical context of our study is located in Finland, and more specifically in South Ostrobotnia in the Seinäjoki University of Applied Sciences. The provision

of some level of entrepreneurship education on all levels of schooling has been a stated policy objective in Finland since the 90's (Pihkala, 2008). Higher education institutions have considerably increasing their efforts to promote entrepreneurship in the 21st century. For Seinäjoki University of Applied Sciences entrepreneurship is one of its strategic areas of emphasis.

Instrument and data collection method

The scales for each variable were developed largely based on Kolvereid (1996). However, in some parts of the instrument (for example attitudes), new scales were proposed and tested using national data during 2008-2009. The data for this study was collected using a self-administered questionnaire in fall 2008 and 2010. Paper copies of the questionnaire were administrated to students during their classroom time by teachers.

In autumn 2008, 534 responses from first year students were received (response rate app. 53 percent), and in autumn 2010, 197 responses from the same individuals were received. The follow-up study is based on this data (197 responses from 1st to 3rd study-year). The students were from six different study fields (business, culture, natural resources, social services and health, technology and tourism and catering).

Variables

Entrepreneurial Intentions. An index of entrepreneurial intention was created by averaging eight items (min=1, max=6.1, mean=3.3, Std. Dev.=1.1). The variable demonstrates good reliability (Cronbach's Alpha=0.86). All the variables and their items are presented in Appendix 1.

Subjective Norm. The variable Subjective Norm has three items. Originally each item had a seven-point scale from 1-7. For the statistical analysis the scales were transformed to -3 - +3 scale. In addition, motivation to comply was measured by three items (seven-point scale from 1 to 7) referring to each of the aforementioned belief questions. The belief based items (coded as ranging from -3 to 3) and the corresponding motivation to comply items (coded as ranging from 1 to 7) were multiplied, and then added to create an index of Subjective Norm (min = -43, max =54, mean = -0.5 Std. Dev. = 15.7). The variable demonstrates acceptable reliability (Cronbach's Alpha =0.73).

Perceived Behavioral Control. An index of Perceived Behavioral Control was created by averaging five item scores (min=1.6 max=6.8, mean=4.1, Std. Dev. 1.0). The variable demonstrates acceptable reliability (Cronbach's Alpha=0.71).

Entrepreneurial Attitude. An index of Entrepreneurial Attitude was created by averaging nine item scores (min=2.3 max=7, mean = 5.0, Std. Dv. = 0.8). The variable demonstrates acceptable reliability (Cronbach's Alpha=0.75).

Entrepreneurship Pedagogy. Respondents were asked if they participated in entrepreneurship courses during their studies. This was further categorized in two options: participation in lecturing-based entrepreneurship courses only (lecture-based pedagogy), and participation in both active- based and lecturing-based entrepreneurship courses (active-based pedagogy). Active-based entrepreneurship courses refer, for example, to co-operating with real companies in projects, making a business plan or managing a virtual enterprise. Active-based entrepreneurship pedagogy includes both kinds of courses, as it would have been unlikely that a student would have no lecturing-based courses. Entrepreneurship pedagogy (active-based pedagogy) was included in the analysis as a dummy variable with the value one given to respondents who indicated that they participated both in active- and lecturing- based courses and a value of zero given to respondents participating only in lecturing-based courses.

Control variables

Gender. Since research has shown that women have less desire to start new businesses than men (e.g. Crant, 1996; Kourislky and Walstad, 1998; Wang and Wong, 2004; Wilson et al., 2004; Shay and Terjesen, 2005; Sequeira et al., 2007; Linan and Chen, 2009; cf. Pruett et al., 2009; Kautonen et al., 2010; Yordanova and Tarrazon, 2010; Lee et al., 2011), gender is going to be controlled as part of the statistical analysis.

Analytical methods

The conceptual model of entrepreneurial potential was tested using structural equation modelling. In the statistical analysis, path analysis was conducted using SPSS Amos. Path analysis is an extension of multiple regression. It enables the usage of more complicated models and can examine situations in which there are several dependent variables and those in which there are chains of influence (Steiner, 2005, 115). One must bear in mind that path analysis cannot be used to establish causality; that is done through the design of the study (Steiner, 2005, p. 122).

For the path analysis, we calculated difference scores for each of the main variables of the TPB model (Entrepreneurial intention, Subjective norm, Entrepreneurial attitudes, Perceived behavioral control). Clarke (2004) states that it is common to use the difference score when studying change from 2-wave data. The difference

score is simply the difference between the wave 2 score and the wave 1 score (or vice versa). Clarke (2004) also argues that although objections have been raised about using the difference score to measure change (ceiling and floor effects, regression to the mean, and measurement error), it has been demonstrated that these problems are not inherent and that the difference score is a valid measure of change. We calculated each time a change variable by subtracting the 2010 value from the 2008 value (e.g. Intention2010 minus Intention2008). As such, we investigated whether changes in intentions were the result of changes in attitudes, in subjective norm and in perceived behavioral control.

Common method variance

We tested the possible effects of common method variance for the variables collected using Harman's one factor test (Harman, 1976). If common method variance was a serious problem in the study, we would expect a single factor to emerge from a factor analysis or one general factor to account for most of the covariances in the independent and dependent variables (Podsakoff and Organ, 1986). All the items used to create the main variables, a total of 29 items, were factor analysed using principal axis factoring where the unrotated factor solution was examined, as recommended by Podsakoff, MacKenzie, Lee and Podsakoff (2003, p. 889). Kaiser's criterion for retention of factors was followed. The sample size seemed to be large enough for the factor analysis, at least based on the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = 0.69).

Factor analytic results indicated the existence of eight factors with eigenvalues greater than 1.0. The eight factors explained 71 percent of the variance among the 29 items, and the first factor accounted for 26 percent of the variance. Since several factors, as opposed to one single factor, were identified and since the first factor did not account for the majority of the variance, a substantial amount of common method variance does not appear to be present. Thus, we conclude that common method variance bias is not a threat to the validity of the results. One should bear in mind though that this procedure does nothing to statistically control for the common method effect: it is just a diagnostic technique (Podsakoff et al., 2003, 889). Hence, the possibility of common method issues cannot be fully discarded.

Respondents

The mean age of the respondents was 23 in 2010. 61 percent of the respondents were female. Table 1 describes the earlier experiences of the respondents before their entered their studies.

Background characteristics of the respondents	Total sample
Earlier participation in entrepreneurship courses	22 %
Earlier work experience (more than 6 months)	50 %
Mother's professional background as an entrepreneur	21 %
Father's professional background as an entrepreneur	37 %

Table 1. Earlier experiences of respondents.

When comparing background characteristics within gender, we found that men had more work experience than women. 63 percent of men and 43 percent of women had earlier work experience. The difference was statistically significant. No other differences related to gender and background characteristics were found.

EMPIRICAL RESULTS

Correlations among the variables in the model are presented in Appendix 5. Tolerance and VIF-values were analyzed to see that there was not a threat of multicollinearity between independent variables.

Education in general and entrepreneurial potential

As far as the effects of education on entrepreneurial potential are concerned, our empirical findings could be summarized as follows. First, all the studied variables related to the TPB model either decreased (i.e. Entrepreneurial intentions, Entrepreneurial attitudes, and Subjective norm) or stayed the same (Perceived behavioral control) during the educational program (see Table 2). As such, higher education in general does not seem to increase entrepreneurial potential.

Second, and more interestingly, there was a statistically significant difference between those students who were exposed to lecture-based pedagogy and the students who experienced active-based pedagogy. More particularly, active-based entrepreneurship pedagogy seems to keep the studied variables at the same level during the educational program. Whereas, following lecture-based pedagogy, we witnessed the same decreasing tendency as with the whole population (see Table 2). As such, it seems that active-based entrepreneurship pedagogy conserved entrepreneurial potential, whereas lecture-based pedagogy decreased entrepreneurial potential in the studied sample.

Variable	Entrepreneurial intentions	Subjective norm*	Entrepreneurial attitudes	Perceived behavioral control
Total sample (n=197)				
1st year	3.3 (1.09)	-0.53 (15.65)	5.0 (0.77)	4.1 (0.96)
3rd year	3.2 (1.09)	-3.3 (15.75)	4.9 (0.82)	4.1 (0.99)
Sig.	**	*	*	-
Active-based pedagogy (n=43)				
1st year	3.6 (1.06)	0.3 (19.98)	5.1 (0.71)	4.3 (1.00)
3rd year	3.4 (1.06)	-3.0 (17.53)	5.1 (0.73)	4.3 (1.12)
Sig.	-	-	-	-
Lecture-based pedagogy (n=23)				
1st year	3.5 (1.10)	-3.1 (14.15)	5.2 (0.67)	4.2 (1.19)
3rd year	3.0 (0.97)	-6.9 (17.06)	4.7 (0.67)	4.0 (0.93)
Sig.	***	*	**	-

+ p< .10. * p< .05. ** p< .01. *** p<.001

Table 2. Changes in Entrepreneurial attitudes, Subjective norm, Perceived behavioral control, and Entrepreneurial intentions during educational program.

We observed some gender related differences. Among female students, intentions and attitudes decreased statistically significantly in comparison to male students. Among male students, intentions and attitudes remained the same but subjective norm decreased. In addition, when we used the earlier experiences of the respondents (listed in the Table 1) in the role of control variables, we failed to observe any differences across the different experiences. Finally, an interesting, and statistically significant, observation relates to the fathers' and mothers' background as entrepreneurs: these two variables affected the initial level of intentions (level of intention when entering the first year), but did not contribute to the development of entrepreneurial intentions over time. That is, those who had either a mother or father as an entrepreneur had higher initial level of entrepreneurial intentions. And yet, those two background characteristics did not impact the development of entrepreneurial intentions during an educational program.

As an ad-hoc analysis, we were interested in discovering patterns inside the student population (see Table 3 for results). For example, we identified 46 students with a high initial level of intention. The level of intentions of these students fell significantly (p=0.000) during the educational program. Respondents with a low initial level of intention (151 students), on the contrary, did not experience a significant change during the educational program. These results are similar to Fayolle et al.'s (2005) findings. Furthermore, as can be seen from the Table 3, there

are 71 respondents who experienced a positive change in intentions during the educational program. These students had a relative low initial level of intention (mean 2.9), which then rose to a significantly to a relatively neutral level (mean 3.7 in 1-7 scale) during the educational program. The profiles of these groups can be found in Appendix 4.

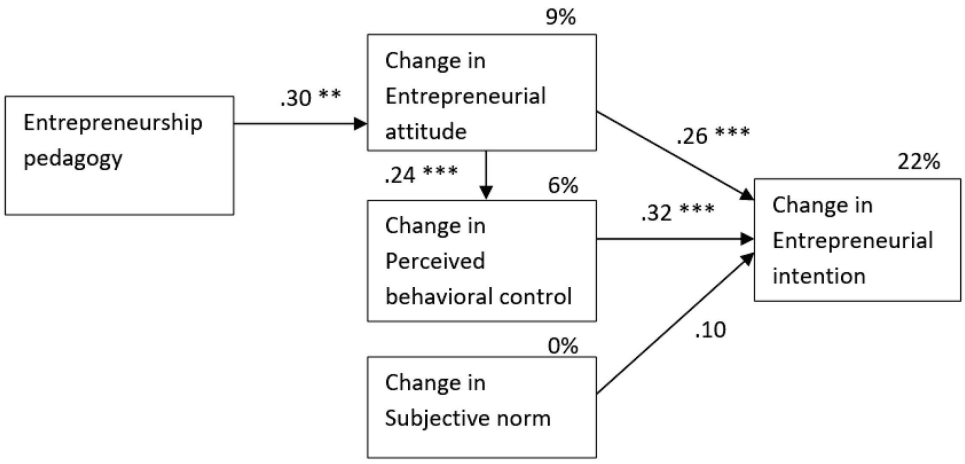
Entrepreneurial intention	1st year (mean, sd.)	3rd year (mean, sd.)	sig. (t-test)
Respondents with a high initial level of intention (n=46)	4.8 (0.57)	4.2 (1.03)	***
Respondents with a low initial level of intention (n=151)	2.8 (0.71)	2.8 (0.90)	-
Respondents with a positive change in intention (n=71)	2.9 (1.00)	3.7 (1.11)	***
Respondents with a negative change in intention (n=126)	3.5 (1.07)	2.9 (0.97)	***

Table 3. Changes in Entrepreneurial attitudes, Subjective norm, Perceived behavioral control, and Entrepreneurial intentions during the educational program for different sub-groups of students.

Antecedents of intentions: personal attributes and perceived skills

As discussed earlier, the conceptual model of entrepreneurial potential was tested using structural equation modelling. Although RMSEA (0.063) and CMIN/DF (1.771) values were acceptable, other fit measures indicated an inadequate fit (NFI = 0.897; CFI = 0.94). After some explorations, we discovered, for example, that the Change in Entrepreneurial attitudes fully mediated the effect of Entrepreneurship pedagogy to the Change in PBC and to the Change in Entrepreneurial intentions.

As a result of our exploration efforts, the Figure 2 presents the final empirical model of Entrepreneurial Potential. For this empirical model, all the fit measures are good (CFI = 1.00; NFI = 0.99; RMSEA = 0.000; CMIN/DF = 0.178). In addition, the squared multiple correlation of a variable is the proportion of its variance that is accounted for by its predictors (Arbuckle, 2007). As can be seen from the Figure 2, the empirical model of Entrepreneurial Potential explains 22% of the variance in the intention development.



Notes: chi-square=0.890, df=5, p=0.971, CMIN/DF=0.178, CFI=1.000, NFI=0.987, RMSEA=0.000
+ p< .10. * p< .05. ** p< .01. *** p<.001

Figure 2. The Empirical Model of Entrepreneurial Potential.

The Table 6 shows the regression estimates between the Change in Entrepreneurial intentions and its determinants and p-values for significance.

			Estimate	S.E.	C.R.	P	Standardized Regression Weights
ATTchange	<---	Ent.pedagogy.	,426	,158	2,685	,007	,299
PBCchange	<---	ATTchange	,297	,086	3,471	***	,241
EIchange	<---	ATTchange	,337	,085	3,979	***	,259
EIchange	<---	PBCchange	,343	,069	4,992	***	,324
EIchange	<---	SNchange	,006	,003	1,632	,103	,103

Table 6. Estimates and Standardized Regression Weights of the Empirical Model of Entrepreneurial Potential.

As can be seen from the Table 6, Change in Entrepreneurial attitude had a significant and positive impact on the Change in Entrepreneurial intention ($p<0.001$). Also, Change in Perceived behavioural control has a significant and positive impact on the Change in Entrepreneurial intention ($p<0.001$). The relationship between Change in Subjective norm and Change in Entrepreneurial intention was not significant. Furthermore, Entrepreneurship pedagogy had a significant and positive impact on the Change in Entrepreneurial attitude ($p<0.01$). The Change in Entrepreneurial attitude has also a positive impact on the Change in Perceived behavioral control ($p<0.001$).

In addition, we observed interesting gender differences when running the above analysis for both groups (see the Appendixes 6 and 7 for results). First, among women, Entrepreneurship pedagogy does not have any significant effects on any

of the studied variables. Among men, however, this effect exits. Second, the Change in Entrepreneurial attitudes has no effect on the Change in Perceived behavioral control among women. Again, among men this effect exists. Third, among women, the empirical model of entrepreneurial potential explains 19% of the variance, whereas among men the model explains 28%.

DISCUSSION AND CONCLUSIONS

The overall purpose of our study was to increase our understanding about the usefulness of enterprise education in general, on the one hand, and different kinds of pedagogical approaches, on the other hand, on the development of entrepreneurial potential among higher education students. Using an interesting sample from one Finnish University, where we followed the development of entrepreneurial potential at the individual level during three years, we were able to find evidence to conclude that higher education in general seems to have a negative impact on the development of entrepreneurial potential of individuals. However, our results demonstrate that those individuals who take part in active-based entrepreneurship courses do not seem to decrease their entrepreneurial potential, as do their colleagues who participate in lecture-based entrepreneurship courses only.

The more specific objective of our study is to investigate the impact of different pedagogical approaches on the development of personal attributes and perceived skills related to entrepreneurship, and to investigate whether this development leads to increased entrepreneurial potential among higher education students. Based on our empirical evidence, entrepreneurship pedagogy seems to matter in the development of entrepreneurial potential. Indeed, it seems that active-based courses are well adapted for entrepreneurship education. In addition, entrepreneurial potential is best increased when educational programs target the improvement of entrepreneurial attitudes of the participants and their perceived skills in carrying out entrepreneurial activities.

While Walter, Parboteeah and Walter (2010) found out that active-based modes of entrepreneurship education have a stronger effect on entrepreneurial intention than reflective modes, in our study we found similar evidence but for active-based entrepreneurship pedagogy (i.e. a mix of project-based learning and traditional lectures). More specifically, our observations point out that active-based entrepreneurship pedagogy seems to influence attitudes, and therefore, instead of a direct effect, to have only indirect effect on the development of entrepreneurial intentions. This observation is in line with the study of Packham, Jones, Miller, Pickernell and Brychan (2010), who found earlier that enterprise education has a positive impact on entrepreneurial attitude. The impact of active-based pedagogies

on attitudes is a particularly positive signal for those struggling to develop and maintain an active approach to teaching entrepreneurship. Active methods such as project-based learning frequently require more resources than traditional lecturing-based courses; it would be difficult to justify the effort if active-based methods had no discernible effect.

It is also interesting to note that the only direct effect that active-based entrepreneurial courses had was on attitudes, and not on perceived behavioural control. The active-based entrepreneurial courses had only indirect effect on perceived behavioural control through the mediating role of attitudes. Similar mediating role for attitudes was also observed by Zampetakis, Kafetsios, Bouranta, Dewett and Moustakis (2009). In their study, attitudes towards entrepreneurship fully mediated the effects of creativity and proactivity on entrepreneurial intent.

In addition to the above main findings, other interesting observations are worth commenting. First, closer analysis indicated that entrepreneurial intentions decreased among students with high initial level of entrepreneurial intentions and increased among a group of those with low initial level of entrepreneurial intentions. This is curious because it seems to indicate that higher education programs have a tendency to equalize the level entrepreneurial intentions of young people over time, regardless of the starting point of each individual, as if there was some kind of an equilibrium point towards which entrepreneurial intentions gear over time in higher education programs.

Second, those who arrive to higher education programs with high entrepreneurial potential end up lowering their potential (see also Fayolle et al., 2005). This observation seems not to be very promising from the point of view of formation of entrepreneurial potential in higher education. Indeed, our results suggest that individuals at the beginning of their educational program seem to show a greater self-confidence in starting businesses than they do at the end of their educational program. However, it isn't untypical for people to overrate their intention to perform a distant action. Hence, an individual, at the time of starting his/her educational program, may overrate his intent to start a business after graduation, whereas at the time of graduation and closer to the actual event, the student is more definite about his intentions. Indeed, our observations could suggest that the entrepreneurial potential of these individuals becomes more realistic over time: younger people understand better their career options, their own competencies, and requirements of starting their own businesses as a result of going through an educational program. And vice versa for some young people, who start their educational program with lower level of entrepreneurial potential: they discover entrepreneurship as one potential option in the future, and therefore their level of

entrepreneurial potential goes up over time during the educational program. Unfortunately, the arrival level of intentions remained at relatively low level for young people whose intentions were developed from low to significantly higher level over time. That is, even for those young people, whose initially low level of intentions were developed to significantly higher level, the arrival level did not indicate strong intentions to start one's own business. This observation could suggest that strategic emphasis on entrepreneurship in the studied university still has work to do before it succeeds to develop entrepreneurial potential among its students.

So, what does increase entrepreneurial potential in individuals? Our empirical observations suggest that changes in attitudes and perceived behavioural control, but not in subjective norm, had a significant and positive impact on the development of entrepreneurial intentions, and therefore on entrepreneurial potential. Hence, we find our results in contradiction to e.g. those of Engle and his colleagues (2010) who, based on their multicountry study, argue that antecedents vary from one country context to another, but that subjective norm is consistently a contributor to entrepreneurial intentions. Based on our observations we can join Boissin et al. (2009) in questioning the influence of subjective norm in the TPB model; the explanatory power of subjective norm cannot be confirmed by our data. However, it is encouraging to note that attitudes and perceived behavioral control – both factors at least theoretically within the scope of influence of higher education programs – contribute to change in entrepreneurial potential. This signifies that in order to increase the entrepreneurial potential, we should focus on improving the knowledge base of young people (to change their attitudes) and put the young people into pedagogical situations where they can develop their skills and competencies in entrepreneurship related tasks (to improve their perceived behavior control).

Finally, the development of entrepreneurial potential among young women and men seems to be driven by different mechanisms, at least according to our observations. Our empirical model of entrepreneurial potential explained 28 % of the variance among male students, and only 19 % among female students. While men seem to follow the general model discussed above, women seem to demonstrate some independence vis-à-vis active-based pedagogy since it does not seem to cause any changes in their entrepreneurial attitudes. Also, changes in the women's entrepreneurial attitudes do not have any impact on changes in the perceived behavioral control. Therefore, those who plan and design entrepreneurship related initiatives to support the development of entrepreneurial potential should bear in mind that women and men do not seem to react in uniform fashion vis-à-vis these initiatives. One possibility is that women are more at home

with lecturing-based pedagogy than men; the growing proportion of women in tertiary education may indicate this. In the EU on average, 124 women were enrolled in tertiary education for every 100 men in 2009 (Eurostat 2012). If entrepreneurial attitudes and skills are best learned in active-based settings, this may favour impacts on men rather than women from entrepreneurship education. Earlier studies have also found differences in learning style between men and women (Gallos, 1993). For example, Kaenzig et al. (2007) called into question the effectiveness and value of group work especially for women students, because women were not happy with their group work in business classes. Usually active-based entrepreneurial courses will be implemented as a group work. Some entrepreneurship studies have also found the different effects of women and men. Also and Isaksen (2012), for instance, found that among Norwegian female pupils at upper secondary school youth enterprise experience had an indirect positive effect on entrepreneurial intentions through its effect on subjective norm and perceived behavioral control. A recent European Commission (2012) study on alumni of entrepreneurship programs found that female alumni score lower on entrepreneurial self-efficacy than their male counterparts, but higher than the control group. Wilson et al. (2007) found that effects of entrepreneurship education in MBA programs on entrepreneurial self-efficacy proved stronger for women than for men. Kickul et al.'s study (2008) also indicated that self-efficacy seemed to have a stronger effect on entrepreneurial interest for girls than for boys. Yordanova and Tarrazon (2010) found that gender effect on entrepreneurial intentions is fully mediated by perceived behavioral control and partially mediated by perceived subjective norms and attitudes. To conclude, a more individualized approach, allowing for the differences in preferences might benefit women. Also, an effort should be made to discover whether there are differences within active-based methodologies; if group work doesn't work well for female students, other active-based methods might be beneficially employed.

In the study at hand, however, it should be acknowledged that the observed difference in impact of active-based pedagogy may relate to work experience as well as gender. The men in the sample had more work experience. The greater practical experience could arguably enable them to better benefit from active-based pedagogy.

Limitations and future studies

While we believe that the results presented herein add to our understanding of the role of entrepreneurship education play in the development of entrepreneurial potential in higher education contexts, we acknowledge that the present research is not entirely beyond reproach. From a theoretical standpoint, we limited our

efforts to investigate the effect of entrepreneurial education on the development of entrepreneurial potential. We do acknowledge that the entrepreneurial potential among young people can be fostered also through other means, such as traineeships and work experience is start-ups and small firms. We encourage future scholarly efforts to investigate those other means and their role in fostering entrepreneurial potential among young people. At the same time, we limited our focus on one intention model when other possible approaches could have been available to study the development of entrepreneurial potential. Again, future scholarly work could complement our results by investigating the same phenomenon through other theoretical lenses. Moreover, an interesting extension of our study would be to investigate whether entrepreneurial pedagogy and the development of personal attributes and skills have effects on individual's actual entrepreneurial behaviour. As such, future scholarly work could investigate the linkage between entrepreneurial potential and actual start-up behaviour and to what extent entrepreneurial pedagogy influences this process.

From an empirical standpoint, our sample was limited to only one university in a country, which has more than 40 universities. Increasing our knowledge of the potential effects of the general environmental and cultural contexts on the formation of entrepreneurial intentions requires further research using versatile samples comprising university students in other regions.

Longitudinal designs are quite demanding. The loss of data is problematic also in our study (534 respondents on 2008, 197 respondents (same individuals) on 2010). The missing data can bias conclusions drawn from the study and the obvious disadvantage in the loss of information resulting from the reduced sample size.

Notwithstanding these limitations, we believe that our findings add to the body of literature on how to develop entrepreneurial potential among young people. We believe that our findings add to what we, as a scholarly community, know about the development of entrepreneurial potential among younger individuals, and hope that both academics and practitioners may benefit from them. The pedagogical aspect of entrepreneurship related education is a particularly important for the development of entrepreneurial potential, yet it has been largely ignored in the entrepreneurship literature. By investigating the impact of different pedagogical approaches on the development of personal attributes and perceived skills related to entrepreneurship, our study is among the first ones to provide empirical evidence about their influence on the development of entrepreneurial potential. Ultimately, we hope to have added richness to the ongoing discussion

among academics and practitioners alike regarding the importance of the development of entrepreneurial potential among younger people.

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Appendix 1. Variables and their items.

Variable (all measured on a 7-point Likert scale; translated from Finnish)

Entrepreneurial intention (Cronbach's Alpha = 0.86)

How likely are you to start your own business and work as an entrepreneur after graduation (or while still studying)?

If you were supposed to choose between entrepreneurship and salaried work after graduation, which one would you choose?

How strong is your intention to embark on entrepreneurship at some point of your professional career?

How likely are you to embark on entrepreneurship after you have gathered a sufficient amount of work experience?

If you were supposed to choose between entrepreneurship and unemployment after graduation, which one would you choose?

Subjective norm (Cronbach's Alpha = 0.73)*

I believe that my closest family members think I should not/should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your closest family members think if you strive to start your own business and to work as an entrepreneur after graduation?

I believe that my best friends think I should not / should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your best friends think if you strive to start your own business and to work as an entrepreneur after graduation?

I believe that my significant others think I should not / should strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your significant others think if you strive to start your own business and to work as an entrepreneur after graduation?

Perceived behavioural control (Cronbach's Alpha = 0.71)

If I established a business and started to work as an entrepreneur after graduation, my chance of success would be (good / bad)

If I really wanted to, I could easily start a business and work as an entrepreneur after graduation

There are very few / numerous things that are beyond my own control but could prevent me from starting my own business and working as an entrepreneur after graduation.

For me, starting my own business and working as an entrepreneur after graduation (very easy / very difficult)

If I established my own business and started to work as an entrepreneur after graduation, my risk of failure would be (very small / very big)

Attitudes towards entrepreneurship (Cronbach's Alpha = 0.75)

To what extent do the following attributes correspond to your perceptions of entrepreneurship (i.e. establishing a business and working as an entrepreneur)? (not at all - completely)

Interesting
Esteemed
Worth pursuing
Boring
Fascinating
Despised
Good income level

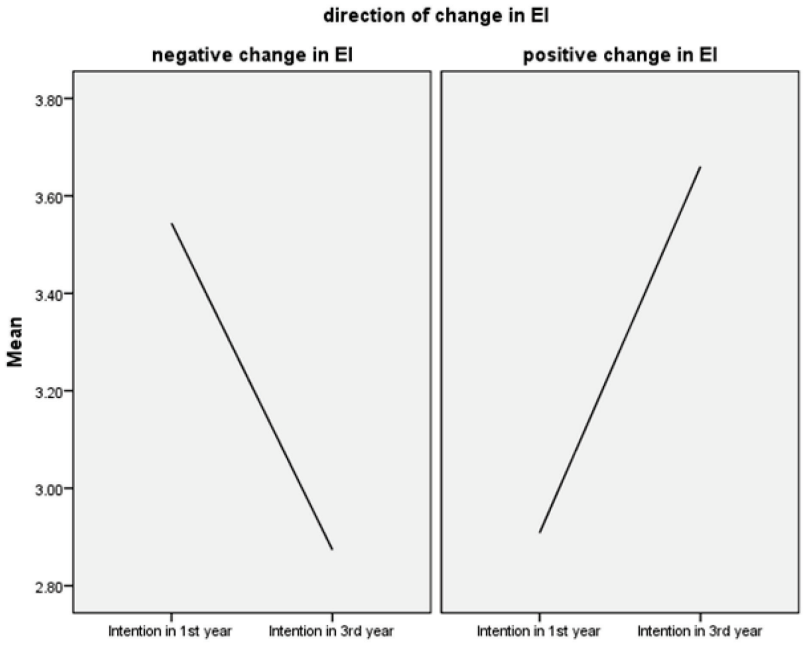
* For the statistical analysis the scales were transformed to -3 - +3 scale. In addition, motivation to comply was measured by three items (seven-point scale from 1 to 7) referring to each of the aforementioned belief questions. The belief based items (coded as ranging from -3 to 3) and the corresponding motivation to comply items (coded as ranging from 1 to 7) were multiplied, and then added to create an index of Subjective Norm.

Appendix 2. Correlations between the main variables.

		Entrepreneurial intentions	Subjective norm	Entrepreneurial attitudes	Perceived behavioral control
Correlations among the scales (2008 data)					
Entrepreneurial intentions	Pearson correlation	1			
	Sig. (2-tailed)				
	n	197			
Subjective norm	Pearson correlation	0.214**	1		
	Sig. (2-tailed)	0.003			
	n	197	197		
Entrepreneurial attitudes	Pearson Correlation	0.502**	0.100	1	
	Sig. (2-tailed)	0.000	0.163		
	n	197	197	197	
Perceived behavioral control	Pearson correlation	0.545**	−0.056	0.475**	1
	Sig. (2-tailed)	0.000	0.433	0.000	
	n	197	197	197	197
Correlations among the scales (2010 data)					
Entrepreneurial intentions	Pearson correlation	1			
	Sig. (2-tailed)				
	n	197			
Subjective norm	Pearson correlation	0.175*	1		
	Sig. (2-tailed)	0.014			
	n	197	197		
Entrepreneurial attitudes	Pearson correlation	0.455**	0.059	1	
	Sig. (2-tailed)	0.000	0.412		
	n	196	196	196	
Perceived behavioral control	Pearson correlation	0.503**	−0.033	0.414**	1
	Sig. (2-tailed)	0.000	0.648	0.000	
	n	197	197	196	197

Notes: *,**Correlation is significant at 0.05 and 0.01 levels, respectively (two-tailed)

Appendix 3. Intention development for different groups of young people.



Appendix 4. The profiles of different groups of young people with intention development.

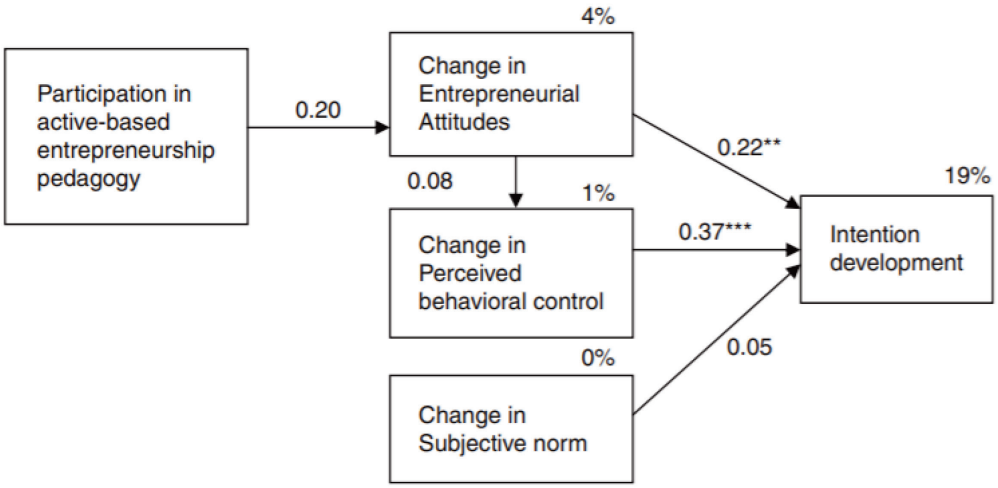
	Group 1: low initial level of intention (%)	Group 2: high initial level of intention (%)	Group 3: negative change in intention (%)	Group 4: positive change in intention (%)
Earlier participation in entrepreneurship courses	23	20	18	31
Earlier work experience (more than 6 months)	50	50	47	55
Mother's professional background as an entrepreneur	17	35	16	31
Father's professional background as an entrepreneur	31	57	34	41
Male	35	52	37	42

Appendix 5. Correlations between the main change variables.

		EI change	ATT change	PBC change	SN change	Active-based entrep. pedagogy
EI change	Pearson correlation	1				
	Sig. (2-tailed)					
ATT change	Pearson correlation	0.339**	1			
	Sig. (2-tailed)	0.000				
PBC change	Pearson correlation	0.388**	0.242**	1		
	Sig. (2-tailed)	0.000	0.001			
SN change	Pearson correlation	0.111	0.015	0.015	1	
	Sig. (2-tailed)	0.119	0.830	0.832		
Active-based entrep. pedagogy	Pearson correlation	0.161	0.305*	0.154	0.010	1
	Sig. (2-tailed)	0.197	0.013	0.216	0.934	

Notes: *,**Correlation is significant at 0.05 and 0.01 levels, respectively (two-tailed)

Appendix 6. The empirical Intention Development model for female students.

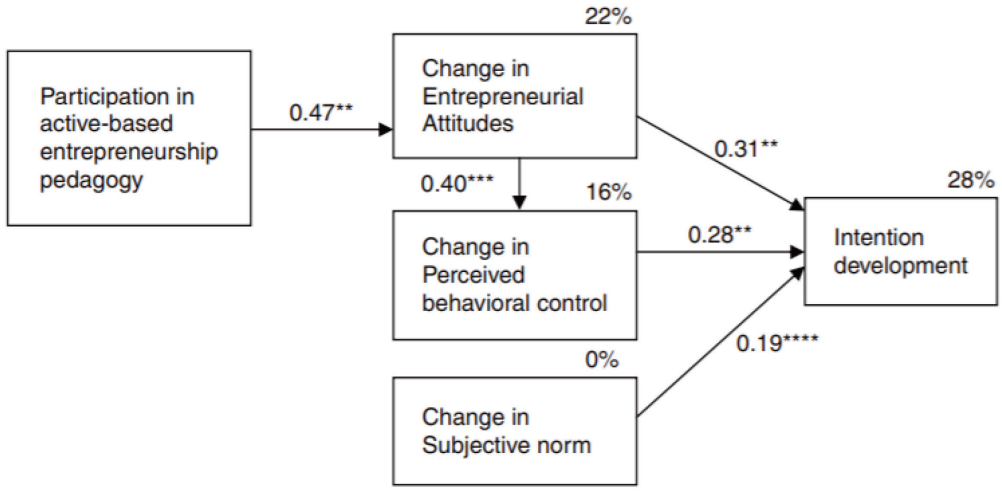


Notes: $\chi^2 = 1.717$, df = 5, $p = 0.887$, CMIN/DF = 0.343, CFI = 1.000, NFI = 0.944, RMSEA = 0.000, $^{**}p < 0.01$; $^{***}p < 0.001$

	Estimate	SE	CR	*p*	Standardized regression weights
ATT change←Ent. pedagogy	0.236	0.179	1,317	0.188	0.200
PBC change←ATT change	0.109	0.133	0.819	0.413	0.075
EI change←ATT change	0.330	0.126	2,619	0.009	0.216
EI change←PBC change	0.385	0.087	4,430	***	0.365
EI change←SN change	0.003	0.004	0.667	0.505	0.055

Note: $^{***}p < 0.001$

Appendix 7. The empirical Intention Development model for male students.



Notes: $\chi^2 = 3.363$, df = 5, $p = 0.644$, CMIN/DF = 0.673, CFI = 1.000, NFI = 0.928, RMSEA = 0.000, **$p < 0.01$; ***$p < 0.001$; ****$p < 0.10$

	Correlations				
	Estimate	SE	CR	*p*	Standardized regression weights
ATT change←Ent. pedagogy	0.803	0.259	3,102	0.002	0.474
PBC change←ATT change	0.422	0.111	3,784	***	0.400
EI change←ATT change	0.352	0.120	2,942	0.003	0.314
EI change←PBC change	0.294	0.113	2,604	0.009	0.277
EI change←SN change	0.013	0.007	1,953	0.051	0.190

Note: ***$p < 0.001$

Article 4

A LONG-TERM EFFECT OF ENTREPRENEURIAL EDUCATION ON ENTREPRENEURIAL INTENTIONS: RESULTS FROM FINNISH HIGHER EDUCATION STUDENTS

Sanna Joensuu-Salo

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Abstract

The economic growth of Finland and the well-being of Finnish society is heavily based on entrepreneurship. Hence, it is important to foster entrepreneurial intentions among students in higher education. Entrepreneurial intentions have been extensively studied in entrepreneurship research for the past 20 years, and most research applies Ajzen's (1991) Theory of Planned Behavior (TPB) in the context of entrepreneurial intentions. However, there remains a demand for research: studies employing the full TPB model are rare and that the biggest research gap lies in longitudinal settings. This paper contributes to entrepreneurial intention research by examining the TPB model in a longitudinal follow-up of the same individuals from a point during their university studies to between one and four years after graduation. In addition, the impact of entrepreneurial education on entrepreneurial intentions requires more research and longitudinal settings. This paper contributes to this research by examining the long-term effect of entrepreneurial education on entrepreneurial intentions as illustrated by Finnish students in higher education. The objectives of the paper are as follows: 1) to examine the long-term effect of attitudes, perceived behavioral control and the subjective norm on entrepreneurial intentions, and 2) to examine the long-term effect of entrepreneurial education on entrepreneurial intentions after graduation. The data for this research were gathered from Finnish students in higher education over the period 2008–2013. The results suggest that attitudes to an entrepreneurial career have explanatory power that is retained with time. Attitudes measured during the period of higher education explained entrepreneurial intentions even two to four years after graduation. Interestingly the results show that entrepreneurial education has a long-term effect on entrepreneurial intentions among Finnish students in higher education.

Keywords: Entrepreneurial intentions, higher education, entrepreneurial education, Finnish students

Introduction

In Finland, entrepreneurship is one of the cornerstones of society. Official Statistics of Finland (2016) reports 357,000 enterprises operating in Finland. The vast majority of those enterprises (98 percent) are small and employ fewer than ten people, and unsurprisingly in Finland, small and medium-sized enterprises (SMEs) create the majority of new jobs, which in the period 2001–2016 meant new jobs for 119 000 people. Economic growth and the well-being of society is evidently heavily based on entrepreneurship; and therefore it is important to encourage entrepreneurship within Finnish society.

Every year, the Global Entrepreneurship Monitor (GEM) research stream collects the views of experts on national circumstances and changes in entrepreneurship. Compared to other EU countries, Finland continues to be a competitive and business-friendly economy, despite the weak global economic situation (Suomalainen et al. 2016). National experts evaluate entrepreneurship policy and regulation, primary and secondary education, cultural and social standards, the physical, financial, and legal infrastructure, and market transparency and its dynamism available to support entrepreneurship at least at the same level as the EU average. However, technology transfer, finance, and higher education are not counted among the sectors clearly supporting entrepreneurship. The GEM results suggest it is important to develop entrepreneurship education within higher education. This challenge has been acknowledged by *Arene* (the council of rectors in Finnish Universities of Applied Sciences), which instructed Applied Universities on how to deliver entrepreneurship education (Arene 2015). Arene suggests that entrepreneurship should be embedded in the strategy of universities. In addition, the Ministry of Education and Culture in Finland published guidelines for entrepreneurship education addressing all educational levels (Opetus- ja kulttuuriministeriö 2017). The guidelines are intended to identify, develop, and guide measures to promote entrepreneurship and entrepreneurship education at various levels of education. The guidelines work as a tool for evaluating and developing activities for school management, staff, and other entrepreneurship educators, and provide tips and planning support for practical work. It is especially important to track students with a high level of entrepreneurial intention and support their path to becoming an entrepreneur.

Entrepreneurial intentions have been extensively studied in entrepreneurship research for the past 20 years (Kolvereid 1996; Krueger and Carsrud 1993; Fayolle and Liñán 2013; Kautonen, van Gelderen, and Fink 2015). In this study, entrepreneurial intentions refer to the commitment to starting a new business (Krueger and Carsrud 1993) after a student graduates. In general, the previous

research has been largely based on Ajzen's (1991) Theory of Planned Behavior (TPB), and has addressed entrepreneurial intention in different contexts. At the core of the TPB is the idea that intentions have three conceptually independent determinants, namely attitude toward the behavior, the subjective norm, and perceived behavioral control (Ajzen 1991). Maalaoui et al. (2018) propose three major types of entrepreneurial intention research; the first being studies exploring the antecedents of intention; the second is an attempt to explain how an entrepreneurial intention can be put into action, and the last type of research seeks to extend the TPB by adding dimensions to the original formula. In recent years, studies of implementation intention in the context of entrepreneurial intention and behavior have been published (e.g., Schjoedt 2018). Other new research agendas in the context of entrepreneurial intention include a culture's mode of influence (Liñán and Jaén 2018) and collective intentions (Brännback, Carsrud, and Krueger 2018). Nevertheless, further research is still required and Schlaegel and Koenig (2014) showed by way of a meta-analysis that studies employing the full TPB model are rare, and only in recent years have published studies examined the intention-behavior link using large samples (Kautonen, van Gelderen, and Fink 2015). Clearly, the biggest research gap has been in longitudinal settings (e.g., Matlay and Carey 2007; Liñán and Fayolle 2015). This paper contributes to entrepreneurial intention research by examining the TPB model in a longitudinal monitoring of individuals from the period when they were in full-time education to between one and four years after they graduated. Accordingly, this study provides unique information about entrepreneurial intention and the TPB model in a longitudinal setting involving Finnish students in higher education.

Prior research demonstrates that entrepreneurial education can have a positive effect on entrepreneurial intentions, entrepreneurial attitudes, and self-efficacy (e.g., Zhao, Seibert, and Hills 2005; Jones et al. 2008; Wilson et al. 2009; Bae et al. 2014), but results are not consistent with other studies finding evidence of a negative impact (e.g., Oosterbeek, van Praag, and Ijsselstein 2010). Culture, gender, self-efficacy, initial level of intentions, or motivation may have a role in the impact of entrepreneurial education on entrepreneurial intentions (Packham et al. 2010; Drost and McGuire 2011; Hytti et al. 2010; Fayolle and Gailly 2013). The impact of entrepreneurial education requires more research and longitudinal settings.

The objectives of the paper are to examine: 1) the delayed effects of entrepreneurship education on entrepreneurial intentions, and 2) the explanatory power of the TPB in a longitudinal setting. In particular, this paper examines how taking entrepreneurship courses affects the entrepreneurial intentions of students in higher education after graduation; and how attitudes, subjective norms, and

perceived behavioral control, as measured during the period of study, explain the variance in entrepreneurial intentions measured after graduation. This paper contributes to this research by examining the long-term effect of entrepreneurial education on entrepreneurial intentions in the context of Finnish higher education students. In addition to contributing to the entrepreneurial intention research, the paper offers guidance to policy makers.

Theoretical framework and propositions

Entrepreneurial intention

Prior research offers several definitions of entrepreneurial intention. Those definitions include that of Krueger, Reilly, and Carsrud (2000, 420) defining intention as "the target behaviors of starting a business." In addition, Crant (1996, 43) defines entrepreneurial intentions as "one's judgements about the likelihood of owning one's own business." Other definitional aspects include the view of entrepreneurship as a process (Gartner, Shaver and Katz 1994; Liñán and Chen 2009) and entrepreneurial intentions as the first step in that process (Lee and Wong 2004). Research suggests that entrepreneurial intention predicts entrepreneurial behavior (Biraglia and Kadile 2017) which indicates the subject will have strong levels of attention to detail, experience with business ideas or concepts, and be capable of action (Bird 1989; Wurthmann 2014). Lortie and Castogiovanni (2015) summarize intention as the state of mind that drives an individual to begin a business, and suggest it is an antecedent of entrepreneurial behavior.

Theory of planned behavior (TPB)

A majority of the intention studies are based on the TPB by Ajzen (1991). The history of the TPB model lies in the psychology of intention (Ajzen and Fishbein 1969), and the TPB suggests that intention is influenced by attitudes, social norms, and perceived behavior control, and that intention is an antecedent of behavior (action) (Ajzen 1991, 188). Accordingly, the stronger the intention to engage in specific behavior, the more likely its actual performance should be. The TPB model has been widely used in entrepreneurship research and tested in different contexts (Armitage and Conner 2001; Sheeran 2002; Krueger and Carsrud 1993; Krueger, Reilly, and Carsrud 2000; Barbosa, Fayolle, and Lassas-Clerc 2006). Maalaoui et al. (2018) conclude that applying the TPB in the field of entrepreneurship is logical. The various antecedents of intention are discussed below.

Attitude to the behavior refers to the extent to which a person evaluates a given behavior positively or unfavorably. The more positive an individual's perception of the outcome of given behavior, i.e. starting a business is (see e.g., Krueger, Reilly, and Carsrud 2000; Segal, Borgia, and Schoenfeld 2005; van Gelderen and Jansen 2006; Pruett et al. 2009), the more favorable the attitude would be toward the behavior. Consequently, positive attitude will lead to stronger intention to start a business. The *subjective norm* refers to the individual's perception of social pressure to perform or not to perform a behavior, which in this context is starting a business. Subjective norms are based on beliefs of whether important referent individuals or groups approve or disapprove of an individual establishing a business, and to what extent that approval or disapproval matters to the individual (Ajzen 1991, 195). *Perceived behavioral control* refers to the individual's perception of the ease or difficulty of performing a given behavior. It is based on beliefs about the existence or lack of necessary resources and the ability to perform a particular behavior (see Bandura et al. 1980; Swan, Chang-Schneider, and McClarity 2007). According to Ajzen (1991), the concept of perceived behavioral control is close to Bandura et al.'s (1980) concept of perceived self-efficacy. In entrepreneurial intention literature, perceived behavioral control and entrepreneurial self-efficacy have been used almost interchangeably (Schlaegel and Koenig 2014).

In most studies, the best predictor of intentions has been perceived behavioral control (Kristiansen and Indarti 2004; Liñán 2004; Segal, Borgia, and Schoenfeld 2005; Wilson, Kickul, and Marlino 2007; Prodan and Drnovsek 2010; Chen and He 2011; Drost and McGuire 2011; Paco et al. 2011; Lee et al. 2011). The second-most common predictor has been attitudes (Zampetakis et al. 2009; Moi, Adeline, and Dyana 2011), and that is followed by the subjective norm (Aizzat, Hazlina, and Chew 2009; Lope Pihie and Hassan 2009; Engle et al. 2010; Siu and Lo 2013). Kautonen, van Gelderen, and Fink (2015) found that attitude, the subjective norm, and perceived behavioral control jointly explain 59 percent of the variation in intention. In Schlaegel and Koenig's (2014) meta-analysis, perceived behavioral control had a significantly larger effect size that either attitude or subjective norms.

However, there are no studies that test the TPB model in a longitudinal setting where attitudes, the subjective norms, and perceived behavioral control explain intentions in the long term, because these variables are normally measured cross-sectionally. The current research tests the durability of these antecedents, and accordingly the following question is presented:

Question 1: Do attitudes, perceived behavioral control, and the subjective norm measured during higher education studies explain entrepreneurial intentions over time?

Entrepreneurship education

There has been a debate over whether entrepreneurship can be taught. According to previous research, entrepreneurial skills or certain facets of entrepreneurship can be learned in the context of entrepreneurial behavior, or at least "fostered, facilitated and nurtured" (Bird 1995; Mayhew et al. 2012; Kuratko 2005). Jones and Iredale (2010) distinguish between enterprise education with a focus on personal attributes and skills that can be used in a variety of contexts and entrepreneurship education with a focus on starting and running a business. The effects of entrepreneurship education have been studied by, for example, Matlay and Carey (2007), Mwasalwiba (2010), Støren (2014), and Zhang, Duysters, and Cloodt (2014), but the results in this research stream have been inconsistent and ambiguous. Some of these studies show entrepreneurship education exerting positive effects on entrepreneurial self-esteem and propensities (e.g., Zhao, Seibert, and Hills 2005; Jones et al. 2008; Wilson et al. 2009; Zhang, Duysters and Cloodt 2014), while others report a negative impact (e.g., Oosterbeek, van Praag, and Ijsselstein 2010). Støren (2014) found that the reported learning outcome of entrepreneurship education was not large, but if of a certain type and scope, entrepreneurship education contributes to an increase in "generic" entrepreneurial skills. Bae et al. (2014) meta-analyzed studies examining the relationship between entrepreneurship education and entrepreneurial intentions and found a significant but a small correlation between entrepreneurship education and entrepreneurial intentions. This result was consistent with the findings by Martin, McNally, and Kay (2013), who also found a small but positive relationship between entrepreneurship education and entrepreneurial intentions.

The TPB can also be used in evaluating the outcomes of entrepreneurship education. Fayolle, Gailly, and Lassas-Clerc (2006) developed a common framework to evaluate entrepreneurship education programs with the TPB model. While testing the framework they found that the entrepreneurship education programs assessed had a strong measurable impact on the entrepreneurial intentions of the students. However, the issue of the impact of entrepreneurship education is still very complex (Henry, Hill, and Leitch 2004), because the impact of entrepreneurship education programs might only become apparent after some time (Fayolle, Gailly, and Lassas-Clerc 2006). In addition, Block and Stumpf (1992) illustrate that it is important to measure the delayed effects of entrepreneurship education.

Hence, in this research the following question is presented:

Question 2: Does entrepreneurship education have delayed effects on entrepreneurial intentions?

Control variables

Gender and work situation are included in the theoretical model as control variables. These control variables were selected because of previous meta-analytical studies (e.g. Haus et al., 2013) and the results from Global Entrepreneurship Monitor (Suomalainen et al., 2016).

Gender

The effect of gender has attracted considerable attention in previous entrepreneurial studies (Fayolle and Liñán 2013). Previous research shows that women have lower entrepreneurial intentions and less desire to start new businesses than men do (e.g., Wilson, Marlino, and Kickul 2004; Liñán and Chen 2009), although not all studies have found a correlation between gender and entrepreneurial intentions (Pruett et al. 2009; Yordanova and Tarrazon 2010). Joensuu et al. (2013) found a gender effect also in the development of entrepreneurial intentions, which were more positive among men than among women; in addition, the male students in Joensuu et al.'s sample recorded higher initial levels of entrepreneurial intention than the female students did. As both existing enterprise statistics and research on entrepreneurial propensity have shown gender differences in entrepreneurial actions (e.g., Crant 1996; Kourislkya and Walstadb 1998; Liñán and Chen 2009; cf. Pruett et al. 2009; Yordanova and Tarrazon 2010; Lee et al. 2011; Zhang, Duysters, and Cloodt 2014), gender is included in the theoretical model as a control variable.

Work situation

Deciding to become an entrepreneur involves choosing that path from among other career alternatives. Douglas and Shepherd (2000) argue that the decision to become an entrepreneur may be modeled as a utility-maximizing career choice, and point out that people choose to be self-employed if the total utility they expect to derive (via income, independence, risk bearing, work effort, and perquisites associated with self-employment) is greater than the expected utility from their best employment option. Eisenhauer (1995) built an economic model of the decision to be an entrepreneur based on the expected utility gained, but also dependent on utility derived from the working conditions of the employment versus self-employment alternatives. The individual has to make a choice as to

which conditions suit best. Hence, it can be assumed that the individual's present work situation can affect entrepreneurial intentions, and work situation is therefore included as a control variable in the model.

Figure 1 presents the theoretical model of the study.

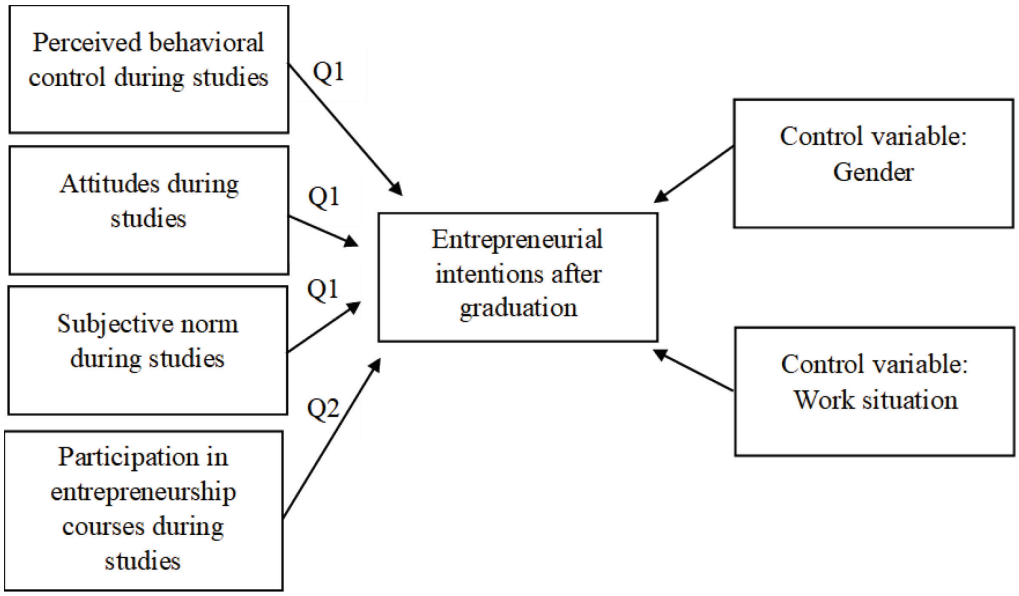

Figure 1. Theoretical model of the study.

Methodology

Data collection

The measurement instrument was based on Ajzen's (1991) TPB model and on the work of Kolvereid (1996), and Tkachev and Kolvereid (1999). The first data collection, Time 1, was undertaken during the period 2008–2012. The questionnaire was sent every year to all the students studying in Seinäjoki University of Applied Sciences during those years. Entrepreneurial intentions, attitudes toward entrepreneurial career, perceived behavioral control, subjective norm, and participation in entrepreneurship courses were measured during the years of studying (2008–2012).

The second data collection, Time 2, took the form of a follow-up after graduation in 2013. It gathered information on entrepreneurial intentions and the situation in

the participants' working lives. The follow-up questionnaire was sent to students who had graduated 2009–2012. This means that at the time of the data collection, some of the students had graduated one year previously (at a minimum) and some four years previously (at a maximum). The questionnaire was sent to 2 280 graduates and included an option to respond by internet or by mail. In addition, those graduates who did not respond by internet or by mail were approached and interviewed by telephone where possible. A total of 1045 responses were received. In the next stage, the data from Time 1 and Time 2 were merged to identify two measurement waves for each student in the form of values for the same student from the study time and after graduation. The combined data produced a latest measurement result from the study time for 282 graduates. For 100 graduates the measurement results derived from the fourth study year just before graduation, for 106 from the third study year, for nine graduates from the second study year, and for 67 from the first study year. The number of graduates the previous year was 180 and during the preceding two to four years, that number was 102. There are more women (73 percent) in the data sample than men (27 percent) and the majority of the respondents (78 percent) were employed. Three percent were entrepreneurs, seven percent were unemployed, five percent were studying, and the rest were on parental leave or fulfilling military service obligations. In addition, five percent were working as an entrepreneur part-time. The respondents represented a variety of fields of study (social services, health and sports 40 percent, social sciences, business and administration 23 percent, technology, communications and transport 17 percent, culture 14 percent, natural sources and the environment 6 percent). Fifty-one percent of the respondents had participated in entrepreneurship courses during their studies.

There can be a problem with data loss in longitudinal settings. Time 1 measurement consists data from different years (2008-2012), which makes it difficult to compare Time 1 data and Time 2 data. To illustrate some comparison, in year 2012 data (Time 1) there were 1 522 answers of which 56 percent were from women. Most of the respondents studied in the field of social services, health and sports (24 percent), in the field of technology (23 percent) and in the field of social sciences, business and administration (22 percent). 13 percent studied in the field of culture, 13 percent in the field of natural sources and the environment and 6 percent in the field of tourism, catering and domestic services. If this is compared to the whole student population in Seinäjoki University of Applied Sciences, the representativeness of the data is good. However, there exist a data loss from Time 1 to Time 2. Time 2 data has more women in the respondents (73 percent) and more respondents representing the study field of social services, health and sports when compared to whole student population.

Variables

Entrepreneurial intentions (EI, measured during studies and in the follow-up study). Averaging six items created an index of entrepreneurial intention. The reliability of the scale was good (Cronbach's alpha 0.89, min 1, max 7, mean 3.3, sd 1.4).

Subjective Norm (SN, measured during studies). Originally the support from people close to the individual (belief items) was measured with three items (a 7-point scale) and motivation to comply was measured by three items (on a 7-point scale) referring to each of the aforementioned belief questions (three items). To support the statistical analysis, the motivation to comply items were transformed to suit a -3 – +3 scale. The belief-based items (coded as ranging from 1 to 7) and the corresponding motivation to comply items (coded as ranging from -3 to +3) were multiplied, and then added to create a subjective norm index (ranging from -63 to +63). This coding is based on that of Ajzen (1991), who suggests that the strength of each normative belief is multiplied by the person's motivation to comply with the referent in question, and the SN is directly proportional to the sum of the resulting products across the salient referents. Cronbach's alpha for the belief scale was 0.85 and for the motivation scale 0.83. The descriptive statistics for the whole scale relating to SN were as follows: minimum -45.0, maximum 56.0, mean -1.1, sd 16.3.

Perceived Behavioral Control (PBC, measured during studies). An index of PBC was created by averaging the five item scores. The reliability of the scale was acceptable (Cronbach's alpha 0.74, minimum 1, max 7, mean 4.0, sd 1.0).

Attitudes toward entrepreneurship (ATT; measured during studies). An index of entrepreneurial attitude was created by averaging nine item scores. The reliability of the scale was acceptable (Cronbach's alpha 0.76, minimum 2.4, max 7, mean 5.0, sd 0.8).

Gender was operationalized as zero for female and one for men. For the analysis, the work situation was operationalized as a dichotomy, zero for *not employed in some firm or organization* and one for *employed in some firm or organization*. Entrepreneurs were coded as zero. This was owing to a need to control for the effect of being employed (not as an entrepreneur). Participation in entrepreneurship courses during studies was operationalized as zero for no entrepreneurship courses taken and one if the respondent had taken entrepreneurship courses.

All variables and items are presented in detail in Appendix 1. Table 1 presents the correlation table of the variables.

Table 1. Correlation table of the variables.

	EI	PBC	ATT	SN	gender	work situation
PBC	.408**	1				
ATT	.415**	.408**	1			
SN	.155**	.042	.154**	1		
gender	.173**	.093	.029	-.027	1	
work situation	.041	.045	.079	.000	.107	1
entrepreneurship courses	.144*	.068	.117	.105	-.181**	-.028

*, **, *** indicate significance at the 90 %, 95 %, and 99 % level respectively.

The data were analyzed using the IBM SPSS Statistics 24 program. Multiple linear regression analysis was used to test the model, where PBC, attitudes and SN measured during studies and participation in entrepreneurship courses during studies explain the entrepreneurial intentions after graduation.

The normality of the scales was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests, which showed that all the variables in our model were normally distributed. Variance inflation factor values were checked for multicollinearity. Homoscedasticity and the normality of residuals were examined. Common method bias was also tested, because the biases can cause potential problems when data for both the predictor and criterion variable are obtained from the same person in the same measurement context using the same item context and similar item characteristics (Podsakoff et al. 2003). It is recommended that researchers, in addition to following good measurement practice, implement additional procedural and statistical means to control for method biases. One way of doing so is to use Harman's single factor test. In the test, all of the studied variables are loaded into an exploratory factor analysis and the unrotated factor solution

examined. The basic assumption is that if a substantial amount of common method variance is present, either a single factor will emerge, or one general factor will account for the majority of the covariance among the measures. Harman's single factor test was used to control for method biases in the current study. The 30 items used to create the main variables were factor analyzed using principal axis factoring where the unrotated factor solution was examined, as recommended by Podsakoff et al. (2003). Kaiser's criterion for the retention of factors was followed. The Kaiser-Myer-Olkin measure for sampling adequacy (KMO) showed that the sample size was suitable for the factor analysis (0.85). Factor analysis results indicated the existence of several factors with eigenvalues greater than 1.0. The first factor accounted for 23 percent of the variance. Since several factors were identified and since the first factor did not account for the majority of the variance, a substantial amount of common method variance does not appear to be present.

Results

For the analysis, the data was divided in two samples. The first sample (Group A) represents respondents that had graduated one year previously (n=180) and the second sample (Group B) represents respondents that had graduated 2-4 years previously. For each individual, there is a measurement from Time 1 (study time) and Time 2 (after graduation). The demographics of the respondents were compared between Group A and Group B to examine possible differences. There were more men in Group A (31 percent) than in Group B (19 percent). In addition, more individuals were employed in some firm or organization in Group A (87 percent) than in Group B (70 percent). However, there were no differences between these groups in taking entrepreneurship courses or in respondent's study fields.

The regression model was tested separately for Group A and Group B. Table 2 presents the findings. Group A presents results for the group that had graduated one year previously and Group B for the group that had graduated 2–4 years previously. Model 1 includes only the variables of the TPB, while Model 2 introduces entrepreneurship courses and the control variables of gender and work situation.

Table 2. Regression results (standard deviations from the mean and β).

	Group A Model 1	Group A Model 2	Group B Model 1	Group B Model 2
Constant	-.720	-.325	-449	-498
	(.594)	(.640)	(.865)	(.836)
PBC	.494***	.416 ***	.242	.208
	(.105)	(.107)	(.131)	(.121)
	β .345	β .296	β .177	β .158
ATT	.429***	.380 **	.532**	.478**
	(.130)	(.130)	(.171)	(.164)
	β .246	β .227	β .299	β .280
SN	.008	.009	.011	.007
	(.006)	(.006)	(.007)	(.007)
	β .088	β .106	β .142	β .097
gender (male)		.264		.593*
		(.211)		(.281)
		β .088		β .194
entrepreneurship		-.004		.725***
courses (yes)		(.191)		(.219)
		β -.002		β .303
work situation		.036		-.158
		(.279)		(.232)
		β .009		β -.061
R-squared	.279	.233	.177	.283
Adjusted R-squared	.267	.205	.151	.236
F statistics	22.352***	8.246***	6.889***	5.987***

Standard errors are reported in parentheses.

*, **, *** indicate significance at the 90 %, 95 %, and 99 % level respectively.

For Group A (those who graduated one year previously), Model 1 (the basic TPB model) explains 27 percent of the variance in entrepreneurial intentions after graduation. The most important variables in the model are PBC (β=.35***) and attitudes (β=.25**). The role of the subjective norm was insignificant. In Model 2, which added participation in entrepreneurial courses and the control variables, none of the added variables was significant and the whole model explains 21 percent of the variance in entrepreneurial intention, which is less than in Model 1.

Interestingly, the model acts quite differently with Group B who graduated 2–4 years previously. In this case, Model 1 explains only 15 percent of the variance in

entrepreneurial intentions after graduation. The only significant variable in the model is attitudes (β=.30**). PBC and SN are both insignificant. Model 2 again adds participation in entrepreneurship courses and control variables to the model, and it explains 24 percent of the variance in entrepreneurial intentions, with the most significant variable in the model being participation in entrepreneurship courses during studies (β=.30***), followed by attitudes (β=.28**), and gender (β=.19*). Other variables are insignificant.

However, it is possible that students who participate in entrepreneurship courses may already have higher entrepreneurial intentions. This can be the main reason to take the entrepreneurship courses during the studies. To examine this phenomenon, the difference between mean values of entrepreneurial intentions measured during studies and after graduation was tested between those who participated in entrepreneurship courses and those who did not. Interestingly these groups do not differ in entrepreneurial intentions measured during studies (mean values 3.5 vs. 3.4). After graduation the mean value of entrepreneurial intention is significantly higher (value 3.5) with graduates that participated in entrepreneurship courses than with other graduates (value 3.1). It seems that those individuals who participated in entrepreneurship courses have retained their intention level. With those individuals who did not participate in entrepreneurship courses, entrepreneurial intentions have decreased. Based on this result, it could be argued that participating in entrepreneurship courses have preservative effect on entrepreneurial intentions.

Table 3. Entrepreneurial intentions during studies and after graduation.

	EI during studies (mean, sd)	EI after graduation (mean, sd)
Group 1: participated in entrepreneurship courses	3.5 (1.1)	3.5 (1.4)
Group 2: no participation in entrepreneurship courses	3.4 (1.3)	3.1 (1.3)
Sig.	-	**

** indicates significance at the 95 % level.

The results suggest some antecedents of intention in the TPB model have explanatory power over time. Hence, Question 1 can be answered affirmatively. Perceived behavioral control and attitudes measured during study time significantly explained the variance in entrepreneurial intentions a year after graduation. The whole TPB model explained 27 percent of the variance in intentions. However, the explanatory power of the TPB model was smaller with the group that graduated 2-4 years previously, and the model explains only 15 percent of the variance in entrepreneurial intentions. The significance of PBC disappears and only attitudes measured during the period of study explain the variance in entrepreneurial intentions. The subjective norm, however, did not explain intentions in any models. It could be argued that attitudes have considerable explanatory power, even over time. Attitudes to an entrepreneurial career measured during studies still explain entrepreneurial intentions even 2–4 years after graduation.

It is interesting to see that entrepreneurial education has a long-term effect on entrepreneurial intentions, and hence Question 2 can be answered affirmatively. Taking entrepreneurship courses did not explain entrepreneurial intentions among respondents that had graduated one year previously, but for the group that had been working for longer (specifically for 2–4 years), having taken entrepreneurship courses at university was the most significant variable in the model. However, further analysis showed that the effect is above all preservative. Entrepreneurial intentions decreased with individuals who did not participate in entrepreneurship courses during studies but not with individuals who did.

Discussion

The objectives of this paper were to examine potential delayed effects of entrepreneurship education on entrepreneurial intentions, and the explanatory power of TPB in a longitudinal setting. The current research shows that entrepreneurship education does indeed have delayed effects. When examining these effects on entrepreneurial intentions in the period of one year subsequent to graduation, no relationship was found. However, significant effects were found between two and four years after graduation. Participation in entrepreneurship courses at university was the most significant factor explaining the entrepreneurial intentions of our sample in the long term. The effect is above all preservative. It may be that the value of entrepreneurial skills and the knowledge of entrepreneurship acquired at university retains better if individual have more work experience. It is interesting that if a person has experienced entrepreneurship education as a full-time student, the idea of becoming an entrepreneur retains to be interesting after exposure to working life. This was not

found with those who did not take entrepreneurship courses. The results support the argument of Fayolle, Gailly, and Lassas-Clerc (2006) that the impact of entrepreneurship education might only become apparent after some delay, and therefore it is important to measure its delayed effects (Block and Stumpf 1992), rather than assessing the effect of entrepreneurship education as soon as courses are completed.

This study also showed that the phenomena of entrepreneurship is somewhat gendered. After experiencing working life for between two and four years, men had acquired stronger entrepreneurial intentions than women. It is interesting that this gender effect was not apparent with the group that graduated one year previously but was apparent with the group that graduated 2-4 years previously. However, it should be noted that in this group there were more women in the data than in the group that graduated one year previously. Despite of this restriction, it seems that men are clearly more tempted by an entrepreneurial career than women are. It is also notable that the current situation in working life did not have an effect on entrepreneurial intentions (whether actually employed or in the outside working life category outlined above).

This paper also examined how the antecedents of intentions explain entrepreneurial intentions in the long term. In particular, the study tested how attitudes, the subjective norm, and PBC measured among higher education students explain the variance in entrepreneurial intentions measured after graduation. It is interesting that with the group that graduated on year previously the subjects' attitudes and PBC were still significant antecedents of entrepreneurial intentions, but with the group that graduated 2-4 years previously, only attitudes had retained any significant meaning. It can be argued that PBC (how a person believes he/she would succeed as an entrepreneur) develops over time and by accruing work experience. That is why PBC measured while studying at university no longer explains entrepreneurial intentions after between two and four years of work experience, while attitude does. This suggests that the attitude to an entrepreneurial career is an important antecedent that endures over time. Attitudes serve multiple functions, such as directing people toward positive outcomes but can also express important aspects of a person's self-concept and identity (Katz 1960; Smith, Bruner, and White 1956). Attitudes do not change quickly, which is why the effect on intentions can be found even after the passage of time. It is also interesting to note that some attitudes are more self-defining than others (Zunick, Teeny, and Fazio 2017), and some are more strongly determined by our environment and unique experiences, and others more strongly determined by our genes (Brandt and Wetherell 2012). While there are no studies investigating whether attitudes toward entrepreneurship are inherited, some attitudes can be

changed (Glaser et al. 2015). It would appear to be important to have entrepreneurship education providers both instill entrepreneurial skills in their students but also foster positive attitudes toward entrepreneurship among educators, management, and the students.

If nations seek to encourage their higher education graduates to pursue a career in entrepreneurship, they might learn from the Finnish experience indicating that they should be developing incentives for universities to foster entrepreneurship through strategy and to embed entrepreneurship in all study fields. Entrepreneurship education builds entrepreneurial competence because it focuses on developing specific skills and values that are useful to nascent entrepreneurs in identifying business opportunities, pursuing them (Alvarez and Busenitz 2001) and can help entrepreneurs to identify, pursue, exploit and safeguard business operations and to establish a successful enterprise (Wiklund et al. 2009). Finland can serve as an exemplar state because the success of start-ups is particularly important there, given the majority of the new jobs in the country are created by SMEs.

Limitations and future research

As with all research, this study has some limitations. First, the data were gathered only from one university of applied sciences. The characteristics of the context can affect the results. Second, 40 percent of the respondents had graduated from the field of social services, health and sports and there were more female respondents in the data. In Finland, entrepreneurship is not a particularly popular career choice for students studying social and health care. This sets restrictions on the generalizability of the results. Third, the study measures entrepreneurial intentions and the antecedents of intentions among students every year, but inevitably in this dataset, the measurement point for the year's group of respondents varies. Some respondents have the Time 1 measurement from the last study year and some from former years. All of this can affect the results.

Despite the above limitations, this study offers new insights into the effects of entrepreneurship education and the importance of attitudes in relation to entrepreneurship. In the future, more longitudinal settings would be required to replicate these results. In addition, it would be interesting to follow these same respondents after 10 years of work experience and then reassess how entrepreneurial intentions develop over time.

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Appendix 1. Variables and items.

Variable (all measured on a 7-point Likert scale; translated from Finnish)

Entrepreneurial intention

How likely are you to continue your career employed by another (i.e. in salaried work)? (1=very unlikely ----- 7=very likely)

How likely are you to start your own business and work as an entrepreneur at some point of your professional career? (1=very unlikely ----- 7=very likely)

How strong is your intention to embark on entrepreneurship at some point of your professional career? 1=no intention -----7=very strong

How likely are you to embark on entrepreneurship after you have gathered a sufficient amount of work experience? (1=very unlikely ----- 7=very likely)

How likely is it that you will be employed for most of your career by a company or public organization (without any connection to entrepreneurship)? (1=very unlikely ----- 7=very likely)

If you were supposed to choose between entrepreneurship and unemployment at some point of your professional career, which one would you choose? (1=unemployment ----- 7=entrepreneurship)

Subjective norm

I believe that my closest family members think I should not (1) -----should (7) strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your closest family members think if you strive to start your own business and to work as an entrepreneur after graduation? (1=not at all ----- 7=very much)

I believe that my best friends think I should not (1) -----should (7) strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your best friends think if you strive to start your own business and to work as an entrepreneur after graduation? (1=not at all ----- 7=very much)

I believe that my significant others think I should not (1) -----should (7) strive to start my own business and to work as an entrepreneur after graduation.

How much attention do you pay to what your significant others think if you strive to start your own business and to work as an entrepreneur after graduation? (1=not at all ----- 7=very much)

Perceived behavioral control (PBC)

If I established a business and started to work as an entrepreneur after graduation, my chance of success would be (1=good -----7=bad)

If I really wanted to, I could easily start a business and work as an entrepreneur after graduation (1=disagree completely -----7=agree completely)

There are very few (1)-----numerous (7) things that are beyond my own control but could prevent me from starting my own business and working as an entrepreneur after graduation.

For me, starting my own business and working as an entrepreneur after graduation (1=very easy-----7=very difficult)

If I established my own business and started to work as an entrepreneur after graduation, my risk of failure would be (1=very small-----7=very big)

Attitudes towards entrepreneurship

To what extent do the following attributes correspond to your perceptions of entrepreneurship (i.e. establishing a business and working as an entrepreneur)?

Interesting (1=not at all -----7=completely)

Esteemed (1=not at all -----7=completely)

Dishonest (1=not at all -----7=completely)

Worth pursuing (1=not at all -----7=completely)

Boring (1=not at all -----7=completely)

Fascinating (1=not at all -----7=completely)

Despised (1=not at all -----7=completely)

Good income level (1=not at all -----7=completely)

Oppressive(1=not at all -----7=completely)