frontiers in Education

ORIGINAL RESEARCH
published: 05 March 2018
doi: 10.3389/feduc.2018.00013

Impact of Entrepreneurship Training on Entrepreneurial Efficacy and Alertness among Adolescent Youth

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Our study focuses on the impact of systematic entrepreneurship training comprising both active and passive learning activities on entrepreneurial alertness and efficacy among adolescent youth. Reports from a two-wave online survey among 328 students from five secondary schools (aged 13–16 years; 34.8% male and 65.2% female) reveal that those who went through entrepreneurship training (treatment group, $N = 142$) had significantly higher entrepreneurial alertness and efficacy levels compared to those who did not go through training (control group, $N = 186$). We also find that even with gender effects accounted for, the higher entrepreneurial alertness and efficacy levels in the treatment group are due in part to both passive and active/hands-on elements of the program. Our study offers direct evidence that conducting entrepreneurship training programs among secondary school students could be an effective means to enhance entrepreneurial competencies among the youth. Specifically, our findings highlight the value of entrepreneurial training in improving age-appropriate competencies of entrepreneurial alertness and efficacy.

Keywords: entrepreneurship, entrepreneurial training, entrepreneurial alertness, entrepreneurial efficacy, youth

OPEN ACCESS

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Specialty section:
This article was submitted to Educational Psychology, a section of the journal Frontiers in Education

Received: *31 October 2017*
Accepted: *15 February 2018*
Published: *05 March 2018*

Citation:
Ho M-HR, Uy MA, Kang BNY and Chan K-Y (2018) Impact of Entrepreneurship Training on Entrepreneurial Efficacy and Alertness among Adolescent Youth. Front. Educ. 3:13. doi: 10.3389/feduc.2018.00013

INTRODUCTION

Entrepreneurship plays a critical role in boosting economic growth and development (Wong et al., 2005). As such, policymakers have been focusing their efforts on entrepreneurship promotion. Promoting entrepreneurship goes beyond assisting incumbent entrepreneurs and business owners; it also encompasses inculcating an enterprising spirit among young people because adolescents are the source of the next wave of entrepreneurs. Entrepreneurship training, which aims to equip participants with relevant knowledge and skills (Katz, 2007), is regarded as a practical means to promote entrepreneurship among young people (Peterman and Kennedy, 2003).

Meta-analytic findings indicate that entrepreneurship training is effective in promoting cognitive and motivational outcomes resulting in more start-ups (Martin et al., 2013). However, our theoretical understanding of how and why entrepreneurship training exerts a positive influence on entrepreneurial competencies is still lacking (Martin et al., 2013). Specifically, our knowledge regarding designing and improving training to promote entrepreneurship effectively is somewhat surprisingly limited (Gielnik et al., 2015). Importantly, according to the Global Entrepreneurship Monitor's special report on entrepreneurship training, we need more studies on entrepreneurship training particularly on whether and in what specific ways training makes a difference (Martinez et al., 2010).

As a tangible response to the various calls for more systematic studies on entrepreneurship training, our study aims to validate the value of promoting entrepreneurship training among adolescents, and specifically to examine whether activities that involve passive learning (e.g., classroom lessons, assembly talks, visits to firms) and those that involve more active, experiential learning (e.g., attachments and internships, product/prototype creation, learning from a mentor, etc.) differentially improve important entrepreneurial competencies and efficacy. The entrepreneurship training in our current study involves adolescent youth. Our focal outcomes are (1) entrepreneurial alertness, or the ability to recognize new opportunities that were previously not available (Baron and Ensley, 2006), and (2) entrepreneurial self-efficacy, or the level of confidence individuals have in their entrepreneurial capabilities (Chen et al., 1998). Alertness and efficacy are age-appropriate entrepreneurial competencies that lay the foundations of future entrepreneurial activity in the later adult stage (Obschonka et al., 2011). Entrepreneurial competencies are not only relevant to those who aspire to pursue their own business ventures in the future; they are also increasingly being recognized as critical occupational skills in navigating the world of work in the twenty-first century (Uy et al., 2015).

RESEARCH QUESTIONS AND GOALS

Entrepreneurship training is a structured program that aims to equip participants with the necessary skillset and mindset for identifying and launching new business ventures (Cope, 2005; Katz, 2007). Previous research on entrepreneurship training include studies that examined the effect of training on university students' entrepreneurial intentions (Souitaris et al., 2007), a pre–post comparison of entrepreneurial career intentions among students in terms of desirability and feasibility (Peterman and Kennedy, 2003), and how entrepreneurial competencies mediate the linkage between entrepreneurial personality and entrepreneurial intention and alertness (Obschonka et al., 2017). Building on these studies, we used a quasi-experimental design to test whether entrepreneurship training (and particular features of it) would improve entrepreneurial competencies and ascertain the impact of training intervention on outcomes of entrepreneurial alertness and entrepreneurial self-efficacy.

The first outcome of entrepreneurial alertness has been argued to be vital for successful entrepreneurship (Obschonka et al., 2017). Entrepreneurship "is based on [the] discovering of opportunities and resources to exploit them" (Kaish and Gilad, 1991, p. 45). It is thus only natural that successful entrepreneurship will require that the entrepreneur be adept at inferring from his surroundings to notice and see value in opportunities not apparent to others (Kaish and Gilad, 1991; Tang, 2008). On a similar note, Kirzner (1973) argued that the element considered entrepreneurial in human action is the alertness to information rather than the possession of information.

Tang et al. (2012) conceived entrepreneurial alertness to be a construct with three dimensions. The first dimension of scanning and searching the environment broadens the domain-specific knowledge base of the entrepreneur. The second dimension of association and connection allows the entrepreneur to make sense of the linkages between outwardly unrelated occurrences and to approach situations with a novel perspective (Tang et al., 2012). The final dimension of evaluation and judgment enables the entrepreneur to be more situationally aware: to focus on the most important details and to discern if there is a possible opportunity (Tang et al., 2012). Individuals possessing high entrepreneurial alertness thus have a more precise perception of reality (Gaglio and Katz, 2001) as they tend to search for and notice environmental changes, and tend to have a more adaptive mental framework (Baron, 2004). Previous studies have found a positive relationship between entrepreneurial alertness and the probability of new venture creation (Langowitz and Minniti, 2007).

The second outcome is entrepreneurial self-efficacy. Self-efficacy shapes one's goals, the amount of effort one is willing to put into the goal, and one's level of persistence (Bandura, 1993). Being a domain-specific efficacy, entrepreneurial self-efficacy has stronger predictive power compared to general self-efficacy (Gist, 1987). Entrepreneurial self-efficacy has thus indeed been consistently shown to be a positive influence on an individual's intentions to become involved in entrepreneurship (e.g., Chen et al., 1998; Segal et al., 2005; Zhao et al., 2005; Cassar and Friedman, 2009). Among incumbent entrepreneurs, entrepreneurial self-efficacy had a positive link with the amount of personal, financial, and time poured into their respective enterprises (Cassar and Friedman, 2009).

Entrepreneurial self-efficacy has been found to have a strong influence on the career options considered by youths in middle and high school aged 11–18 years (Wilson et al., 2007). Similarly, Schröder and Schmitt-Rodermund (2013) found that for adolescents from families that run their own enterprises, the higher their perceived entrepreneurial competencies (analogous to entrepreneurial self-efficacy), the more intrinsically motivated they were to succeed in their respective family businesses in the future. Entrepreneurial self-efficacy is also a "significant driver of the decision to invest in discovering an entrepreneurial opportunity as well as to exploit an entrepreneurial opportunity" (Cassar and Friedman, 2009, p. 254) and has additionally been found to moderate the relationship between environmental munificence and entrepreneurial alertness (Tang, 2008).

Both entrepreneurial alertness and entrepreneurial self-efficacy have been recommended as behavioral competencies that should be promoted more comprehensively in entrepreneurial curricula (Morris et al., 2013). Entrepreneurial alertness has been postulated to be "an individual capability that can be learned and improved" (Tang et al., 2012, p. 91). Entrepreneurial self-efficacy appears to be moldable through entrepreneurship education (Zhao et al., 2005; Fayolle et al., 2006). Taken together, the first goal of this study is to test if entrepreneurship training can increase (a) entrepreneurial alertness and (b) entrepreneurial self-efficacy.

In congruence with scholarly recommendations to explore which teaching methods are effective in entrepreneurship education (e.g., Segal et al., 2007; Pihie and Bagheri, 2011), our study also examined features of the entrepreneurship training program. As entrepreneurship is action-oriented (Rasmussen and Sørheim, 2006), the experiential learning of entrepreneurship through activities has been encouraged by several scholars

(e.g., Rasmussen and Sørheim, 2006; Morris et al., 2013). Educators in general believe in the importance of experiential learning in entrepreneurship training (Segal et al., 2007).

The activities in the training program examined in this study range from assembly talks and mentor guidance to internships and competitions. The activities are of various types, from experiential to verbal persuasion. According to Bandura's theory of self-efficacy, self-efficacy can be developed through experiences of mastery, modeling, verbal persuasion, and physiological states (Bandura, 1977). Likewise, for entrepreneurial alertness, Tang et al. (2012) argued that following social cognitive theory, alertness can be influenced "by actively engaging in behavior, cognition, action, and experiential learning" (p.91). Thus, our second goal for this study is to examine whether the features of entrepreneurship training in the form of passive and active/hands-on activities account for the impact of entrepreneurship training on (a) entrepreneurial alertness; and (b) entrepreneurial self-efficacy.

In sum, our research seeks to add nuance to address the broad question—*does entrepreneurship training make a difference?*—by focusing on the adolescent youth context. Specifically, using a quasi-experimental design that allows us to compare differences in entrepreneurial competencies between a treatment or training group and the equivalent non-training group before and after the training, our research examines two questions: (1) Does systematic entrepreneurship training could effectively account for changes in secondary school students' entrepreneurial alertness and efficacy? (2) Do active/experiential and passive learning activities differentially improve entrepreneurial competencies and efficacy?

METHOD

Our data collection effort was part of a larger study on entrepreneurship promotion and training among the youth in Singapore. As such, we report only the relevant measurements and results pertaining to the aims of the current study.

Participants, Design, and Procedures

We recruited participants from five secondary schools in Singapore for this two time-point study. These five schools were sponsored by the government agency responsible for entrepreneurship promotion and development to conduct entrepreneurship training among their students. As this was a quasi-experimental study, random assignment was not employed. Instead, students who registered for the entrepreneurship training program were recruited to form the treatment group, while a corresponding number of students who did not register for the training program from the same school were recruited to form the control group. Participants in the treatment and control groups were comparable in age and educational levels.

In total, we recruited 365 participants at Time 1, the initial stage before the commencement of the entrepreneurship training program. Time 1 was to serve as the baseline measurement. There were 156 (42.7%) participants in the treatment group and 209 (57.3%) participants in the control group. Participants had a mean age of 14.53 years (SD = 1.13). There were 130 (35.6%) males and 235 (64.4%) females. The sample comprised of 106 (29.0%) Secondary 1, 41 (11.2%) Secondary 2, 157 (43.0%) Secondary 3 and 60 (16.4%) Secondary 4 students. One participant did not provide information about his/her year of study.

An information sheet about the study was disseminated to the parents 3 weeks before the administration of the first survey at Time 1. As the participants were secondary school students and thus minors, we sought for parental consent. Students whose parents consented to their participation were invited for the first survey at Time 1. They completed the online questionnaire administered by the research team in the computer laboratories of their respective schools. Participants who completed the first survey received a S$10 stationery store voucher and light refreshment.

We administered another survey at Time 2, 3 months after Time 1. Time 2 thus occurred after the conclusion of the program and was taken to see if there were any changes after the program. Some participants from Time 1 were excluded from participating at Time 2 following these exclusion criteria: (1) missing more than two responses in any section of the survey at Time 1 and/or (2) giving the same responses within any one displayed page in the Time 1 survey. After collecting the data, we used the same two criteria again when cleaning the responses from Time 2. After taking into consideration the two exclusion criteria and attrition, we were left with 328 (89.9%) valid responses in Time 2, with 142 (43.3%) participants in the treatment group and 186 (56.7%) participants in the control group. The demographic characteristics of the sample did not change drastically; the mean age was 14.55 years (SD = 1.13), and there were 114 (34.8%) males and 214 (65.2%) females. There were 96 (29.3%) Secondary 1, 37 (11.3%) Secondary 2, 140 (42.7%) Secondary 3 and 54 (16.5%) Secondary 4 students. One participant did not provide information about his/her year of study. Participants who completed the Time 2 survey received a notebook and a stationery store voucher worth S$10.

Entrepreneurship Training Program

The training program, which took place from around May to September 2015 was systematically implemented across the five schools mentioned in the earlier section on participants, design, and procedures. The program involved a structured curriculum consisting of about 15–21 sessions for students to acquire four main skills—interpersonal/personal, innovative thinking, financial, and marketing communications. The trainers comprised internal (i.e., teachers) and external (i.e., vendors) sources. The school teachers have a background in design and technology and/or had previous experience organizing similar entrepreneurship programs. The external trainers were hired from an established financial literacy education provider that obtained government accreditation. Because of the structured curriculum, the core components and key activities of the programs conducted in the five schools were similar; for example, students learned how to market and pitch, were involved in design and prototyping, and went on learning journeys. Students also met with entrepreneurs who shared their experiences, and some entrepreneurs were involved as mentors to students. The schools also held internal showcases and selected students were sent to take part in external competitions.

Variables and Measures

Passive and Active Entrepreneurial Activities

A list of 11 activities was used at Time 2 as a measure of student participation in passive and active learning activities. The list was created by building on an earlier list of activities reported in Uy et al. (2013), as these activities were common across entrepreneurship training programs in Singapore schools. Passive entrepreneurial activities refer to three activities that expose participants to entrepreneurship *via* a passive delivery of information. These activities included assembly talks, classroom lessons, and external visits to understand enterprise and innovation. Active entrepreneurial activities refer to eight activities that expose participants to entrepreneurship *via* active exchange and engagement with entrepreneurial experiences. These activities included attachments and internships, lessons involving product and prototype creation with the opportunity for hands-on experience acquiring entrepreneurship-related skills, and participation in business competitions within and outside of the school. The full list of activities is in Appendix A.

Participants were asked to indicate the activities they participated in. Two activity scores were calculated by summing the number of activities participated under each activity type. The composite passive entrepreneurial activities scores ranged from 0 to 3 (M = 2.18, SD = 1.05), while the active entrepreneurial activities scores ranged from 0 to 8 (M = 4.24, SD = 2.49). Higher activity scores indicate greater participation in the respective entrepreneurial activity type. **Table 1** provides a breakdown of treatment and control group participation in various activities in Time 2. The figures suggest that the treatment group had a significantly higher participation rate on all 11 activities ($p < 0.05$).

Entrepreneurial Efficacy

Entrepreneurial efficacy was measured at Time 1 and Time 2 using a 15-item scale. Out of the 15 items, five items were adapted from Chan et al. (2012) entrepreneurial efficacy scale, and 10 were new items created to reflect self-reported efficacy in both entrepreneurial skillsets and mind-set. Eleven items measured self-reported efficacy in entrepreneurial skillsets; examples of the items are "I am confident of developing a product using needs identification techniques" and "I am capable of conducting a market research by myself." Four items measured self-reported efficacy in an entrepreneurial mind-set; examples of the items are "I realize that starting and managing a profitable business requires plenty of hard work and sacrifice" and "I understand that even though the objective of running a business is to earn money, I should be guided by moral principles." The full list of items is in Appendix B.

Participants were asked to rate their confidence in completing tasks related to entrepreneurship on a 5-point Likert scale ranging from 1 (*not at all confident*) to 5 (*extremely confident*). The reliabilities at Time 1 were $\alpha = 0.94$ for entrepreneurial skillset efficacy, $\alpha = 0.85$ for entrepreneurial mindset efficacy, and $\alpha = 0.93$ for the entrepreneurial efficacy scale as a whole. The reliabilities at Time 2 were $\alpha = 0.93$ for entrepreneurial skillset efficacy, $\alpha = 0.86$ for entrepreneurial mindset efficacy, and $\alpha = 0.92$ for the entrepreneurial efficacy scale as a whole.

Composite entrepreneurial skillset efficacy (for Time 1, M = 3.13, SD = 0.81; for Time 2, M = 3.09, SD = 0.78) and entrepreneurial mindset efficacy (for Time 1, M = 3.84, SD = 0.78; for Time 2, M = 3.84, SD = 0.76) scores were computed by taking the mean scores across the items in each subscale. Entrepreneurial efficacy as a whole had a mean of 3.32 at Time 1 (SD = 0.72) and a mean of 3.29 at Time 2 (SD = 0.68). Higher mean composite scores indicated higher entrepreneurial efficacy.

Entrepreneurial Alertness

Entrepreneurial alertness was measured at Time 1 and Time 2 using the entrepreneurial alertness scale developed by Tang et al. (2012). These items were grouped into three dimensions of alertness: (1) *scan and search* (five items), (2) *associate and connect* (three items), and (3) *evaluate and judge* (four items). The *scan and search* dimension refers to the ability of entrepreneurs to attune to information about new business ideas. Items for the *scan and search* dimension include "I have frequent interactions with others to acquire new information" and "I always keep an eye out for new business ideas when looking for information." The *associate and connect* dimension refers to the ability to apply and

TABLE 1 | Frequency distribution of the participation in active and passive activities at Time 2.

		No. participation	
		Treatment	Control
		(*n* = 142)	(*n* = 186)
Passive activities	1. Assembly talks	129	122
	2. Classroom lessons	122	132
	3. External visits	120	90
Active Activities	4. Attachments/internships	48	45
	5. Product development lessons	118	123
	6. Group work for business idea development	124	108
	7. Report presentation	108	118
	8. Learning from mentor	90	67
	9. Receiving guidance from mentors/facilitators	104	86
	10. Presenting ideas at entrepreneurship-related events/competitions in school	81	62
	11. Presenting ideas at entrepreneurship-related events/competitions outside of school	73	36

extend logic to different pieces of information. For the *associate and connect* dimension, example items are "I see links between seemingly unrelated pieces of information" and "I often make novel connections and perceive new or emergent relationships between various pieces of information." The *evaluate and judge* dimension describes an individual's ability to assess opportunities and make judgments about the feasibility of their business ideas. Examples of the *evaluate and judge* dimension items include "I have an extraordinary ability to smell profitable opportunities" and "I have a gut feeling for potential opportunities."

Participants rated the extent to which they agreed with the items on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The reliabilities at Time 1 were $\alpha = 0.76$ for scan and search, $\alpha = 0.70$ for associate and connect, $\alpha = 0.71$ for evaluate and judge, and $\alpha = 0.88$ for the entrepreneurial alertness scale as a whole. The reliabilities at Time 2 were $\alpha = 0.71$ for scan and search, $\alpha = 0.69$ for associate and connect, $\alpha = 0.65$ for evaluate and judge, and $\alpha = 0.83$ for the entrepreneurial alertness scale as a whole.

Composite scan and search (for Time 1, M = 3.50, SD = 0.62; for Time 2, M = 3.47, SD = 0.57), associate and connect (for Time 1, M = 3.47, SD = 0.63; for Time 2, M = 3.54, SD = 0.58), and evaluate and judge (for Time 1, M = 3.53, SD = 0.59; for Time 2, M = 3.53, SD = 0.56) scores were computed by taking the mean scores across the items in each dimension. Overall entrepreneurial alertness had a mean of 3.50 at Time 1 (SD = 0.55) and a mean of 3.51 at Time 2 (SD = 0.47). Higher mean composite scores indicated higher levels of entrepreneurial alertness in each respective dimension.

Analysis

To demonstrate the impact of the training program on the treatment group, we first conducted MANCOVA on the five dependent variables (i.e., entrepreneurial skillset and mindset efficacy, and the three dimensions of entrepreneurial alertness scores) collected at Time 1, controlling for gender, to ensure the treatment and control groups were comparable before examining the training effect. To test the presence of training effect, we again conducted MANCOVA to compare the treatment and control groups in entrepreneurial efficacy and alertness at Time 2, controlling for gender. Any significant difference indicated from MANOVA was followed by *post hoc* univariate ANCOVA to detect at which dependent variable the training effect was present (Pituch and Stevens, 2016). Gender was included as a covariate in all the aforementioned analyses because gender gap between males and females in entrepreneurship has been found in serveral past studies (e.g., Mueller, 2004; Wilson et al., 2007; Walter et al., 2013).

With the training effect established, we then tried to identify if the features of the training program that can improve the entrepreneurial outcomes of the adolescents. Amount of exposure to two set of features, passive and active entrepreneurial activities (see **Table 2**), were compared between the treatment and control groups, controlling for gender by MANCOVA. After confirming these features differed between the two groups, we then checked if the amount of exposure to passive and active entrepreneurial activities can account for the significant training effects on the entrepreneurial outcomes found earlier through MANCOVA, controlling for gender. *Post hoc* ANCOVA analyses were followed up to determine which type of activities was relevant in contributing the training effect for each entrepreneurial outcome.

RESULTS

Table 2 below shows the descriptive statistics, correlations, and reliabilities of all the measures mentioned in the Section "Materials and Methods."

Training Effects on Entrepreneurial Outcomes

At Time 1, MANCOVA results indicated no significant difference between the treatment and control groups in the entrepreneurial efficacy and alertness scores, $F(5, 321) = 0.507$, $p = 0.771$. Therefore, no *post hoc* test was further conducted. This implies that adolescents in both groups were comparable in terms of their perceived efficacy in entrepreneurial skillset, mind-set, and alertness at the beginning of the study, when entrepreneurial training was either absent or minimal.

At Time 2, MANCOVA results indicated significant differences between the treatment and control groups, $F(5, 321) = 2.275$, $p = 0.047$, η_p^2 (partial eta squared) = 0.034. To identify where group

TABLE 2 | Descriptive statistics, correlations, and reliabilities.

Variables	No. items	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Gender (F = 0, M = 1)	1	–	–	–											
2 Entrepreneurial skillset efficacy (Time 1)	11	3.13	0.81	0.17**	(0.94)										
3 Entrepreneurial mindset efficacy (Time 1)	4	3.84	0.78	0.13*	0.51**	(0.85)									
4 Entrepreneurial skillset efficacy (Time 2)	11	3.09	0.78	0.25**	0.67**	0.34**	(0.93)								
5 Entrepreneurial mindset efficacy (Time 2)	4	3.84	0.76	0.17**	0.30**	0.48**	0.43**	(0.86)							
6 Scan and search (Time 1)	5	3.50	0.62	0.15**	0.58**	0.31**	0.44**	0.21**	(0.76)						
7 Associate and connect (Time 1)	3	3.47	0.63	0.12*	0.51**	0.21**	0.37**	0.17**	0.72**	(0.70)					
8 Evaluate and judge (Time 1)	4	3.53	0.59	0.10	0.66**	0.33**	0.50**	0.25**	0.67**	0.66**	(0.71)				
9 Scan and search (Time 2)	5	3.47	0.57	0.13*	0.38**	0.22**	0.47**	0.22**	0.49**	0.37**	0.41**	(0.71)			
10 Associate and connect (Time 2)	3	3.54	0.58	0.09	0.32**	0.15**	0.39**	0.16**	0.34**	0.37**	0.40**	0.53**	(0.69)		
11 Evaluate and judge (Time 2)	4	3.53	0.56	0.12*	0.45**	0.20**	0.52**	0.27**	0.38**	0.33**	0.52**	0.53**	0.47**	(0.65)	
12 Active entrepreneurial activities	8	4.24	2.49	0.04	0.22**	0.09	0.35**	0.15**	0.18**	0.13*	0.15**	0.24**	0.21**	0.22**	–
13 Passive entrepreneurial activities	3	2.18	1.05	–0.01	0.21**	0.17**	0.27**	0.21**	0.17**	0.12*	0.17**	0.21**	0.13*	0.17**	0.61**

*$p < .05$, **$p < .01$

differences were present, univariate ANCOVA was conducted on each of the five dependent variables (i.e., entrepreneurial skillset, entrepreneurial mindset, and three dimensions of entrepreneurial alertness). There was a significant diffeence in entrepreneurial skillset efficacy between the treatment (M = 3.19, SD = 0.83) and control (M = 3.02, SD = 0.73) groups, $F(1, 325) = 4.01$, $p = 0.046$, $\eta_p^2 = 0.012$. There was also a significant difference in entrepreneurial mindset efficacy between the treatment (M = 3.98, SD = 0.72) and control (M = 3.73, SD = 0.77) groups, $F(1, 325) = 8.349$, $p = 0.004$, $\eta_p^2 = 0.025$. There was a significant difference in the scan and search dimension of entrepreneurial alertness between the treatment (M = 3.55, SD = 0.60) and control (M = 3.42, SD = 0.55) groups, $F(1, 325) = 4.027$, $p = 0.046$, $\eta_p^2 = 0.012$. There was also a significant difference in the evaluate and judge dimension of entrepreneurial alertness between the treatment (M = 3.61, SD = 0.60) and control (M = 3.47, SD = 0.51) groups, $F(1, 325) = 4.412$, $p = 0.036$, $\eta_p^2 = 0.013$. In short, adolescents in the treatment group scored significantly higher in entrepreneurial skillset efficacy, mindset efficacy, scanning, and searching, and evaluating and judging compared to the adolescents in the control group. There was no significant difference in the associate and connect dimension of entrepreneurial alertness between the treatment (M = 3.58, SD = 0.61) and control (M = 3.51, SD = 0.56) groups at Time 2, $F(1, 325) = 0.915$, $p = 0.339$.

Taken together, the results suggest that the entrepreneurial training program had a valuable impact in improving overall entrepreneurial outcomes among adolescents. Compared to adolescents who did not receive any entrepreneurship training, those who received training reported higher entrepreneurial skillset and mindset efficacies, and improved ability to scan and search for, and evaluate and judge entrepreneurial opportunities.

Features of the Training Program

The subsequent set of analyses centered on identifying the features of the training program that improved the entrepreneurial outcomes of the adolescents. MANCOVA was conducted to compare the amount of exposure to (1) passive entrepreneurial activities and (2) active entrepreneurial activities in the treatment and control groups (see **Table 1**), controlling for gender. There was a significant difference between the two groups, $F(2, 324) = 30.918$, $p = 0.000$, $\eta_p^2 = 0.16$. *Post hoc* ANCOVA revealed significant differences in the amount of passive activities between the treatment (M = 2.61, SD = 0.74) and control (M = 1.85, SD = 1.12) groups, $F(1,325) = 49.323$, $p < 0.001$, $\eta_p^2 = 0.132$. There was also a significant difference in the amount of active/hands-on activities between the treatment (M = 5.25, SD = 2.19) and control (M = 3.47, SD = 2.42) groups, $F(1, 325) = 46.957$, $p < 0.001$, $\eta_p^2 = 0.126$. Thus, compared to those who did not receive entrepreneurial training, those who received training reported having exposure to more passive and active/hands-on entrepreneurship-related activities. The entrepreneurial training program effectively increased the exposure to entrepreneurship-related activities for adolescents in the treatment group. No significant gender difference was found for the amount of exposure in both active and passive entrepreneurial activities.

The next step taken was to check if the amount of exposure to passive and active entrepreneurial activities was responsible for accounting for the significant training effects on the entrepreneurial outcomes found earlier. To establish the roles played by passive and active activities in the observed differences at Time 2, we performed MANCOVA on the five entrepreneurial outcomes (i.e., entrepreneurial skillset, entrepreneurial mindset, and three dimensions of entrepreneurial alertness), including gender, passive and active activities as covariates.

With the inclusion of gender, passive and active activities as covariates, there was no significant difference between the treatment and control groups, $F(5, 319) = 1.202$, $p = 0.308$, though we found a significant gender effect: $F(5, 319) = 5.432$, $p < 0.001$. Also, significant effects of exposure to both active and passive activities were detected. *Post hoc* ANCOVA analyses (with the inclusion of gender, passive, and active activities as covariates) was then performed on each of the entrepreneurial outcomes separately.

Active activities contributed to the differences between the treatment and control group in (1) entrepreneurial skillset efficacy, $F(1, 323) = 19.607$, $p < 0.001$, $\eta_p^2 = 0.057$; (2) the *scan and search* dimension of entrepreneurial alertness, $F(1, 323) = 5.383$, $p = 0.021$, $\eta_p^2 = 0.016$; (3) the *evaluate and judge* dimension of entrepreneurial alertness, $F(1, 323) = 5.540$, $p = 0.019$, $\eta_p^2 = 0.017$. Passive activities, on the other hand, contributed to the difference between the treatment and control group in entrepreneurial mindset efficacy, $F(1, 323) = 6.832$, $p = 0.009$, $\eta_p^2 = 0.021$.

Gender was also a significant covariate for (1) entrepreneurial skillset efficacy, $F(1, 323) = 22.621$, $p < 0.001$, $\eta_p^2 = 0.065$; (2) entrepreneurial mindset efficacy, $F(1, 323) = 9.730$, $p = 0.002$, $\eta_p^2 = 0.029$; (3) the *scan and search* dimension of entrepreneurial alertness, $F(1, 323) = 5.170$, $p = 0.024$, $\eta_p^2 = 0.016$; and (4) the *evaluate and judge* dimension of entrepreneurial alertness, $F(1, 323) = 4.374$, $p = 0.037$, $\eta_p^2 = 0.013$.

Taken together, the results show that besides gender, the program features of passive and active activities can account for the training effects on the entrepreneurial outcomes of entrepreneurial skillset, entrepreneurial mindset, and all three dimensions of entrepreneurial alertness. Our results suggest that entrepreneurial training is valuable and should be promoted among adolescents to enhance their entrepreneurial efficacy and alertness.

DISCUSSION

Based on a recent report sponsored by the World Bank, many countries have increasingly recognized structural policies, such as entrepreneurship training, to be effective means of equipping their citizens—especially the youth—with necessary entrepreneurial competencies (Valerio et al., 2014). However, there is a dearth of research on entrepreneurial education in secondary schools (Sánchez, 2013; Moberg, 2014; Elert et al., 2015). Our findings offer insights that contribute to the development of a comprehensive theory of entrepreneurship education and training (Pittaway and Cope, 2007; Martin et al., 2013).

Research Implications

Our study provides valuable evidence that entrepreneurship training programs among secondary school students can be an

effective means for equipping youths with entrepreneurial competencies and favorable attitudes toward entrepreneurship. There were no significant differences between the treatment and control groups on any of the measures before the program commenced. Significant differences appeared after the treatment group had undergone training. These differences demonstrate, as mentioned by Morris et al. (2013), that dynamic competencies can be picked up and grown over time with practice and exposure.

Our study also uncovered that entrepreneurship training can increase the entrepreneurial alertness of secondary school students to some extent *via* the usage of active/hands-on activities, consistent with social cognitive theory (Tang et al., 2012). Valliere (2013) proposed a schematic model of entrepreneurial alertness, whereby alertness can be taught by (1) first helping individuals to obtain the needed schemata for entrepreneurial alertness by imparting relevant information, and then (2) conducting continued deliberate practice of activating and applying the schemata. Though only the ratings of *scan and search*, and *evaluate and judge* dimensions were significantly higher in the treatment group versus the control group, we note a similar, albeit smaller, difference between both groups in the *associate and connect* dimension. Perhaps, the active/hands-on activities in the program lent themselves better to the practice of scanning and searching as well as evaluating and judging, versus associating and connecting information. Alternatively, the items for *associate and connect* may have appeared to be broader in scope than the items from the other two dimensions, which were more specific to entrepreneurial behaviors, thus making it difficult for students to judge if the program had indeed improved their abilities in that area.

Next, our study shows that entrepreneurship training can increase the entrepreneurial self-efficacy of secondary school students *via* active/hands-on and passive activities embedded in the training program. The contribution of active/hands-on activities to the development of entrepreneurial efficacy (i.e., skillset) in the students is supported by arguments on the impact of experiential learning in entrepreneurship education (e.g., Gibb, 1987; Chen et al., 1998; Aronsson, 2004; Fuchs et al., 2008). Experience in performing a relevant and sufficiently challenging task has long been argued to be the most critical factor in developing high domain-specific self-efficacy (Erikson, 2003) The presence of three crucial elements of mastery modeling (Wood and Bandura, 1989) in active/hands-on activities may have contributed to their effectiveness in building self-efficacy in the entrepreneurial skillset. The interactions with mentors and lessons on product development may have helped impart entrepreneurial skills and affirmed the self-belief of students about their capabilities (Wood and Bandura, 1989). Group work, report presentations, and internships may have filled in the role of guided skill mastery, where students put to practice their recently developed skills in a "safe" space with feedback (Wood and Bandura, 1989). Internal and external school competitions may have played the final role of allowing students to take on directly increasingly difficult tasks that can build and stabilize their self-efficacy (Wood and Bandura, 1989).

The contribution of passive activities to the development of entrepreneurial mindset efficacy in the students demonstrates that though verbal persuasion has been classically viewed as more limited in its efficacy (Bandura, 1977), it may still have its place in entrepreneurship education. Experiential learning may not be suitable for all teaching contexts (Fayolle, 2008). Furthermore, realistic verbal persuasion is helpful in overcoming lack of self-confidence, improving self-regulation, encouraging individuals to put in more effort in performing a task (Wood and Bandura, 1989), thus making it particularly effective in shaping the entrepreneurial mindset efficacy of students.

The significant finding of gender as a covariate is in line with the gender gap commonly noted in entrepreneurship research. In our results, we observe as well that female students who attended the program scored lower than male students in all dimensions of entrepreneurial self-efficacy and alertness. It has previously been suggested that the masculine discourse surrounding entrepreneurship (Ahl and Marlow, 2012) and societal stereotypes of entrepreneurship as predominantly masculine (Gupta et al., 2008) may lead to females being less likely to identify themselves as entrepreneurs, regardless of the types of activities in which they have been involved (Verheul et al., 2005). Other authors have found that for females, having a role model can help boost their entrepreneurial self-efficacy (Barnir et al., 2011). In any case, our study provides further support to account for gender heterogeneity in future work (Westhead and Solesvik, 2016).

Limitations and Future Directions

We acknowledge that the quasi-experimental nature of the study may have contributed to the smaller effect sizes. It is also possible that the training program may have been presented slightly differently by the trainers and/or teachers from the various schools. Future studies can consider employing the same trainers across every program to establish uniformity across schools to have a better control over potential confounding trainer effects. The number of time-points can also be increased with longer follow-up periods to verify the stability and changes in the effects of the training program. A true experimental study can be conducted with all the confounding variables controlled in the future.

The lack of training effect on the *associate and connect* dimension of entrepreneurial alertness presents a possible avenue for future research. For example, future studies may consider looking at the sort of activities in a training program that can improve this dimension, or perhaps investigate if this dimension may be less malleable compared to the other two dimensions.

Future studies can also go beyond the passive/active grouping of training activities to examine more deeply which specific activities contribute most to the effectiveness of the program. Previous literature has suggested that teamwork activities may be especially potent for entrepreneurial learning (Huber et al., 2014). Moreover, there have been suggestions that the social interactions of adolescents with their peers and educators are important factors that influence the effectiveness of the training program (Man and Yu, 2007). In contrast, other authors have promoted for more solo-work activities (Sexton and Upton, 1984).

Our study also did not look into whether the development of entrepreneurial self-efficacy and entrepreneurial alertness would increase the likelihood of the students becoming actual entrepreneurs. Schoon and Duckworth's (2012) longitudinal study involving over 6,000 individuals tracked from birth until age 34 revealed that becoming an entrepreneur was associated

with entrepreneurial career intent expressed at mid-adolescence (age 16). It will be important for future studies to monitor if youth who undergo training end up establishing their own business ventures at some point in their lifetime.

Finally, it may be useful for future studies to explore more outcomes alongside entrepreneurial self-efficacy and entrepreneurial alertness to refine policy-making decisions. For example, it has been found that self-control is another important factor for successful entrepreneurship: it ensures that the entrepreneurial goals set by individuals high in entrepreneurial self-efficacy are not too lofty and unachievable (Baron et al., 2016).

Practical Implications

Our study highlights that the effectiveness of an entrepreneurship training program for youth relies heavily on the types of activities it provides. Experiential learning is important for the development of the more *hands-on* competencies of entrepreneurial skillset efficacy, *scanning and searching*, and *evaluating and judging*. The activities should ideally cover a range of difficulty and independency levels, from lessons on product development in school to competing in nation-wide entrepreneurship competitions. Students can then hone their self-efficacy and entrepreneurial alertness as they progress through the program.

Verbal persuasion, though less encouraged in the current literature for inclusion in entrepreneurship training programs, still appears to play a crucial role, at least in shaping the entrepreneurial mindset of students. The personal sharing of entrepreneurship experiences by individuals, some of whom are alumni of the respective schools, may have made the social persuasion particularly effective due to their perceived credibility and familiarity with entrepreneurship (Bandura, 1984, as cited in Gist, 1987). External visits to companies and meeting the heads of those companies may be effective in helping students and more realistically shape their ideas of entrepreneurship. Such visits give students an opportunity to understand more deeply how they can utilize otherwise distant knowledge learned from the classroom within the constraints of real life.

Overall, the study shows that a healthy mix of activities is critical to the success of an entrepreneurship education program.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of the ethics guidelines for human biomedical research of the Institutional Review Board at Nanyang Technological University, which approved the study protocol. Parents or guardians provided written informed consent for the adolescents' participation. Assent from the adolescent participants were further sought before the study was conducted.

AUTHOR CONTRIBUTIONS

M-HH and MU are responsible for the design of the study, data analysis, and manuscript preparation. BK is responsible for data analysis and manuscript preparation. K-YC is responsible for the design of the study and manuscript preparation.

ACKNOWLEDGMENTS

We would like to thank Spring Singapore, Stephanie Tan Li Ting, and Jiang Weiting for their assistance in data collection, and the Ministry of Education for the financial support.

FUNDING

This study was funded under the Singapore Ministry of Education's Tier 2 Academic Research Fund (Grant no: MOE 2013-T2-2-104).

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

APPENDIX A

Activities List

Scale:

0	1
Did not participate	Participated

Passive activities

1 Assembly talks or "personal sharing" of entrepreneurship experience in school
2 Classroom lessons on entrepreneurship in school
3 External visits (e.g., Red Dot Museum, Company Visits) to understand enterprise and innovation

Active activities

1 Attachments and internships to my mentor's company
2 Lessons on product or prototype development
3 Worked in groups for business ideas development
4 Presented reports about the progress of my projects
5 Learned from my mentor about their experiences
6 Received guidance and feedback from my mentors/facilitators
7 Presented your idea at entrepreneurship-related events and competitions IN your school
8 Presented your idea at entrepreneurship-related events and competitions OUTSIDE your school

APPENDIX B

Entrepreneurial Efficacy

Based on your current abilities, how confident are you in performing the following tasks successfully now?

Key terms you will see

Partner(s) refers to an individual or company who is to some extent involved in your business dealings.

Instructions: Please read each statement carefully and choose the option that best describes your confidence level using the scale. There are NO right or wrong answers. Please answer honestly and frankly.

Scale:

1	2	3	4	5
Not at all confident	A little confident	Moderately confident	Fairly confident	Extremely confident

Skillset							
1	I am able to see myself starting and running a business in future	1	2	3	4	5	
2	I am confident of developing a product using needs identification techniques	1	2	3	4	5	
3	I understand the mindset of consumers and how to market my product/service to them	1	2	3	4	5	
4	I am able to communicate my business ideas to other people such as mentors, potential customers and potential business partners	1	2	3	4	5	
5	I am capable of conducting a market research by myself	1	2	3	4	5	
6	I know how to pitch and sell ideas and products/services to people	1	2	3	4	5	
7	I am able to determine appropriate pricing strategies and channels for marketing	1	2	3	4	5	
8	I am confident of doing up a budget for my business	1	2	3	4	5	
9	I understand the financial requirements and considerations to start and run a business	1	2	3	4	5	
10	I am able to assess the strengths and weaknesses of my business idea in comparison to existing products/services in the market	1	2	3	4	5	
11	I understand how to develop and analyse income statements	1	2	3	4	5	
Mindset							
1	I understand that starting a business is about taking and managing risks	1	2	3	4	5	
2	I understand that even though the objective of running a business is to earn money, I should be guided by moral principles	1	2	3	4	5	
3	I realize that starting and managing a profitable business requires plenty of hard work and sacrifice	1	2	3	4	5	
4	I understand that starting and running a business involves facing many problems and having to tackle them when they arise	1	2	3	4	5	