A longitudinal panel study of entrepreneurial intentions of higher education students in Finland

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Abstract

The aim of this paper is to present results from using the instrument for tracking the changes in entrepreneurial intentions of bachelor level students. The objectives of this study are threefold: (1) to analyse the antecedents of intentions in three different study years of the same individuals, (2) to analyse change in entrepreneurial intentions and its antecedents from 1st to 3rd and to 4th year of study; and (3) to examine the role of gender and role models in the initial level and development of entrepreneurial intent, and the impact of higher education on the development of entrepreneurial intent in three years of time. First, the cross-sectional analysis of the predictors of intentions in three different study years is done. Second, the change on two-wave panel data (the change from 2008 to 2011) is done using difference score with multiple linear regression modeling. Thirdly, the analysis of change on multi-wave panel data is done using latent growth curve analysis with structural equation modeling.

Keywords: entrepreneurship, entrepreneurial intention, longitudinal data, panel study, university, student

Introduction

One of the ways in which societies seek to increase entrepreneurship is training. Although the content, methods and utility of entrepreneurship education remain under discussion (Mwasalwiba, 2010; Pittaway and Cope, 2007), entrepreneurship education is attracting considerable effort and attention. Some studies suggest that higher education reduces the likelihood of entrepreneurship (Kangasharju and Pekkala, 2002), whereas some suggest that entrepreneurship education programmes increase entrepreneurial competencies and intentions (Sanchez, 2011). Systematic approaches to evaluating the impact of these various entrepreneurial initiatives at the individual level seem to be lacking. An effort has currently under way, however, to develop an instrument to measure the impact of entrepreneurial initiatives specifically at the individual level (see Varamäki et al., 2011). In previous literature there is a lack of longitudinal studies (Matlay and Carey, 2007) and pose formidable data collection challenges (e.g. Harte and Stewart, 2010). Even more there is lack of those kind of longitudinal studies which have more than two measurements i.e. panel studies in evaluating the changes in entrepreneurial intentions. Entrepreneurial intentions hence refer to the commitment to starting a new business (Krueger and Carsrud, 1993) after graduation (directly or later in the career).

The aim of this research paper is to present results from using the instrument for tracking the changes in entrepreneurial intentions of bachelor level students during their studies in Universities of Applied Sciences in Finland. Students in different fields of study were followed up for three

years (from 1st to 3rd and to 4th study year). The collected data enables longitudinal follow-up of the same individual. The objectives of this study are threefold: (1) to analyse the antecedents of intentions in three different study years of the same individuals, (2) to analyse change in entrepreneurial intentions and its antecedents from 1st to 3rd and to 4th year of study; and (3) to examine the role of gender and role models in the initial level and development of entrepreneurial intent, and the impact of higher education on the development of entrepreneurial intent in three years of time. First, the cross-sectional analysis of the predictors of intentions in three different study years is done. Second, the change on two-wave panel data (the change from 2008 to 2011) is done using difference score with multiple linear regression modeling. Thirdly, the analysis of change on multi-wave panel data is done using latent growth curve analysis with structural equation modeling.

The rest 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. Last, we discuss the implications of our study.

Review of literature and theoretical model

Intentions and their antecedents

In order to study the relative importance of intention antecedents, we will adopt an existing intention model, namely the Theory of Planned Behavior by Ajzen (1988; 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 TPB suggests that intention is the immediate antecedent of behaviour and, thus, the stronger the intention to engage in 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, forthcoming). The core of the TPB is the idea that intentions have three conceptually independent determinants, namely attitude towards the behavior, subjective norm and perceived behavioral control (Ajzen, 1991, p.188). Ajzen´s (1991) model has been widely used in entrepreneurial research, and almost without exceptions amongst student populations (e.g. Devonish *et al.*, 2010; Fayolle *et al.*, 2005; Autio et al., 2001; Krueger *et al*., 2000; Tkachev and Kolvereid, 1999; Kolvereid, 1996; Krueger, 1993) (exceptions include, for example, Kautonen *et al.*, 2010; Tornikoski and Kautonen, 2009). Fayolle (2005) suggests that the TPB is particularly appropriate to evaluation of entrepreneurship education programmes.

Attitude towards the behavior refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question. The more positive an individual's perception is regarding the outcome of starting a business (see e.g. Shapero and 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 and, consequently, the stronger the individual's intention to go ahead and start a business should be.

Subjective norm refers to the perceived social pressure to perform or not to perform that behavior. It is based on beliefs concerning whether important referent individuals or groups approve or disapprove of an individual establishing a business, and to what extent this approval or disapproval matters to the individual (Ajzen, 1991, p. 195). Generally speaking, the more the opinion of a particular referent group or individual matters to the individual and the more encouraging the individual thinks it is of enterprising activity, the stronger should be the individual's intention to start a business. 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 behavioral control refers to the perceived ease or difficulty of performing the behavior. It is based on beliefs regarding the presence or absence of requisite resources and opportunities for performing a given (see Bandura *et al.*, 1980; Swan *et al.*, 2007). In general, the greater this perceived behavioural control, the stronger the individual's intention to start up in 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 any given application. 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; Veciana *et al.*, 2005; Hmieleski and Corbett, 2006; Urban, 2006; Sequeira *et al.*, 2007; Wilson *et al.*, 2007; van Gelderen *et al.*, 2008; McGee *et al.*, 2009; Carey *et al.*, 2010; 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; Moriano *et al.*, 2011).

The second 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, 2011).

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

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), and since entrepreneurial role models seem to be connected to more positive attitudes and intentions to start businesses (Feldman *et al.*, 1991; Crant, 1996; Chen *et al.*, 1998; Wang and Wong, 2004; Linan and Chen, 2009 ; Zhao *et al.*, 2005;

Van Auken *et al*., 2006; Pruett *et al*., 2009; Kuckertz and Wagner, 2010; Basu and Virick, 2010), *gender* and *role models* are included in our theoretical model as factors influencing level on entrepreneurial intentions.

Some studies suggest that higher education reduces the likelihood of entrepreneurship (Henley 2007; Wu and Wu 2008; Nabi *et al.* 2010, cf. Ertuna and Gurel, 2011). However, entrepreneurial skills are included in the generic competences that Bachelors graduating from Finnish Universities of Applied Sciences should possess according to the national framework for qualifications (Ministry of Education, 2009; Arene, 2010). Hence entrepreneurial skills are incorporated in all Bachelor curricula, even those that do not specifically include entrepreneurship education. Thus, it is reasonable to suggest that university studies, over time, influence students' abilities with respect to entrepreneurship. Since intentions are influenced by a person's subjective appraisal of whether he or she has relevant skills, we include *subjective impact of studies on entrepreneurial abilities* as a factor in our model.

The Intention Development model

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

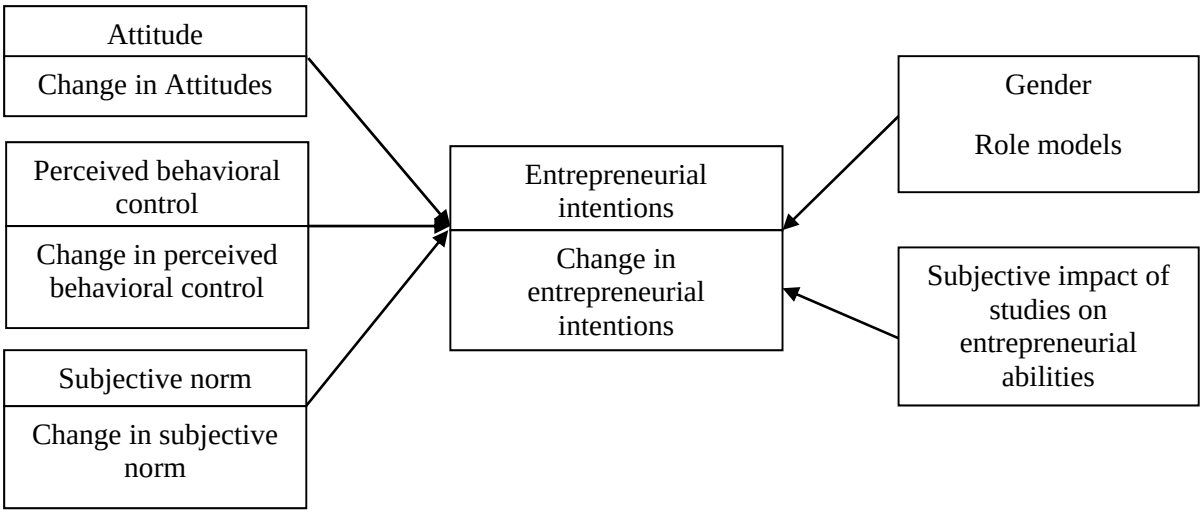

FIGURE 1. The theoretical Intention Development model.

Ajzen´s antecedents of intentions, and change in intentions and their antecedents, are analyzed using multiple regression analysis. Gender and role models are included in the analysis. Intention development is analyzed using latent growth curve analysis, with gender, role models and subjective impact of studies on entrepreneurial abilities as exogenous variables.

Methodology

Instrument and data collection method

The instrument used in the 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 fall 2008, 2010 and 2011 in four different universities of applied sciences students representing six different study fields. For the follow-up of the same individuals from 1st to 3rd and to 4th year (with three measurements) 91 responses were received.

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 -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 alpha	min	max	mean	sd
EI 2008	0.87	1.0	5.9	3.4	1.0
EI 2010	0.87	1.1	6.1	3.3	1.1
EI 2011	0.87	1.0	6.3	3.3	1.2
SN 2008	0.78	-33	54	-2.4	15.2
SN 2010	0.74	-32	27	-2.8	13.5
SN 2011	0.65	-51	40	-4.4	15.0
PBC 2008	0.64	2.6	6.8	4.2	0.8
PBC 2010	0.77	2.0	6.6	4.2	1.0
PBC 2011	0.79	1.6	6.6	4.1	1.0
ATT 2008	0.78	2.9	6.6	5.1	0.8
ATT 2010	0.78	3.7	6.7	5.0	0.7
ATT 2011	0.82	1.0	6.9	4.9	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 31 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 = 0.79).

Factor analytic results indicated the existence of eight factors with eigenvalues greater than 1.0. The eight factors explained 68 percent of the variance among the 31 items, and the first factor accounted for 31 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

56 percent of the respondents were female. 22 percent of the students had a mother whose professional career has been an entrepreneur and 40 percent a father who has been an entrepreneur.

Analysis and results

Cross-sectional analysis in different study years

Cross-sectional analysis was done using multiple linear regression modeling. We tested how the antecedents of intentions explain the variance of intentions in three different study years. The data is from same individuals. Two models were made for each study year. The first model was made of the background characteristics of the respondents. Gender was operationalized one for males and zero for females. Mother´s and father´s professional background as an entrepreneur was operationalized one for yes and zero otherwise. For the second model Ajzen´s determinants (attitudes, perceived behavioral control and subjective norm) were included in the model.

Gender explains intentions in the 1st study year significantly. Also father´s professional background as an entrepreneur has value. Mother´s professional background as an entrepreneur has no value when Ajzen´s determinants are included in the model. The background characteristics only explain 22% of the variance of intentions. When Ajzen´s determinants are included in the model, adjusted R^2 rises to 42%. The best predictors of intentions are perceived behavioral norm and attitudes. Subjective norm has no significant value.

When moving to 2nd year of study, the significance of mother´s and father´s professional background as an entrepreneur disappears. Gender has still some significant value. Perceived behavioral norm is the best predictor of intention formation. Also subjective norm has significant effect on intentions. Attitudes have some influence. The background characteristics explain only 9% of the variance. Model 2 explains 41 % of the variance of intentions.

The significance of attitudes becomes more important when moving to 4th year of study. The attitudes are the best predictors of intentions in the 4th year followed by perceived behavioral control. Subjective norm has no value. From background characteristics only father´ professional background has some value in predicting the intentions. The model 2 explains 57% of the variance of intentions.

When analyzing these different models, it is notable that the significance of attitudes rises when moving to the last study year. The gender has significant value in predicting the attitudes in the first year but not in the last year in model 2. The model 2 made for the 4th year of study has the highest R^2 value (explains 57% of the variance) compared to other models made of Ajzen´s determinants (in 1st year 42%, in 3rd year 41%). The F-statistics show the same result. The higher value is explained by the much higher beta-value for attitudes compared to other models (1st year .27, 3rd year .25, 4thyear .46). Attitudes significance as a predictor becomes much more important than other determinants when moving to 4th year of study. Table 2 gives the results of the analysis.

TABLE 2. Linear regression for the 1st, 3rd, and 4th year of study.

	1st year Model 1	**1st year Model 2**	**3rd year Model 1**	**3rd year Model 2**	**4th year Model 1**	**4th year Model 2**
Background variables						
Gender	0.35***	0.33***	0.23*	0.21*	0.28**	0.14
Mother's professional background as an entrepreneur	0.21*	0.07	0.18	0.00	0.13	-0.06
Father's professional background as an entrepreneur	0.29**	0.19*	0.20	0.02	0.22*	0.17*
Independent variables						
Attitudes		0.27**		0.25*		0.46***
Perceived behavioral control		0.27**		0.37***		0.34***
Subjective norm		0.16		0.31***		0.02
Model fit statistics						
Adjusted R^2	0.22	0.42	0.09	0.41	0.11	0.57
F-statistics	9.083***	11.407***	3.911*	11.090***	4.455**	20.451***
F change		10.612***		16.152***		31.632***

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

Standardized coefficients reported.

The two-wave panel data analysis from 1st to 4th study year

Two-wave panel data was first analyzed by testing mean differences from 1st and 4th year of study in entrepreneurial intentions, subjective norm, entrepreneurial attitudes and perceived behavioral control. Paired samples t-tests were used. Second the data was analyzed by using difference score. This difference score was created for the main variables (Intention, Subjective norm, 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 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, subjective norm and perceived behavioral control.

Two models were made for the analysis. The first model was made of the background characteristics of the respondents. Gender was operationalized one for males and zero for females. Mother´s and father´s professional background as an entrepreneur was operationalized one for yes and zero otherwise. For the second model Ajzen´s determinants (the change in subjective norm, the change in attitudes and the change in perceived behavioral control) were added in the model.

Table 3 presents the results of the longitudinal follow-up of the same students from 1st to 4th study year. The entrepreneurial intentions decreased during the 1st and 4th year among the respondents, although the difference is not statistically significant.

TABLE 3. Results of the follow-up of the same students from 1st to 4th study year.

	Entrepreneurial intentions	**Subjective norm**	**Entrepreneurial attitudes**	**Perceived behavioral control**
Whole sample				
1st year	3.4 (1.04)	-2.4 (15.16)	5.1 (0.75)	4.2 (0.82)
4rd year	3.3 (1.22)	-4.3 (15.11)	4.9 (0.89)	4.1 (1.00)
Prob.	No significance	No significance	No significance	No significance

Table 4 presents the multiple linear regression results for the change in entrepreneurial intentions. The model 1 presents the results for the model made of background variables. None of the variables have effect in the model. The model 2 presents the results for the model where the Ajzen´s determinants (change in attitudes, change in subjective norm, and change in perceived behavioral control) are included. This model explains 34% of the variance in the dependent variable. The only significant predictors of change in intentions seem to be the change in attitudes ($p<0.001$), and the change in perceived behavioral control ($p<0.01$). Change in subjective norm has no significant value in predicting the change in intention. The change in attitudes is the most important antecedent in explaining changes in entrepreneurial intentions.

TABLE 4. Linear regression for two-wave panel data.

	Model 1	**Model 2**
Background variables		
Gender	-0.03	-0.11
Mother's professional background as an entrepreneur	-0.05	-0.07
Father's professional background as an entrepreneur	-0.02	0.02
Independent variables		
Change in attitudes		0.39***
Change in perceived behavioral control		0.31**
Change in subjective norm		0.10
Model fit statistics		
Adjusted R^2	-0.03	0.34
F-statistics	0.115	8.316***
F change		16.454***

+ p< .10. * p< .05. ** p< .01. *** p<.001
Standardized coefficients reported.

The multi-wave panel data analysis for 1st, 3rd and 4th study year

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 more effective testing of systematic interindividual differences in change. 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, p. 305.)

The purpose of this study was to examine the role of gender and entrepreneurial role models in the initial level of entrepreneurial intent, and the significance of subjective impact of studies on the development of entrepreneurial intent in three years of time. The model assumes that gender, mother´s professional background as an entrepreneur and father´s professional background as an entrepreneur, have a significant role in the initial state of intention. This model further assumes that student´s own experience that studies have given abilities for entrepreneurship, is a key contributor for development of entrepreneurial intention over time.

Outcome Variable

The main outcome variable in the model is entrepreneurial intention. Entrepreneurial intention was measured in three waves: 2008 (first study-year), 2010 (third study year) and 2011 (fourth study year).

Exogenous Variables

Gender was operationalized as the gender of the respondent and is included as a dummy variable, with a value of zero for female respondents and one for male respondents. *Father's professional background* was included in the model as a dummy variable with the value one given to respondents who indicated that father used to be an entrepreneur and a value of zero otherwise.

Mother's professional background was included in the model as a dummy variable with the value one given to respondents who indicated that father used to be an entrepreneur and a value of zero otherwise. *Subjective impact of studies* was measured with variable where respondents were asked whether they think that their studies at the university have given them abilities for entrepreneurship. This was measured with scale from 1 to 7-point likert scale and added in the model.

Statistical Analyses

Amos 19, a structural equation modeling (SEM) program, was used to test the relationships among the variables. Table 5 presents the correlation matrix with means and standard deviations for the observed variables. Statistically significant correlations are presented.

TABLE 5. Means, standard deviations and intercorrelations among study variables.

	Gender	Mother as an entrepreneur	Father as an entrepreneur	Subjective impact of studies on entrepreneurial abilities	EI 2008	EI 2010	EI 2011
Gender	1						
Mother as an entrepreneur	-.256*	1					
Father as an entrepreneur	-.037	.276**	1				
Subjective impact of studies on entrepreneurial abilities	-.072	.112	.029	1			
EI 2008	.285**	.187	.323**	-.020	1		
EI 2010	.182	.160	.233*	.179	.637**	1	
EI 2011	.221*	.122	.252*	.311**	.500**	.725**	1
Mean	0.44	0.26	0.40	4.14	3.43	3.32	3.31
SD	0.50	0.44	0.49	1.47	1.04	1.09	1.22

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

*. Correlation is significant at the 0.05 level (2-tailed).

Latent factors were used to assess differences in the *intercept*, that is the initial level of entrepreneurial intention, and the *slope*, that is the rate of change over time in entrepreneurial intent. Overall model fit, as evidenced by statistically significant goodness-of-fit statistics, was evaluated for significance in the model.

Results for the multi-wave data

The Figure 2 presents the results of the model (standardized regression weights shown also). The fit measures are as follows: CFI 1.00, NFI 0.97, RMSEA is 0.000, CMIN/DF 0.490. Fit measures indicate a good fit.

FIGURE 2. the tested model of entrepreneurial intentions: standardized solution
Notes: chi-square=5.387, df=11, p=0.911, CMIN/DF=0.490, CFI=1.000, NFI=0.968, RMSEA=0.000, N = 91

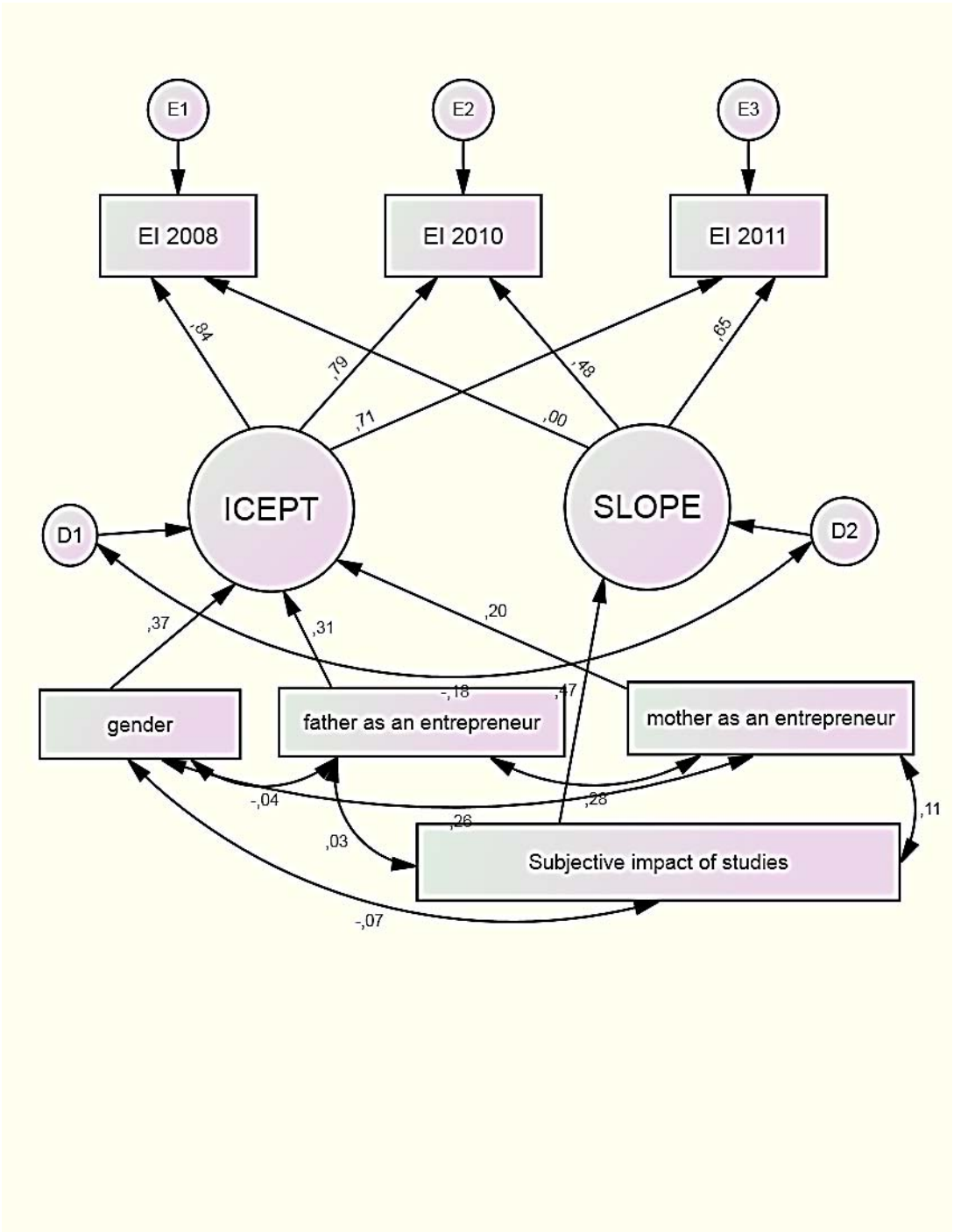

Table 6 presents the estimates and standardized regression weights of the model. Gender (male) has a very significant and positive effect on the initial level of intention: males have higher scores in entrepreneurial intention than females in the beginning of the studies. Also father´s professional background has a positive and significant effect on the initial. Mother´s professional background as an entrepreneur has no significant value. Subjective impact of studies has a positive and significant effect on the development of entrepreneurial intentions. The more students believe that studies have given them abilities for entrepreneurship, the more positive will the development of entrepreneurial intentions be.

TABLE 6. Estimates and standardized regression weights.

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Standardized regression weights
ICEPT	←	father as an entrepreneur	,540	,184	2,933	**	,305
ICEPT	←	mother as an entrepreneur	,415	,225	1,844	,065	,199
ICEPT	←	gender	,653	,180	3,619	***	,375
SLOPE	←	Subjective impact of studies on entrepreneurial abilities	,084	,022	3,749	***	,467

Implications

We have pilot tested the instrument to measure the impact of entrepreneurial initiatives on individuals in longitudinal panel study of the same students.

The first objective was to analyse the antecedents of intentions in three different study years of the same individuals. For the 1st year, perceived behavioral control and attitudes explain intentions. Interestingly, the impact of attitudes on intentions increases as graduation approaches. For the 4th year students attitudes are the best predictor of intentions, followed by perceived behavioral control. Subjective norm has no effect on intentions for the 4th year although it is significant for the 3rd year. This would suggest that attitudes are the key antecedent for entrepreneurial intentions rather than perceived behavioral control, which has been most commonly been the best predictor of intentions in previous studies.

The second objective was to analyse change in entrepreneurial intentions and its antecedents from 1st to 3rd and to 4th year of study. We observed that entrepreneurial intentions decreased slightly over time (i.e. between 1st to 3rd and to 4th year of studies), albeit the change was not statistically significant. This is similar to Pihkala's (2008) study, which found no statistically significant change in intentions. It is clear from the results that higher education isn't inspiring students to form

entrepreneurial intentions. The only significant predictors of change in individual student's intentions seem to be change in attitudes and change in perceived behavioral control, change in attitudes being the more important predictor. Again, attitudes emerge as the key factor.

Finally, the third objective was to examine the role of gender and entrepreneurial role models in the initial level and development of entrepreneurial intent, and the role of higher education in the development of entrepreneurial intentions. It was found that in the 1st year gender explains intentions significantly. The importance of gender is reduced to insignificance in the fourth year, however. Further, although gender explains initial entrepreneurial intentions, it does not explain change in intentions. This suggests that studies have a leveling effect with respect to entrepreneurial intent. Father's career in entrepreneurship is the only background variable that explains intentions in the 4th year of studies, and its explanatory power is considerably lower than that of attitudes and perceived behavioral control. Neither gender nor role models explain change in intentions. However, the subjective impact of studies, i.e. the students' perception of entrepreneurial abilities given by their studies, has a strong positive influence on development of entrepreneurial intentions.

Figure 3 presents the conceptual model of our study as modified on basis of the analyses.

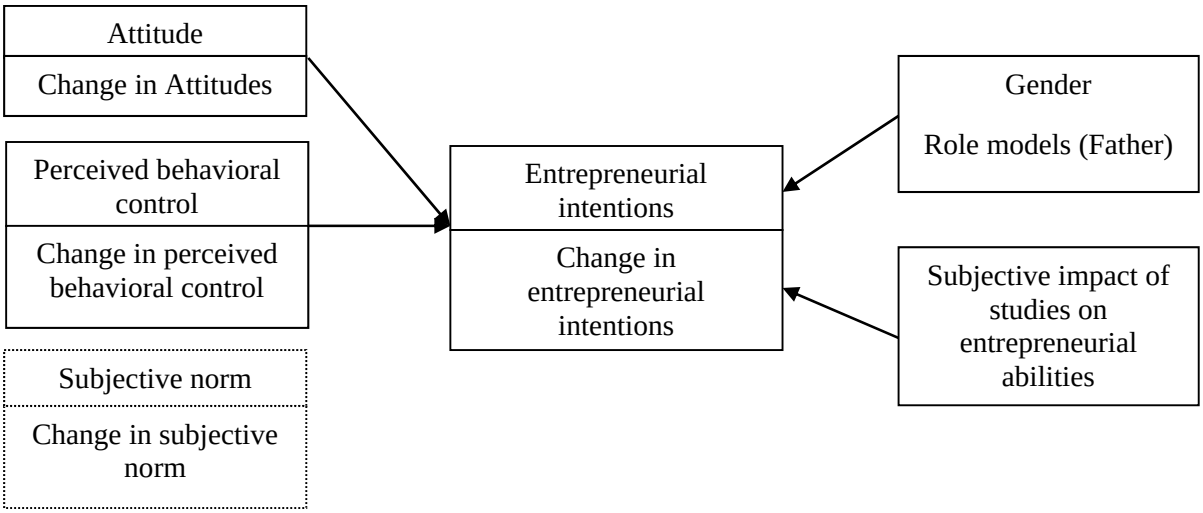

FIGURE 3. Modified model.

Taken together the results suggest that it is in fact possible to influence development of entrepreneurial intentions by higher education. To accomplish that, universities should try to ensure that students' entrepreneurial skills are developed over their years of study and that students recognize their skills as applicable to entrepreneurship. Higher education *per se* presumably increases skills; whether the skills are entrepreneurial, and perceived as such, is another matter.

It must be concluded that although Universities of Applied Sciences put considerable effort into developing entrepreneurial skills, the efforts are not translated into developing intentions with any great effect. The results show that focus on skills must be accompanied by focus on positive attitudes toward entrepreneurship. Ability is not enough without the will to wield it. The students' entrepreneurial attitudes need to be boosted with the same intensity as their skills.

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