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ORIGINAL SCIENTIFIC PAPER

Comparing the Entrepreneurial Intention between Female and Male Engineering Students

Upoređivanje preduzetničkih namera između ženskih i muških studenata tehnike

Choitung Lo*, Hongyi Sun,
City University of Hong Kong, Department of Systems Engineering and Engineering Management, Hong Kong,
Kris Law,
The Hong Kong Polytechnic University, Department of Industrial and Systems Engineering, Hong Kong

A B S T R A C T

Women business ownership contributes to entrepreneurship quality and diversity. However, the new venture creation rate of females lags far behind that of males. How to increase female entrepreneurship by entrepreneurship education is an important topic in the field. It has been reported that students' entrepreneurial intention is a key to their future entrepreneurial behaviors. This paper aims to empirically compare the entrepreneurial intentions between female and male engineering students with the exertion of entrepreneurship education. The Theory of Planned Behavior (TPB) was used as the theoretical basis of this study. A total of 411 engineering students from three universities in Hong Kong, 303 males and 108 females, were involved in this study. The results show that TPB is appropriate to explain entrepreneurial intention of both female and male students. Further, male and female students are different in terms of entrepreneurial attitudes, social norms and entrepreneurial intentions even they experienced entrepreneurial education. This

* Tat Chee Avenue, Kowloon, Hong Kong SAR, email: choitung@yahoo.com.hk

study suggests that teaching strategies to foster entrepreneurial intention of females should (1) emphasize female entrepreneurship, 2) provide female entrepreneurial models, and (3) create an entrepreneurial culture in campus. This study is perhaps the first study to investigate the entrepreneurial intentions by gender in association with entrepreneurship education. It contributes to developing appropriate education measures to aid female students to achieve entrepreneurial potential and promote female entrepreneurship.

KEW WORDS: *entrepreneurship education, entrepreneurial intention, gender difference, theory of planned behavior*

Introduction

The growing viability of entrepreneurship has promoted individual career options of entrepreneurship. In recent years, female entrepreneurship has been increasingly popular and it plays a more and more important role in economic development (Verheul, Thurik, and Grilo, 2006), contributing to job creation and social wealth, as well as the diversity of entrepreneurship (Langowitz and Minniti, 2007). However, the rate of women entrepreneurship still falls far behind that of men. Women business ownership only accounts for about half of that for men (Fairlie and Robb, 2009) and the lower rate of women entrepreneurship has been found in different countries, such as Canada, US, Portugal, and UK (OECD, 2008). Although the increase in entrepreneurship rate, males seem to dominate the entrepreneurship world.

The disparity between females and males regarding their entrepreneurial career interests and attitudes has provoked loads of study on the effect of gender on entrepreneurship. For example, researchers found that several factors influence the participation of male and female entrepreneurs, including financial support, risk-taking propensity (Verheul, Thurik, and Grilo, 2006), alertness to existing opportunities (Langowitz and Minnitti, 2007), and internal control (Wilson, Kickul, and Marlino, 2007). Some researchers believed that the divide between men and women is determined by their gender stereotypes which impact people's cognition and behavior (Gupta et al., 2005). Entrepreneurship is traditionally considered masculine, so men tend to have higher intention to pursue an entrepreneurial career (Johnson, Stone, and Philips, 2008; Langowitz and Minnitti, 2007; Petridou, Sarri, and Kyrgidou, 2009).

To encourage entrepreneurship for both females and males, governments and academics concentrated on entrepreneurship education, which is recognized to improve entrepreneurial intention and performance (Linan, Rodriguez-Cohard, and Cantuche, 2011). Many scholars argued that education and training on entrepreneurship are crucial to fostering the entrepreneurial intention that predicts entrepreneurial behavior (Dickson, Solomon, and Weaver, 2008; Dutta, Li, and Merenda, 2010; Souitaris, Zerbinati, and Al-Laham, 2007). These studies, however, did not investigate the effect of entrepreneurship education by gender, i.e., what are the differences between male and female students being exposed to entrepreneurship education? Or does entrepreneurship education have a different degree of impact on entrepreneurial attitudes and intentions of females and males? As the perception of females and males about entrepreneurship are different (Gupta et al., 2005), the influence of entrepreneurship education on their entrepreneurial attitudes and intentions would be different. This paper, based on the theory of planned behavior (TPB) which has been recognized appropriate to explain entrepreneurial intention (Ajzen, 1991; 2005; Souitaris, Zerbinati, and Al-Laham, 2007), addresses this gap by studying the influence of entrepreneurship education on entrepreneurial intention of male and female students.

Three research questions are proposed in this paper:

1) Can TPB explain entrepreneurial intentions of both male and female students?
2) Does entrepreneurship education influence entrepreneurial intentions of male and female students differently?
3) What are the exact differences between male and female students in entrepreneurial intentions?

Understanding the differences between male and female students has significant implications for improving the entrepreneurial career interests, especially female students, by addressing particular considerations of this gender group of potential entrepreneurs. This will contribute to developing appropriate education measures to facilitate students, especially females, to achieve their entrepreneurial potential and promote female entrepreneurship.

Theories and Hypotheses

Entrepreneurship Education

Entrepreneurship education has been developed rapidly in the past decades. Entrepreneurship courses and programs are not only offered in business schools, but also in engineering and science disciplines (Solomon, 2007). Researchers have found that entrepreneurship programs that involve interactive learning, action-based learning, role models, creativity and innovation, social networks, and other aspects associated to new venture creation have significant impact on one's desire to pursue an entrepreneurial career, enhancing abilities and skills for startup (Dickson, Solomon, and Weaver, 2008; Dutta, Li, and Merenda, 2010; Sanchez, 2011). Therefore, entrepreneurship education influences entrepreneurial intentions to engage in entrepreneurship.

Despite the popularity of entrepreneurship education, generally accepted teaching contents and methods are still lacking (Matlay, 2005). Some researchers concentrated on the theoretical content of entrepreneurship courses/programs (Fiet, 2001), while others emphasized the adoption of a more practically focused and active-based approach (Mbaziira and Oyedokun, 2007). Furthermore, there is a lack of empirical studies between females and males and those who have received entrepreneurial education and those that have not (Solomon, 2007) in order to resolve the issues related to entrepreneurship education.

Research on entrepreneurship education appears not mature and it is challenging for educators to develop quality entrepreneurship courses/programs by designing appropriate education strategies (Matlay, 2005). Addressing the differences between female students and male students regarding their entrepreneurial attitudes and intentions will help to clarify the needs and factors influencing the startup intentions of the specific gender group. Many factors influence the emergence of entrepreneurial activities, such as economic environment and personalities (Arenius and Minniti, 2005), whilst individual intention to start up plays a decisive role (Ajzen, 2005; Krueger, Reilly, and Carsrud, 2000). Entrepreneurship education intervention seems to have a critical position in enhancing entrepreneurial career intention of students (Dutta, Li, and Merenda, 2010; Fayolle, Gailly, and Lassas-Clerc, 2006; Souitaris, Zerbinati, and Al-Laham, 2007).

Theory of Planned Behavior (TPB)

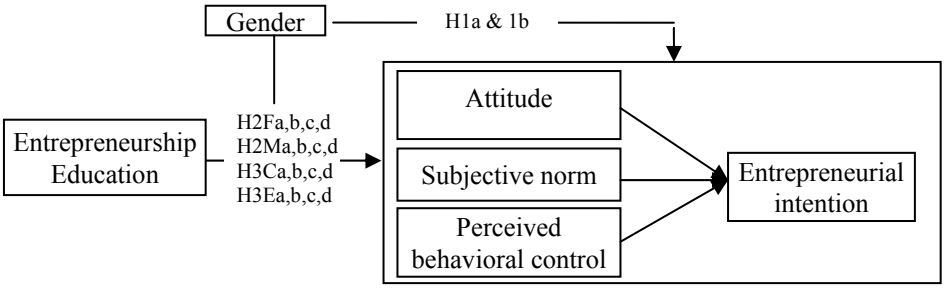
Intention is the key to explaining human behaviors (Sheeran, 2002). Many social behaviors, such as entrepreneurship, are volitionally controlled and can be best predicted by intentions (Ajzen, 1991; 2005). In TPB, three attitudinal antecedents determine intention, in turn, the intention influences behavior. The first antecedent, attitude toward behavior, refers to personal interest in and desirability to perform a behavior. The second one, subjective norm, is the social pressures perceived by a person to perform or not to perform the behavior. The third one, perceived behavioral control, refers to the ease or difficulty in performing the behavior and it is highly related to the concept of self-efficacy or self-capability. Meta-analytic evidence has showed that TPB is robust that intentions explain behavior, while the three attitudinal antecedents explain intentions; exogenous factors, such as education, influence intention indirectly through the three antecedents (Armitage and Conner, 2001).

Many empirical studies on entrepreneurship have tested TPB and proved that this model is appropriate to study entrepreneurial intention of students (Fayolle, Gailly, and Lassas-Clerc, 2006; Souitaris, Zerbinati, and Al-Laham, 2007; van Gelderen et al., 2008). According to the researchers, entrepreneurial attitudes at both personal level and social level elucidate how the entrepreneurial intention forms. These attitudes and intentions are associated with individual perception and they are learnable (Ajzen, 2005), thus, fostering these variables is crucial to promoting entrepreneurship.

Conceptual Models and Hypotheses

Figure 1 illustrates the conceptual model of this work. The model proposes that TPB explains the entrepreneurial intentions of both female students and male students. It also demonstrates the influence of entrepreneurship education on students' entrepreneurial intention as well as its three attitudinal antecedents, namely, attitude toward entrepreneurship, subjective norm, and perceived behavioral control. Three sets of hypotheses are formulated accordingly.

Figure 1: Conceptual model



The first set of hypotheses is to confirm if the TPB explains the entrepreneurial intentions of students in the context of this study. Many empirical studies showed the relationship between the three attitudes and entrepreneurial intentions (Gird and Bagraim, 2008; Luthje and Franke, 2003; van Gelderen et al., 2008). However, some researchers failed to find the significant effect of subjective norm (Leroy, Manigart, and Meuleman, 2009; Linan and Chen, 2009). Theoretically, subjective norm directly influence entrepreneurial intention (Ajzen, 2005), but researchers have called for more empirical evidences (Linan and Chen, 2009; Krueger, Reilly, and Carsrud, 2000). Thus this study firstly tests if the TPB explains the entrepreneurial intentions of female students and male students.

H1a: TPB model explains entrepreneurial intention of **female** students.

H1Fa: Attitude toward entrepreneurship positively influences entrepreneurial intention of female students.

H1Fb: Social norm about entrepreneurship positively influences entrepreneurial intention of female students.

H1Fc: Perceived behavioral control about entrepreneurship positively influences entrepreneurial intention of female students.

H1b: TPB model explains entrepreneurial intention of **male** students.

H1Ma: Attitude toward entrepreneurship positively influences entrepreneurial intention of male students.

H1Mb: Social norm about entrepreneurship positively influences entrepreneurial intention of male students.

H1Mc: Perceived behavioral control about entrepreneurship positively influences entrepreneurial intention of male students.

The second set of hypotheses deals with the influence of entrepreneurship education. According to TPB (Ajzen, 2005), entrepreneurial behavior is determined by intention, which is derived from three antecedent attitudes. Exogenous factors such as demographic factors influence entrepreneurial intention indirectly either through deriving attitudes or moderating the relationship between intentions and behavior (Ajzen, 2005). Entrepreneurship education, as an external factor, thus influences attitude toward entrepreneurship, subjective norm and perceived behavioral control that predict entrepreneurial intention (Krueger, Reilly, and Carsrud, 2000).

The effect of entrepreneurship education on entrepreneurial intention has been confirmed by many studies (Dutta, Li, and Merenda, 2010; Gird and Bagraim, 2008; Souitaris, Zerbinati, and Al-Laham, 2007). These studies provided evidence that through entrepreneurship education, the entrepreneurial attitudes and intentions of participants including males and females are significantly improved. That is, students who take an entrepreneurship course will have higher level of entrepreneurial intention, attitude toward entrepreneurship, subjective norm and perceived behavioral control than the non-trained group. Therefore, in this study, it is reasonable to propose that male students and female students who take an entrepreneurship course will have higher level of entrepreneurial attitudes and intentions than those males and females who do not take the course.

H2Fa: Entrepreneurship education positively enhances the **entrepreneurial intention** of **female students**.

H2Fb: Entrepreneurship education positively enhances **female students'** the **attitude toward entrepreneurship**.

H2Fc: Entrepreneurship education positively enhances **female students' subjective norm** as regard to entrepreneurship.

H2Fd: Entrepreneurship education positively enhances **female students' perceived behavioral control** as regard to entrepreneurship.

H2Ma: Entrepreneurship education positively enhances the **entrepreneurial intention** of **male students**.

H2Mb: Entrepreneurship education positively enhances **male students'** the **attitude toward entrepreneurship**.

H2Mc: Entrepreneurship education positively enhances **male students' subjective norm** as regard to entrepreneurship.

H2Md: Entrepreneurship education positively enhances **male students' perceived behavioral control** as regard to entrepreneurship.

Differences between males and females regarding their entrepreneurial career interests and attitudes have received increasing attentions of scholars in recent years. Rivera et al. (2007) found that women tend to perceive higher career barriers, and that such perceptions can influence career choices. This is evidenced by research on gender stereotypes that career barriers are usually related to gender-based differences (Cardoso and Marques, 2008). Gender stereotypes impact individuals' career choices by affecting their attitudes and perceptions about entrepreneurship, which is traditionally considered as a male profession (Johnson, Stone, and Philips, 2008). Thus, female students are assumed to have lower entrepreneurial attitudes as compared with males. Researchers have also found that females are more likely to recognize that they have lower entrepreneurial skills, capabilities and performance than men (Chowdhury and Endres, 2005; Wilson, Kickul, and Marlino, 2007), attributed to the characteristics of entrepreneurship (i.e., masculine areas) (Langowitz and Minnitti, 2007).

Hence, although the number of female entrepreneurs has been increasing in these years, still males are more likely to have positive perception about entrepreneurship, they are considered more suitable and more capable to be involved in entrepreneurship (Verheul, Van Stel, and Thurik 2006). These lead to the assumptions of this study that entrepreneurial attitudes and intentions are different between male and female students (whether they study entrepreneurship or not). Male students are more likely to have high entrepreneurial intentions and attitudes than females.

H3Ca: Male students have higher entrepreneurial intention than female students in control group (where students do not study entrepreneurship).

H3Cb: Male students have more positive attitude toward entrepreneurship than female students in control group.

H3Cc: Male students perceive more positive normative beliefs about entrepreneurship than female students in control group.

H3Cd: Male students perceive higher entrepreneurial control than female students in control group.

H3Ea: Male students have higher entrepreneurial intention than female students in entrepreneurship group.

H3Eb: Male students have more positive attitude toward entrepreneurship than female students in entrepreneurship group.

H3Ec: Male students perceive more positive normative beliefs about entrepreneurship than female students in entrepreneurship group.

H3Ed: Male students perceive higher entrepreneurial control than female students in entrepreneurship group

Methodology

Data Collection and Participants Characteristics

The participants of this study included engineering students majored in systems engineering and industrial engineering management from 3 universities in Hong Kong. They included two groups. The entrepreneurship group was the undergraduate engineering students who took an entrepreneurship course, and the control group was the engineering students who had similar academic background with the first group, but did not take the course. The entrepreneurship courses offered in the universities aimed at delivering entrepreneurial knowledge and skills to the students in order to develop their entrepreneurial attitudes and intentions. These courses all lasted for one semester and they were similar in terms of contents and teaching methods.

Questionnaires were administered to 294 engineering students who took an entrepreneurship course in their classes and randomly to 300 students who did not take the courses in the engineering departments. A total of 411 useful questionnaires were collected with a response rate of 69%, including 201 from the entrepreneurship group and 210 from the control group. In both groups, around 70% were male students and 30% were female students. The average age of all the respondents was 22 years old, and most of them (> 96 %) were in their second or third year of study.

These figures roughly corresponded to the general characteristics of engineering students in universities in Hong Kong (University Grant Committee, 2010). Generally, the non-respondents and respondents did not show significant difference in terms of their gender, race, age, and year of study. Therefore, the data collected were considered representative.

Measures

The four TPB variables (entrepreneurial intention, attitude toward entrepreneurship, subjective norm and perceived behavioral control) were measured by multiple items. Each item was measured by a 7-point Likert Scale with 1 representing strongly disagree to 7 representing strongly agree. *Entrepreneurial intention* was measured by four items developed based on Autio et al. (2001) and Kolvereid and Isaksen (2006). These items included (1) I will join on-campus entrepreneurial programs/activities which assist students in creating own business if available, (2) I will start my own business after graduation in the future, (3) I will work together with good partners to start a new business in the future, and (4) I will start my own business if financial support is secured.

The measures of *attitude toward entrepreneurship* were developed based on the items validated by Luthje and Frank (2003) and Kolvereid and Isaksen (2006). Three items were to measure this construct, including (1) I'd rather be my own boss than have a secure job, (2) I can make big money only if I create my own business, and (3) I'd rather create a new firm than be the employee of an existing one.

Subjective norm was measured by three items which have been validated by previous studies on entrepreneurship (Autio et al. 2001; Carr and Sequeira 2007). The items included (1) I believe that my closest family thinks that I should pursue a career by creating my own business, (2) I believe that my closest friends think that I should pursue a career by creating my own business, and (3) I believe that other people who are important to me think that I should pursue a career by creating my own business.

The measures of *perceived behavioral control* were developed based on the items used by Autio et al. (2001) and Kolvereid and Isaksen (2006). Three items were used, including (1) If I start my own business, the chances of success would be very high, (2) I have enough knowledge and

skills to start a business, and (3) I am capable to develop or handle an entrepreneurial project.

Finally, gender was measured using a single item on the questionnaire. Female is coded as 0, while male is coded as 1. Entrepreneurship education was measured in a dichotomous scale with codes of yes=1 and no=0.

Reliability and Validity Tests

The reliability and validity results presented in **Table 1** showed that values of Cronbach's alpha for each factor was greater than 0.7. Thus, the measurements used in this study were reliable. The construct validity was tested using an exploratory factor analysis (Bryman and Cramer, 2005). The results indicated that the items respectively converged into their belonging factors with loadings exceeded 0.5. Thus, the construct validity of the measurements used in this paper was achieved (Hair et al., 2006).

Table 1: Reliability and validity test of the measurements (n =411)

Items	Eint	Att	SN	PBC
1	0.831	0.867	0.882	0.823
2	0.838	0.857	0.894	0.866
3	0.874	0.882	0.904	0.873
4	0.847	-	-	-
Total (Eigen values)	2.875	2.264	2.394	2.191
% of variance	71.868	75.463	79.811	73.018
Con. alpha	0.869	0.837	0.873	0.813

Hypothesis Testing Methods

Structural equation modeling (SEM) and t-tests were used to test the hypotheses stated in the conceptual model. SEM was used to verify the TPB in the context of female and male engineering students (H1a &1b). T-tests were used to compare the differences between the entrepreneurship group and control group (H2Fa-d, H2Ma-d), and male and female students H3Ca-d, H3Ea-d) regarding their entrepreneurial intentions and attitudes.

As the sample sizes of female and male students were different, unpaired t-tests (Armitage, Berry, and Matthews, 2002) were used in this study. Two cases were considered: 1) sample sizes are unequal but variance is equal, and 2) sample sizes are unequal and variance is also

unequal. Among the respondents, 108 were female students and 303 were males. The gender distribution matched the fact that about 70% of engineering students in Hong Kong were males (University Grant Committee, 2010). Levene's test was conducted for testing the equality of variances. The computations were done by SPSS and t-statistics were selected based on the results of the equality test.

Results

Correlations among the Variables

Before testing hypotheses, the correlations among the variables were analyzed as shown in **Table 2**. Attitude toward entrepreneurship, subjective norm and perceived behavioral control are all highly related to entrepreneurial intention ($p<0.01$). Gender was significantly related to entrepreneurial intention and subjective norm ($p<0.05$), while it did not significantly link to attitude toward entrepreneurship or perceived behavioral control. Entrepreneurship education was highly associated with the four entrepreneurial variables (Eint, Att, SN, and PBC, $p<0.01$). The correlations may indicate that it needs to further explore how entrepreneurship education influences the entrepreneurial attitudes and intentions of female students and male students.

Table 2: Correlations among the variables (n=411)

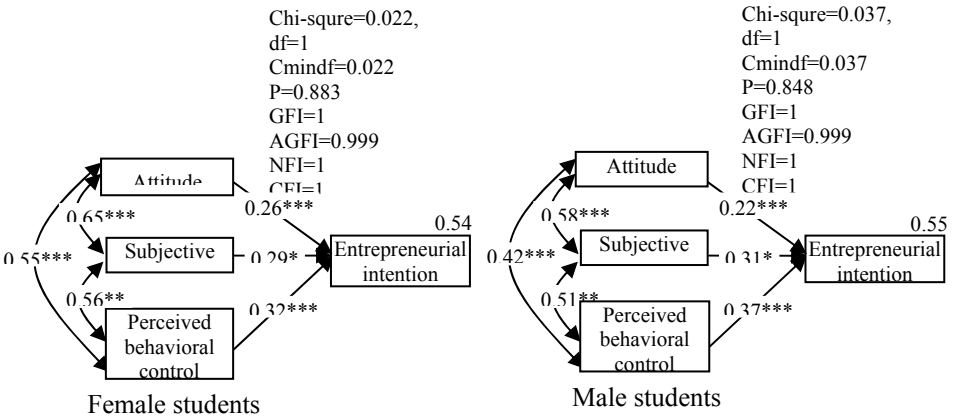
	Eint	**Att**	**SN**	**PBC**	**EE**	**Gender**
Entrepreneurial intention (Eint)	1					
Attitude toward entrepreneurship (Att)	0.577**	1				
Subjective norm (SN)	0.633**	0.601**	1			
Perceived behavioral control (PBC)	0.621**	0.460**	0.523**	1		
Entrepreneurship education (EE)	0.278**	0.272**	0.402**	0.377**	1	
Gender	0.116*	0.072	0.110*	0.061	-0.079	1

** Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

TPB suitable for both Males and Females

The TPB was applied to examine the entrepreneurial intentions of both female and male students. The results are presented in **Figure 2**. The overall fit indices of both models indicated a good model fit (Kline, 2005), for example, GFI, AGFI, NFI, CFI, and TLI were close to 1, RMSEA was close to zero, and the chi-square statistics ($p>0.05$) was not significant. Moreover, in both models, all the paths were significant at a level of 0.01. That is, the TPB fitted both female and male data very well. Therefore, hypotheses H1a and H1b were supported.

*Figure 2: Test of TPB for female and male engineering students (Standardized estimates) ***p<0.001; **p<0.01.*



Influence of Entrepreneurship Education

H2Fa,b,c,d and H2Ma,b,c,d argued that entrepreneurship education would enhance the entrepreneurial intention, attitude, subjective norm and perceived behavioral control of female students and male students. The results in **Table 3** show that female students in entrepreneurship group had significantly higher level of entrepreneurial intentions and attitudes (personal attitude toward entrepreneurship, subjective norm, and perceived behavioral control, $p<0.05$) than the females in control group. Similar results were found for male students ($p<0.01$). The tests achieved sufficient power of 0.95, which was far above the cut value of 0.8 (alpha was set to be 0.1 as the sample sizes were relatively small (Stevens, 2002)),

indicating that we correctly rejected the null hypotheses when they were really false (Steinberg, 2011). Thus, the errors associated with sample size were not significant (Cohen, 1988). Therefore, regardless of gender, the students who took the entrepreneurship course had significantly higher level of entrepreneurial intention and attitudes than those who did not take the course. Thus, hypothesis H2Fa,b,c,d and H2Ma,b,c,d were supported.

Table 3: Influence of entrepreneurship education by gender

		Gender	Control group (N=210) mean	Entrep. group (N=201) mean	Sig.
H2Fa	Entrepreneurial intention	Female	3.578	4.121	**0.018**
H2Fb	Attitude toward entrepreneurship	Female	3.632	4.194	**0.007**
H2Fc	Subjective norm	Female	3.000	3.933	**0.000**
H2Fd	Perceived behavioral control	Female	3.681	4.622	**0.000**
H2Ma	Entrepreneurial intention	Male	3.863	4.488	**0.000**
H2Mb	Attitude toward entrepreneurship	Male	3.838	4.442	**0.000**
H2Mc	Subjective norm	Male	3.353	4.333	**0.000**
H2Md	Perceived behavioral control	Male	4.018	4.718	**0.000**

Differences between Male Students and Female Students

H3Ca,b,c,d and H3Ea,b,c,d respectively posited that male students would have higher entrepreneurial intentions and attitudes than female students in control group and entrepreneurship group. As presented in **Table 4**, the mean scores on the four entrepreneurial variables of male students were all higher than those of female students, in both entrepreneurship group and control group. But the difference in attitude toward entrepreneurship between females and males was not significant regardless of whether they studied entrepreneurship ($p>0.1$). That is, the personal interest in business ownership for male and female students was statistically similar.

The results also showed that in control group, male students had significantly higher level of subjective norm and perceived behavioral control than females ($p<0.05$) with a power of 0.8 (correctly rejecting null hypotheses (Cohen, 1988)), but their entrepreneurial intentions were not significantly different. In entrepreneurship group, males had stronger intentions to start up ($p<0.05$) with a power of 0.8, while their perceived

behavioral control was similar to that of females (p>0.05). Therefore, H3Cc,3Cd and H3Ea,3Ec were supported, while H3Ca,3Cb and H3Eb,3Ed were not supported.

Table 4: Differences between female and male students

		Control group (n=210)		Entrepreneurship group (N=201)	
	Gender	**Mean**	**Sig.**	**Mean**	**Sig.**
a. Entrepreneurial intention (H3Ca,**3Ea**)	Female	3.578	0.127	4.121	**0.034**
	Male	3.863		4.488	
b. Attitude toward entrepreneurship (H3Cb, 3Eb)	Female	3.632	0.189	4.194	0.146
	Male	3.838		4.442	
c. Subjective norm (**H3Cc**, **3Ec**)	Female	3.000	**0.031**	3.933	**0.036**
	Male	3.353		4.333	
d. Perceived behavioral control (**H3Cd**, 3Ed)	Female	3.681	**0.021**	4.622	0.527
	Male	4.018		4.718	

Discussions and Implications

Discussions

The purpose of this work was to explore the differences between female and male students in terms of their entrepreneurial attitudes and intentions by studying an entrepreneurship course. The results showed that entrepreneurial intentions of males and females were significantly predicted by attitude toward entrepreneurship, subjective norm, and perceived behavioral control (**H1a & H1b**). Further, the entrepreneurship course was found to positively enhance the entrepreneurial attitudes and intentions of both boys and girls (**H2Fa-d & H2Ma-d**). The results are congruent with previous studies (Dutta, Li, and Merenda, 2010; Fayolle, Gailly, and Lassas-Clerc, 2006) that entrepreneurship learning and training can strengthen individuals' interest in engaging in entrepreneurial activities, improve their normative norm about venture creation, and develop their skills and abilities to start up.

While we looked at the specific differences between male and female students with the exertion of entrepreneurship education, we found that the male students and female students were different regarding their entrepreneurial attitudes and intentions. The **most obvious difference** was

related to their subjective norm. Male students consistently perceived more positive **normative belief** about entrepreneurship than the female students regardless of their entrepreneurship education background (**Table 4: H3Cc & H3Ec**). The findings reflect that subjective norm, referring to social pressures or influences that opposes to personal interest in entrepreneurship, distinguishes male and female's entrepreneurial decision. The results confirm the prior research on gender stereotype and entrepreneurship (Fairlie and Robb, 2009; Gupta et al., 2005; Verheul, Van Stel and Thurik, 2006). The stereotype influence is obvious in traditional masculine cultures, such as Chinese culture. Hence, even though the entrepreneurship course significantly increased the students' belief that they were more likely to get approval of creating own businesses after studying entrepreneurship (**Table 3**), it seemed difficult to change their belief about social norm that males should pursue an entrepreneurial career rather than females.

In terms of **perceived behavioral control**, male students perceived significantly more capable than females to handle entrepreneurial activities in the control group (**H3Cd**), while the difference was *not* significant in entrepreneurship group (**H3Ed**). That is, without studying entrepreneurship, the gender-based perception about individual capability to carry out an entrepreneurship behavior (man-characterized area) diminished the female students' control over creating a new venture (Verheul, Van Stel, and Thurik, 2006). However, the situation changed after learning entrepreneurship. Female students were as capable as their male counterparts regarding performing entrepreneurial activities. This probably reflects that female students are more eager to learn entrepreneurial knowledge, to develop related skills and abilities, and to face challenges in their careers (Petridou, Sarri, and Kyrgidou, 2009). Thus, the entrepreneurial knowledge and skills acquired through entrepreneurship education successfully strengthened the female students' confidence, capabilities and entrepreneurial acumens, and reduce the differences between females and males.

Further, the **attitudes toward entrepreneurship** of males students (studying entrepreneurship or not) were relatively higher than those of females, but not significantly (**Table 4: H3Cb & 3Eb**). The findings indicated that although entrepreneurship education had a positive effect on attitude toward entrepreneurship (**Table 3**), the difference between female and male students regarding their personal interest in or preference to

entrepreneurship was not significant. This is can probably be explained by that women are better educated and more independent than before and they have more opportunities to develop their career interests like men (Lind, 2006). In recent years, women have developed more positive perceptions and evaluation about entrepreneurship and innovation (e.g., importance and benefits of entrepreneurship and innovation to the society and individuals) (Verheul, Thurik, and Grilo, 2006). The prevalence of entrepreneurship and innovation may have improved people's attitude toward initiating entrepreneurial activities. Although it somehow is male-characterized, it is as valuable, important and interesting for women to engage in entrepreneurship as men. Thus, the personal attitude toward entrepreneurship between genders was found to be not significant.

Males' **intention** to startup was slightly higher than that of female students ($p>0.05$) in control group (**H3Ca**), while in the entrepreneurship group, this difference was significant ($p<0.05$) (**H3Ea**). Among those who did not study entrepreneurship, female students and male students had similar level of entrepreneurial intention. This was perhaps attributed to their lower level of understanding, knowledge and skills about entrepreneurship (Fayolle, Gailly, and Lassas-Clerc, 2006; Souitaris, Zerbinati, and Al-Laham, 2007). The attractiveness of entrepreneurship to the female and male students was similar and their entrepreneurial intention could not be significantly distinguished. However, after entrepreneurship education, the intentions of all students to start up were significantly increased. Particularly, male students, after completing the entrepreneurship course, achieved higher improvement of entrepreneurial intentions than females. This difference in entrepreneurial intention could be associated with the difference in subjective norm. As males perceive much more encouragement to perform entrepreneurship, their intentions to start up are likely to be higher.

The study reveals that, after exposing to entrepreneurship education, female and male students had similarly favorable attitude regarding entrepreneurship. The females also felt as capable as their male counterparts. However, the females cared more about normative opinions on whether they should become entrepreneurs because of the gender stereotype. The subjective norm differences between male and female students significantly influenced their entrepreneurial intentions.

Implications for Entrepreneurship Education

This study has important implications for entrepreneurship education. Entrepreneurship programs and courses to be constructive and facilitate entrepreneurial potential of students, especially females, should consider the differences of entrepreneurial attitudes and intentions between males and females. Educational measures should be directed at the three attitudinal antecedents of intention, with more effort in improving **subjective norm** about female entrepreneurship. Under the impact of gender stereotypes, females are more likely to self-impose and to be imposed by other people some barriers to becoming entrepreneurs, thereby decreasing their entrepreneurial intentions (Langowitz and Minniti, 2007). Accordingly, when designing entrepreneurship courses, education measures should (1) emphasize woman entrepreneurship in order to break the image that "entrepreneurs are usually males", (2) provide support and encouragement to female students, and (3) create an entrepreneurial atmosphere or culture within the campus.

First, knowing what to do to become an entrepreneur is not enough to foster entrepreneurial intention, the potential female entrepreneurs have also to ascertain that entrepreneurship is important to them, and values and contributions of women entrepreneurship to the economic development are acknowledged and supported by the society. Accordingly, some facts and examples of woman entrepreneurship (e.g., retailing and services, sectors with relatively low risk and capital investment), rather than only famous male entrepreneurs, should be involved in entrepreneurship courses. Teachers should also stress the contribution of woman entrepreneurship (e.g., diversity in entrepreneurship using different approaches and strategies to create and run their businesses) (Verheul, Van Stel, and Thurik, 2006). The purpose that we underline woman entrepreneurship is to break the image that "entrepreneurs are usually males" and clarify that it is also common and suitable for women to create new business and they can perform as well as male entrepreneurs do.

Second, providing female entrepreneurial role models is very relevant to giving supports (psychological and technical) and confidence to potential female entrepreneurs. Social learning theory holds that role model plays an important role in providing entrepreneurial motivation, confidence, knowledge and resources (Bandura, 1986). The opinion, suggestion and inspiration of the women entrepreneurial models can be a

powerful source of encouragement, recognition and qualification to potential female entrepreneurs. Thus, the entrepreneurship courses/programs should provide entrepreneurial models, such as female entrepreneurs who are professional and have similar backgrounds (age, education, culture, gender and business areas) to the students to deliver guest lecturers, seminars, or other forms of interaction. Entrepreneurs with "closer" backgrounds to the students will lead to stronger interest in entrepreneurship and motivate the students to imitate the entrepreneurial behaviors (Bandura, 1986).

Thirdly, creating entrepreneurial atmosphere and culture within the campus, especially promoting female entrepreneurship is important, given the strong association between normative belief and cultures (Ajzen, 1991; 2005). A supportive culture for female entrepreneurship helps recognize the value of female entrepreneurship and approves/validates entrepreneurial attempts of female students, hence improves the entrepreneurial intentions of female students. Institutes may create a female entrepreneurial culture through a series of promotion activities on women business ownership (e.g., seminars by local woman entrepreneurs, female business project competitions, entrepreneurial workshops and mentoring schemes for female entrepreneurship. In an environment with entrepreneurial culture, it is more likely to have higher entrepreneurial intentions and start-up rate (Veciana, 2007).

Conclusion

Although extensive research has been observed on entrepreneurship education, comparing the impact of entrepreneurship education on entrepreneurial intention of female and male students is rare. Overall, entrepreneurship education improves both males' and females' entrepreneurial attitudes and intentions. The normative beliefs that entrepreneurship is in favor of males are difficult to be changed, reflecting the self-perceptions about entrepreneurship shaped by gender stereotypes. Our findings provide the foundations for future research and discussion of the teaching of entrepreneurship for enhancing female entrepreneurship in particular. Educators can benefit from this work by developing quality entrepreneurship programs and courses to encourage entrepreneurial activities for both males and females.

There are some limitations in this study, which can nonetheless be considered as opportunities for future research. First, this study used cross-sectional design that deals with the status of data. Despite the prevalence of this approach used in entrepreneurship education research, the comprehensive findings on the causal effect of entrepreneurship education on entrepreneurial intention should be further explored with a longitudinal research design, which concerns changes in entrepreneurial attitudes and intentions upon the intervention of entrepreneurship education. Second, the participants in this study were undergraduate engineering students from Hong Kong. The results were limited to the context of Hong Kong engineering students. Future studies on entrepreneurial intentions are encouraged to include students from different countries and disciplines to have more representative results. Third, this study focused on entrepreneurial intention, not actual entrepreneurial behaviors. The outcome of entrepreneurship education on the entrepreneurship rate was not addressed. In this aspect, our model could be extended to include the actual entrepreneurial activities of the students, in order to reveal the effect of entrepreneurship education on startup.

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A P S T R A K T

Poslovne firme u vlasništvu žena doprinose kvalitetu i raznovrsnosti preduzetništva. Međutim, stopa pokretanja novih biznisa od strane žena daleko zaostaje za muškarcima. Podsticanje ženskog preduzetništva preko programa preduzetničke edukacije, predstavlja izuzetno važnu temu u ovom domenu. Ustanovljeno je da su preduzetničke namere kod studenata ključne kod njihovog preduzetničkog ponašanja. Cilj ovog rada je da empirijski uporedi preduzetničke namere između muških i ženskih studenata tehničkih nauka koji su prošli preduzetničku edukaciju. Teorija Planiranog Ponašanja (TPP) je korišćena kao teorijska osnova ove studije. U ovoj studiji je učestvovalo ukupno 411 studenata tehničkih nauka sa univerziteta u Hong Kong-u, od čega 303 muškarca i 108 žena.

Rezultati pokazuju da je TPP pogodna da razjasni preduzetničke namere, kako muških, tako i ženskih studenata. Dalje, muški i ženski studenti se razlikuju ne samo po preduzetničkim namerama, već i po preduzetničkim stavovima i društvenim normama, čak iako su iskusili preduzetničku edukaciju. Ova studija sugeriše da bi nastavne strategije koje podstiču ženske preduzetničke namere trebalo da 1) stave akcenat na žensko preduzetništvo, 2) omoguće ženske preduzetničke modele, i 3) stvore preduzetničku kulturu u studentskim domovima. Ova studija je verovatno prva koja istražuje preduzetničke namere po polu, uključujući preduzetničku edukaciju. Ona doprinosi promovisanju ženskog preduzetništva, kao i razvoju pravih edukativnih mera za pomoć ženskim studentima, kako bi ostvarile svoj preduzetnički potencijal

KLJUČNE REČI: *preduzetnička edukacija, preduzetničke namere, polna različitost, teorija planiranog ponašanja*

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