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## The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes

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## ABSTRACT

Using a mediating model, this article highlights entrepreneurial mindset (EM) as a novel impact of entrepreneurship education (EE) and addresses the scarcity of research on the relationship between EE and EM. Based on 1428 valid samples from higher education students in China, the results revealed that the impact of EE on EM is complex. EE significantly enhanced students' entrepreneurial inspiration, which, in turn, promoted formation of students' EM. Entrepreneurial inspiration also mediated the impact of EE on EM at a significant level. In addition, the role of educational attributes, including the type of learning experience, type of course, and type of activity were highlighted. Finally, the direct effect of extracurricular activity was found to be significantly positive whilst that of curriculum attendance was significantly negative. Our findings contribute to theories of both EE and EM and particularly to the understanding of not only whether, but also how EE affects EM in higher education settings. The findings of this research can help to inform the future design and assessment of EE programs.

### 1. Introduction

Policymakers and economists have indicated that entrepreneurship plays an important role in promoting economic growth and innovation (Fayolle & Gailly, 2008; van Praag & Versloot, 2007). Related research findings show that a higher level of entrepreneurship might be achieved through education (EC, 2006; Jack & Anderson, 1998). Entrepreneurship education (EE) programs have accordingly experienced a rapid and global development within higher education over recent decades (Fayolle, 2013; Neck & Greene, 2011).

Assumptions underpinning the expansion of EE programs include the belief that entrepreneurship is teachable and entrepreneurs can be developed (Erikson, 2003) and that EE might positively affect students' learning outcomes (Rideout & Gray, 2013). Research into the impact of EE has examined entrepreneurial knowledge, skills and behaviour, and entrepreneurial intent (EI). Nabi, Liñán, Fayolle, Krueger, and Walmsley (2017) called for novel impact indicators of EE beyond EI after a review of 159 articles on EE impact found that 51 percent focused on EI.

This research explores a new EE impact indicator by highlighting entrepreneurial mindset (EM), which was considered as a deeper cognitive phenomena reflecting malleable cognitive structures (Krueger, 2015, pp. 6–18). This structure reflects the way of thinking

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that makes entrepreneurs so unique in the engagement of entrepreneurial activities. EM enables individuals to think and act entrepreneurially because it underpins successful future strategies (Covin & Slevin, 2002). In nature, the foundation of EM lies in cognitive adaptability (Haynie, Shepherd, Mosakowski, & Earley, 2010), which is vital to achieve desirable outcomes following entrepreneurial action (Krauss, Frese, & Friedrich, 2005).

Despite its purported importance, the EM research is still nascent (Krueger, 2015, pp. 6–18). Existing studies of EE impact have mainly addressed EI (Nabi et al., 2017) and few studies have examined the EE-EM link. The lack of research into EM has been recently highlighted (Nabi et al., 2017; Yatu, Bell, & Loon, 2018). EM is closely related to opportunity recognition, which lies at the core of entrepreneurship and might determine entrepreneurial success. Bridging the connection between EE and EM would thus contribute to a deeper understanding on the scope and extent of EE impact. One of the key challenges is to verify whether EE can positively impact the cultivation of students' EM.

Moreover, it is not clear how EM evolves throughout education. Emotional factors are probably crucial for the formation of EM because affective events play a vital role in entrepreneurial learning (Cope, 2003) and because different educational designs can trigger affective events, which successively promote entrepreneurial competences (Lackéus, 2014). However, emotional constructs are rare in EE research (Kyrò, 2008). A possible emotional mediator between EE and EM is entrepreneurial inspiration (Souitaris, Zerbinati, and Al-Laham 2007), a gap for EE researchers seeking the emotional drivers of EM.

In addition, the effectiveness of EE in higher education, while largely positive, has shown some mixed results (Bae, Qian, Miao, & Fiet, 2014; Martin, McNally, & Kay, 2013; Oosterbeek, van Praag, & IJsselstein, 2010; Pittaway & Cope, 2007). These contradictory findings may be due to pedagogy, as studies have shown that educational attributes like extracurricular activity, optional courses, and practice-based activity can influence students' EI (Arranz, Ubierna, Arroyabe, Perez, & Arroyabe, 2017; Karimi, Biemans, Lans, Chizari, & Mulder, 2016; Piperopoulos & Dimov, 2015). Accordingly, existing literature presents the opportunity for this study to explore the role of educational attributes which represent situational factors within EE.

The impact of EE could also differ because of local or national context (Ahmad, Abu Bakar, & Ahmad, 2018; Chen & Agrawal, 2018). Only 5 percent of empirical samples used in EE impact studies are from fast-growing emerging economies such as Brazil, Russia, India and China (Nabi et al., 2017). In China, management education appeared in a few universities in the 1980s, business schools or management schools were established in the early 1990s, and MBA programmes were introduced in the mid-1990s, which planted the seeds for the flourishing of entrepreneurship education later (Li, Zhang, & Matlay, 2003). However, EE was a relatively new concept and practice until 2001 when the Ministry of Education introduced a pilot initiative of EE at the undergraduate level in nine universities (Li et al., 2003). After that, EE has developed rapidly but it is optional and isolated from the curriculum framework in higher education. In 2015, the central government implemented a national policy of 'enterprising and entrepreneurship education' which has led to widespread EE programs and courses in higher education sectors. This policy adopted a broader perspective on entrepreneurship education calling for entrepreneurial modules in a coherent framework in general education in universities and colleges. It has also encouraged the development and delivery of education through the use of active student centred educational approaches (Tan, 2016, 2017). However, compared to business education curricula, the entrepreneurship education discipline is still relatively young and under researched in China. It has not yet developed a universally-recognized teaching mode with best practices (Lin & Xu, 2017). Furthermore, stakeholders of EE may be unaware of how EE programs affect students' learning outcomes. It is therefore useful and timely to examine the link between EE and EM within Chinese higher education.

This study aims to firstly investigate the impact of EE on the cultivation of EM of Chinese students in higher education and secondly to explore the role of inspiration and educational attributes, respectively, in the relationship between EE and EM. In particular, this research focuses on two aspects of EE: curriculum attendance and extracurricular activity, and three educational attributes: type of learning experience, type of course, and type of extracurricular activity. This research has adopted four cognitive attributes of entrepreneurs as components of an entrepreneurial mindset: risk propensity, ambiguity tolerance, dispositional optimism, and alertness to opportunity because they are closely linked to entrepreneurial activity and process (Baron, 2006; Kaish & Gilad, 1991; Shane & Venkataraman, 2000).

The study highlights EM as a new type of impact and thus expands the EE impact framework by confirming the direct effect of EE on EM. Further academic value is added by investigating the mediating roles of inspiration and the roles of education attributes, which will provide new insights into the formative factors of EM and deepen the understanding of whether and how EE affects EM. The research should consequently provide new insights for EE researchers, educators, and policy-makers. This paper is structured as follows. First, theoretical grounding is provided followed by hypotheses and the research framework. Secondly, the methodology is described including samples and measures. Thirdly, the results are presented followed by a discussion section including theoretical and practical implications. Finally, the conclusion provides the key findings, contributions, limitations and suggestions for future research.

## 2. Theoretical grounding and hypotheses

### 2.1. Social cognitive theory and entrepreneurship education research

There is still no consistent and reasonable model of matching which type of entrepreneurship education yields which outcomes since paradigms of entrepreneurship education are diversified ranging from a causal and linear understanding of planning, through an approach which focuses on students' mindsets, to a process-related entrepreneurial and methodical approach (Rasmussen & Nybye, 2013, pp. 4–5). Entrepreneurial mindset is viewed as a critical element in the learning journey towards entrepreneurial effectiveness of entrepreneurial education (QAA, 2018, pp. 20–21). The existing EE impact research is mainly based on the theory of

entrepreneurial intentions, frequently drawing on Ajzen's (1991) Theory of Planned Behaviour (TPB) and Shapero and Sokol's (1982) Entrepreneurial Event Model (EEM) based on motivational theories. The former consists of three components that predict the formation of intention which in turn predicts behaviour, namely the attitude toward the behaviour, subjective norms and the degree of perceived behavioural control (self-efficacy). The latter indicates that EI stems from the perception of feasibility and desirability, and this path is affected by the cultural and social context. Although the two frameworks have been over-used, they provide an applicable model for us to understand and predict entrepreneurial intentions.

However, in order to explain the relationship between entrepreneurship education and students' entrepreneurial mindset instead of intention, we follow Bandura's (2001) Social Cognitive Theory (SCT) which reveals interactions between personal (cognitive) variables, environmental factors, and behaviours in human functioning. Béchard and Grégoire (2005) argue that SCT may provide a coherent framework to understand holistically entrepreneurship education from the view of cognitive psychology. Winkler (2014) applied this theory into the context of entrepreneurship education and developed a dynamic framework for EE impact research, which contributes to investigation of how environmental factors of EE learning affect student cognition and subsequent entrepreneurial behaviour. Winkler (2014) further identified environmental factors such as academic courses, curricula and non-academic learning experiences (activities for example), and cognitive factors such as self-efficacy and intention. Given that entrepreneurial learning could result in mind-shift and emotional changing (Gibb 2002), and that entrepreneurial mindset is a metacognitive function (Haynie et al., 2010), EM is therefore a kind of cognitive personal variable influenced by environmental variables within EE here referring to curriculum and extra-curricular activities. Clearly, this study contributes to Winkler's (2014) framework by recognizing EM as a new type of cognitive variable. In this sense, SCT provides to some extent the theoretical grounding for our research leading us to investigate the relationship between EE and the changes of students' EM. Therefore, the impact of EE on EM could be explained by SCT in a broad view.

## 2.2. Entrepreneurship education and entrepreneurial mindset: the direct effect

The notion of mindset originates from the cognitive psychology fields. Mindsets are not innate; they can be influenced and learned by an individual's prior knowledge and the interaction with current environment (Mathisen & Arnulf, 2014). McGrath and MacMillan (2000, XV) firstly defined entrepreneurial mindset as 'the ability to rapidly sense, act, and mobilize, even under highly uncertain conditions'. Shepherd, Patzelt, and Haynie (2010, p. 62) explained EM as an 'ability and willingness of individuals to rapidly sense, act, and mobilize in response to a judgement decision under uncertainty about a possible opportunity for gain'. McMullen and Kier (2016, 664) stressed that EM is an 'ability to identify and exploit opportunities without regard to the resources currently under their control', which means that entrepreneurial activity has risks to some extent. Other definitions of entrepreneurial mindset existing in the literature vary but the common point of them is that entrepreneurial mindset is a way of thinking or an ability to capture entrepreneurial opportunities in an uncertain situation. As a kind of metacognition, entrepreneurial mindset can be improved through training and can be considered as a mind habit that requires learning to shape (Schmidt & Ford, 2003).

Based on the combination understanding of those definitions of entrepreneurial mindset, we recognized four components of an entrepreneurial mindset: alertness to opportunity, risk propensity, ambiguity tolerance, and dispositional optimism. We also claim that the development of the four specific mindsets are closely related to entrepreneurship education which supports our hypothesis. The definitions, rationale and explanations are as following.

*Alertness to opportunity* was conceived as an entrepreneurial cognition process with alert scanning and search, alert association and connections, and evaluation and judgment related to the information of opportunity (Tang, Kacmar, & Busenitz, 2012). This means that alertness to opportunity is the ability to possess keen insights into identifying entrepreneurial opportunities. The process of entrepreneurship starts from opportunity recognition, but prior to opportunity recognition, alertness to opportunity is a prominent factor (Krueger, Reilly, & Carsrud, 2000). Researchers have agreed that the higher a person's level of alertness is, the more probable the opportunity can be recognized even without active engagement of observing or searching for them (George, Parida, & Lahti, 2016). In this sense, alertness to opportunity is a basic and crucial element of an entrepreneurial mindset. Many scholars agree that alertness involves a mindset based on several capacities and processes such as prior knowledge, skills of pattern recognition and information processing (Ardichvili 2003). We can argue that this knowledge and soft skills on which alertness is based could be learned and developed by education. Tang et al. (2012) found that alert scanning and search for opportunity represent the cumulative learning and experience in the developmental cognition process. Therefore, entrepreneurial education is one of the determinants of alertness to opportunity.

*Risk propensity* is defined as a subject's current tendency or willingness towards taking or avoiding risks (Pablo, 1997). Risk propensity plays a critical role in opportunity identification and the success of entrepreneurial action. Individuals with a greater risk-taking propensity find it easier to perceive the overall opportunities around them (Foo, 2011). Studies show that the different extent of risk propensity of entrepreneurs could result in different entrepreneurial decisions (Hadida & Paris, 2014). We thus consider it as a pivotal element of an entrepreneurial mindset. In nature, risk propensity is not a stable and unchangeable trait, but can vary and be shaped in different scenarios (Wang, Xu, and Zhang et al., 2016). Ertuna and Gurel (2011) detected a significant positive interaction link between attending entrepreneurial education in university and increased risk-taking propensity. Neneh's (2012) study found that education could enhance factors like risk taking which shapes EM. Sánchez (2013) concluded that an educational program for science and engineering students had a positive impact on the entrepreneurial competencies of students including risk taking. Also, Bell's (2015) study indicated that the experiential learning approach in business higher education in the UK could develop students' entrepreneurial characteristics such as risk taking. These findings jointly support the assumption that EE could affect students' mindset of risk propensity.

*Ambiguity tolerance* is defined as the way individuals interpret, process, and respond to information about vague situations marked by a series of inconsistent, complex, unfamiliar or fragmented clues (Furnham & Ribchester, 1995). Entrepreneurs need to have high level of ambiguity tolerance because entrepreneurial activities are by nature unpredictable. If entrepreneurs are highly tolerant with ambiguity, they view ambiguous scenarios as promising and challenging, instead of stressful and disappointing (Furnham & Ribchester, 1995). For these reasons, we believe ambiguity tolerance is an important element of an entrepreneurial mindset. Lackéus' (2014) study found that action-based entrepreneurial education has an impact on the formation of ambiguity tolerance through certain emotional events. This study has identified the importance of ambiguity tolerance as an impact indicator of EE, and provides support for this study to explore the links between EE and ambiguity tolerance.

*Dispositional optimism* is defined as 'the global generalized tendency to believe that one will experience good versus bad outcomes in life' (Crane, Blunden, & Meyer, 2012, p. 116). Optimism is not only linked to desirable results, but also connected to joy which affects the assessment of opportunity and the following behaviour in the entrepreneurial activities (Grichnik, Smeja, and Welpe 2010). In this sense, dispositional optimism, rather than pessimism, is extremely important for entrepreneurs to motivate themselves and to obtain goals continuously. The relationship of EE and dispositional optimism is under-covered in previous research. Studies show that self-efficacy can mediate the effects of entrepreneurial learning in courses on entrepreneurial intention (Zhao, Selbert and Hills 2005), but self-efficacy is highly correlated to optimism (Crane, 2014). Crane and Meyer's (2007) study demonstrated that dispositional optimism can be effectively measured and enhanced in entrepreneurial courses. This suggests that EE is relevant to EM and it can be assumed that it could be fostered and enhanced through targeted education.

The above four components of an EM are internally connected. Specifically, *alertness to opportunity* plays a central role in opportunity recognition which pushes forward the process of entrepreneurship in an uncertain environment. This kind of uncertainty is typically demonstrated as risk and ambiguity (McGrath & MacMillan, 2000). Individuals with a higher *risk propensity* find it easier to perceive entrepreneurial opportunity around them (Foo, 2011). Moreover, the uncertainty of the entrepreneurial situation leads to unpredictable results and thus *ambiguity tolerance* is also necessary for an entrepreneur. In addition, as the process of entrepreneurship involves alertness to opportunity in a risky and ambiguous situation of uncertainty, entrepreneurs need to cope with impediments, setbacks, and even failures possibly occurring in the journey of entrepreneurship (Crane et al., 2012). Therefore, *dispositional optimism* together with the other three components jointly contributes to an entrepreneurial mindset.

In addition, considering that the forms of entrepreneurship education in higher education settings in China can be mainly classified into curriculum in the classroom and activities outside the classroom according to the different learning experiences, and Arranz et al. (2017) investigated the impact of entrepreneurship education using a distinction between curriculum and extra-curriculum, the concept of entrepreneurship education in this study is divided into two categories: curriculum attendance and extra-curricular activity. The two variables are potentially proxies of entrepreneurship education. Therefore, the following hypotheses are proposed:

**Hypothesis 1.** Curriculum attendance is positively related to (a) alertness to opportunity, (b) risk propensity, (c) ambiguity tolerance, and (d) dispositional optimism.

**Hypothesis 2.** Extracurricular activity is positively related to (a) alertness to opportunity, (b) risk propensity, (c) ambiguity tolerance, and (d) dispositional optimism.

### 2.3. Entrepreneurship education and entrepreneurial mindset: the indirect effect through entrepreneurial inspiration

Affective development related to feelings, emotions, and moods is an important key to the learning process of entrepreneurship, which is often neglected in the entrepreneurship research (Gibb 2002). Emotions have been found to moderate the relationship between knowledge and cognitive skills (Loon & Bell, 2018). As a construct with emotional components, entrepreneurial inspiration has been defined as 'a change of hearts and minds evoked by events or inputs from the program and directed towards considering becoming an entrepreneur' (Souitaris, Zerbinati, and Al-Laham 2007, 573). This definition encompasses a new desired target of motivation to be entrepreneurial and an educational stimulator from curriculum or co-curriculum. Souitaris, Zerbinati, and Al-Laham (2007) illustrated inspiration was one of the three types of benefits from an entrepreneurship program including both a course and complementary activities in university science and engineering majors. Nabi, Walmsley, Liñán, Akhtar, and Neame (2018) also found that participants in an EE programme covering a taught component and a practical component in the first year of higher education demonstrated higher inspiration by contrast to non-EE counterparts. EE is influential in the formation of inspiration because EE, formal courses or out classroom activities, theoretically entails academic triggers which drives students to be inspired and encouraged towards the goal of becoming an entrepreneur. For example, a professor's view in an entrepreneurship course or participating in entrepreneurship club activities (triggers), may change students' both hearts of loving entrepreneurship and minds of being more entrepreneurial (targets). In this vein, we suggest that:

**Hypothesis 3.** Curriculum attendance is positively related to entrepreneurial inspiration.

**Hypothesis 4.** Extracurricular activity is positively related to entrepreneurial inspiration.

With regard to the link between inspiration and entrepreneurial outcome, Souitaris, Zerbinati, and Al-Laham's (2007) study examined this in two European countries. A positive relationship between inspiration and entrepreneurial outcome (intent) was found. Nabi et al. (2018) investigated the function of inspiration in the formation of EI in first year students at a UK university. They found that both theoretical and practical inspiration was strongly related to an increase in EI. As mindset is a type of deeper cognitive

learning outcome relating to hearts and minds, it might be developed through emotional change such as inspiration. Therefore, the following hypothesis is proposed:

**Hypothesis 5.** Entrepreneurial inspiration is positively related to (a) alertness to opportunity, (b) risk propensity, (c) ambiguity tolerance, and (d) dispositional optimism.

According to [Nabi et al. \(2017\)](#), entrepreneurial inspiration is likely to be a central construct as both an impact indicator of EE, and as a predictor of other impact measures. This suggests inspiration could be a mediating factor in the EE-EM link. Verification of H3, H4 and H5 could show a mediation effect of entrepreneurial inspiration between entrepreneurship education and entrepreneurial mindset. It is suggested that:

**Hypothesis 6.** Entrepreneurial inspiration plays a mediating role in the relationship of entrepreneurship education and entrepreneurial mindset.

#### 2.4. *Entrepreneurship education and entrepreneurial mindset: Contextual effect through educational attributes*

As discussed earlier, varied results of EE impact studies could be partly explained by context-specific factors related to educational attributes. Curriculum and extracurricular activity are two basic sources of learning experiences in an entrepreneurship education program, but their effect is unequal. [Peterman and Kennedy \(2003\)](#) argue that formal curriculum does not stimulate entrepreneurial intention, on the contrary, it reduces tolerance for ambiguity. [Shapero and Sokol \(1982\)](#) also explain that formal education decreases curiosity and risk propensity. However, extracurricular activities like guest speakers, business plan competitions, and entrepreneurship incubator projects are incentives to the motivation of entrepreneurship ([Souitaris, Zerbinati, and Al-Laham's 2007](#)). [Arranz et al. \(2017\)](#) found that curricular and extra-curricular education have an unbalanced impact on university students, and that formal courses and extracurricular activities have moderating roles in the formation of entrepreneurial intention and other competences. Hence, we expect to observe whether outside classroom activity is more influential than formal courses on the cultivation of students' mindset. This leads to the following hypothesis.

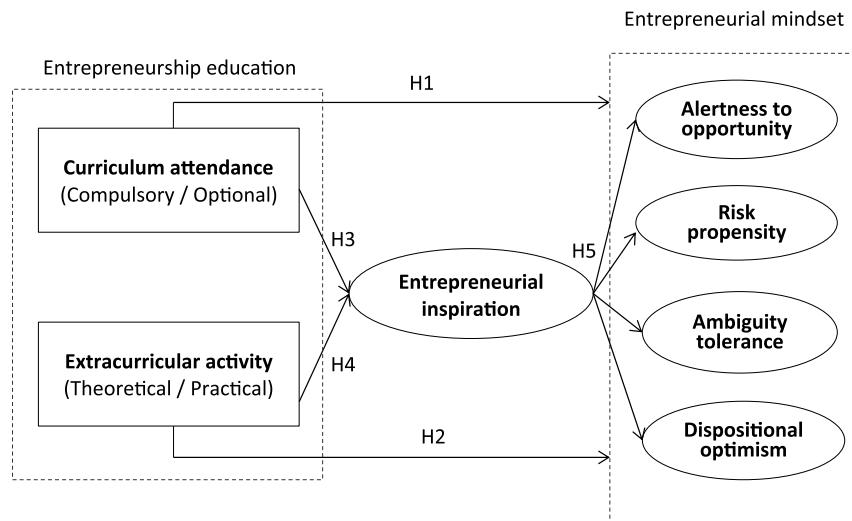
**Hypothesis 7.** Extracurricular activity has a greater effect on entrepreneurial inspiration and the four entrepreneurial mindsets, than curriculum attendance.

The course type (optional or compulsory) embodies different attributes of curriculum. [Oosterbeek et al. \(2010\)](#) found that EE programs could fail to meet expectations partly because course participation was compulsory. [Karimi's et al. \(2016\)](#) study suggested that elective EE programs had greater impact on students' entrepreneurial intention and opportunity identification than compulsory ones. Students with a genuine interest in a subject are more likely to opt into studying an optional course, whilst the interest of students enrolling on compulsory courses may be harder to discern. This might suggest that students who chose optional entrepreneurship courses will be more interested and engaged. Previous research has found that academic boredom negatively impacts learning and achievement ([Sharp, Sharp, & Young, 2018](#)) and positive emotions support cognitive learning ([Loon & Bell, 2018](#)). So, an optional course should exert more influence on students' learning outcomes including mindset. Therefore, it is suggested that:

**Hypothesis 8.** An optional course has a bigger influence on entrepreneurial inspiration and the four entrepreneurial mindsets, than a compulsory course.

Entrepreneurship education takes many different forms including curricular courses and extracurricular activities and serves different purposes in undergraduate level. [Johannisson \(1991\)](#) identified five elements in entrepreneurial learning: know-why, know-what, know-how, know-who and know-when and suggested a basic distinction between theoretical-oriented learning (e.g. 'know-what', 'know-why') and practical-oriented learning (e.g. 'know-how', 'know-who') in entrepreneurship education. Here the distinction between theoretical and practical mainly based on the different focus of learning contents and its outcomes in EE although practical contents have some theoretical grounding or theoretical ones may have practical applications. Theoretical learning usually yields knowledge acquiring while practical learning often leads to new skills and competences of students by experiential learning. [Fayolle, Gailly, and Lassas-Clerc \(2006\)](#) and [Sun, Lo, Liang, and Wong \(2017\)](#) elaborated EE content using [Johannisson's \(1991\)](#) classification to investigate the EE-EI relationship. [Nabi et al. \(2018\)](#) applied theoretical and practical learning types to examine the impact of EE on entrepreneurial learning and inspiration in higher education. Therefore, extracurricular activity as one type of learning experience can also be classified into theory-based and practice-based activity. For example, entrepreneurial knowledge can be gained primarily through theoretical-oriented activities such as successful entrepreneur's speech, face-to-face communication with an entrepreneur, conferences or workshops related to entrepreneurship, entrepreneurial spirit and values transmitted by the university or colleges, and entrepreneurial skills and competencies can be obtained through practical-oriented activities such as entrepreneurship club, entrepreneurship design competition, enterprise visit or internship, business simulators or games, entrepreneurial incubation project, and entrepreneurial activity of resourcing or networking, which were used as items of the measurement scale in this research.

It is acknowledged that all of the extra curricula activities had some theoretical grounding and were not purely practical or that the theoretical grounding was covered elsewhere, for example in corresponding classes. Although, it is hard to exactly pinpoint the balance the theoretical grounding provided and the practical nature of the activity and previous training. In EE research, [Piperopoulos and Dimov \(2015\)](#) found that there was a negative relationship between self-efficacy and entrepreneurial intentions in theory courses, whilst there was a positive relationship in practical courses. Also, [Hynes, Costin, and Birdthistle \(2011\)](#) found that a practice-based learning module brings real business learning and meets the requirements of different internal and external



**Fig. 1.** Conceptual framework of the research.

Note: The H6-8 are not shown in the figure for the reason of simplification.

stakeholders in entrepreneurship education. However, the role of theoretical and practice-based activity in EE impact research requires further exploration. So, the following hypothesis is proposed:

**Hypothesis 9.** A practical extracurricular activity has a greater impact on entrepreneurial inspiration and the four entrepreneurial mindsets, compared to a theoretical activity.

In summary, a mediating model has been developed as the conceptual framework (Fig. 1). This model bridges the gap between EE and EM and explores the mediating role of inspiration and the role of educational attributes in the EE-EM link.

### 3. Methodology

#### 3.1. Sample and data collection

This study adopted a convenience sampling method, widely adopted in studies of entrepreneurship education (Aranz et al., 2017; Nowiński, Haddoud, Lančarič, Egerová, & Czeglédi, 2017). Researchers collected data from 15 higher education institutions in Jiangsu Province, China, chosen because the provincial government of Jiangsu has implemented the reform of Innovation and Entrepreneurship Education to stimulate the regional development in economy and society (OJG 2016). Institutional, geographical and individual distribution was considered to reduce bias. The sampling institutions have usually offered entrepreneurial modules integrated in the undergraduate program. The 15 institutions consist of 6 universities, 3 colleges and 6 vocational institutes, in which entrepreneurial learning covers elective and compulsory courses in classroom, as well as extracurricular activities outside the classroom. Institutions were selected from different areas of Jiang Province: 11 of the institutions were from the East, 3 institutions were from the North, and 1 institution was centrally located.

Researchers conducted a survey to collect data. The questionnaire was tested prior to the survey by email on 20 students from different institutions, five of whom were interviewed for feedback. The researchers then revised the questionnaire. A responsible person from each sampling institute was fully briefed on the parameters of the study. The survey was formally carried out between June and July 2017 using online forms. Participation in the survey was voluntary and anonymous.

Researchers collected 1761 survey responses. Any questionnaires that were answered and submitted in less than 5 min or that were answered with unqualified names of institutions were eliminated. The final sample size was 1428. The demographics of the valid sample is detailed in Table 1.

#### 3.2. Measures

All independent and dependent variables were measured using existing measurement tools or adapted from existing scales.

##### 3.2.1. Independent variables

Entrepreneurship education was measured by two constructs: one was 'curriculum attendance' and the other was 'extracurricular activity'. Both of them aim to capture students' learning involvement and experiences in entrepreneurial offerings.

**Curriculum attendance.** This was measured using a multiple-choice question to examine participation in entrepreneurial courses (Sieger, Fueglistaller, & Zellweger, 2014). Students were asked to select statements reflecting their situation. Multiple answers were

**Table 1**

The demographics of the valid sample.

Variables		Frequency	Percent (%)
Gender	Male	703	49.23%
	Female	725	50.77%
Age	< 18	23	1.61%
	18–20	862	60.36%
	21–23	512	35.85%
	> 23	31	2.17%
Grade	First year	581	40.69%
	Second year	520	36.41%
	Third year	265	18.56%
	Forth year	52	3.64%
	Other	10	0.70%
Major	Mathematics and Science	125	8.75%
	Engineering and Technology	570	39.92%
	Social Science	77	5.39%
	Economics and Management	249	17.44%
	Medical Science and Pharmacy	20	1.40%
	Art and Humanity	108	7.56%
	Agriculture and Animal Husbandry	91	6.37%
	Other	188	13.17%

Note: N = 1428.

coded from 0 to 2, 0 for 'I have not attended a course on entrepreneurship' (two items), 1 for 'I am studying on a course related to entrepreneurship', 2 for 'I have at least finished a compulsory or an optional course on entrepreneurship' (two items).

**Extracurricular activity.** This was measured following [Arranz's et al. \(2017\)](#) 7-point Likert scale (Cronbach's alpha = .710). It was adapted into ten items to suit the higher education context in China. Students were first asked to answer whether they were involved in the activities (1 = yes, 0 = no), which included 'entrepreneurship clubs', 'business simulations or games', and 'face-to-face communication with an entrepreneur'. When answered affirmatively, further questions about the impact of the activity were given (1 being lowest and 7 highest). The score for this variable was calculated by multiplying the yes or no value (0/1) with the degree value (1–7).

In order to explore the role of educational attributes in the impact of entrepreneurship education, three binary variables were used. The first is 'type of learning experiences', including 'curricular' and 'extracurricular'. They were measured using data provided by two independent variables of 'curriculum attendance' and 'extracurricular activities' respectively. The score of the former is used for the score of 'curricular', and the latter is used for the average score of 'extracurricular'. The second one, 'type of course', is represented by two choices: 'compulsory' and 'optional'. The data was provided by part of items in the scale of the independent variable 'curriculum attendance' in this study. Responses were coded 1 for 'compulsory' and 0 for 'optional'. The third variable is 'type of activity', which includes 'practical' and 'theoretical'. The same data was used from the ten-item scale 'extracurricular activity', in which six items are practical and the remaining four are theoretical.

### 3.2.2. Dependent variables

Four individual constructs were adopted to measure the concept of entrepreneurial mindset. The measurement and statistical analysis are interpreted at the level of individual original variables rather than at the level of composite variable.

**Alertness to opportunity.** This construct was measured by excerpting the scale developed and validated by [Tang et al. \(2012\)](#) (Cronbach's alpha > .700) to capture students' sensitivity in seeking new opportunities. Students were asked to what extent they agreed with 6 items referring to alert scanning and search, alert association and connections, and evaluation and judgement, for example, 'I have frequent interactions with others to acquire new information.' The scale ranged from 1 (strongly disagree) to 7 (strongly agree).

**Risk propensity.** Five items were extracted on the general risk propensity scale developed and validated by [Hung, Tangpong, Li, and Li \(2012\)](#) (Cronbach's alpha = .750) that captured risk propensity towards entrepreneurial activity in higher education settings on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). One example item is: 'I like to take chances, although I may fail.'

**Ambiguity tolerance.** Based on [Geller, Tambor, Chase, and Holtzman \(1993\)](#), this construct was originally tested on a group of physicians as a general personal attribute (Cronbach's alpha = .700). This was adapted into a 5-item section to measure the level of tolerance toward ambiguity situations in undertaking tasks on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). An example of these items is: 'I can tolerate ambiguous conditions and unpredictable results'.

**Dispositional optimism.** This was measured by using [Crane's \(2014\)](#), 11-item survey instrument based on the widely used Life Orientation Test-Revised instrument validated by [Scheier, Carver, and Bridges \(1994\)](#) (Cronbach's alpha = .780). Six items were selected and adapted to the Chinese higher education environment using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Each value of an item contributes to the average score of an individual's level of dispositional optimism. A sample item is, 'In

uncertain times, I would expect the best'.

### 3.2.3. Mediating variables

**Entrepreneurial inspiration.** The scale proposed by Souitaris, Zerbinati, and Al-Laham (2007) and recently applied by Nabi et al. (2018) (Cronbach's alpha = .849) was adopted to measure inspiration, with a binary (1 = yes; 0 = no) response scale. If yes, a further question was added regarding its impact on a 7-point Likert Scale (1 = lowest extent; 7 = highest extent). The score for the construct of inspiration was calculated by multiplying the value of perceived stimulator (0 or 1) with the degree value of the impact (1–7).

### 3.2.4. Control variables

Gender, age, grade, major, institution type as well as prior entrepreneurial exposure and initial level of entrepreneurial mindset were controlled in this study according to existing literature (Fayolle & Gailly, 2015; Zapkau, Schwens, & Kabst, 2017).

## 3.3. Statistical methods

SPSS 20.0, MPLUS 7.0 and Stata 14.0 were used to conduct data cleaning and data analysis. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to conduct reliability, validity and descriptive analysis. Structural equation model (SEM) analysis was used to test the hypotheses. The direct effects analysis was implemented using the path coefficients method. The mediating analysis and conditional indirect effects were based on Preacher, Rucker, and Hayes (2007) and Fairchild and MacKinnon (2009).

## 4. Results

### 4.1. Measurement model

Table 2 presents the reliability, validity, correlations and descriptive statistics for the variables in our model. Reliability was assessed using Cronbach's alpha ( $\alpha$ ) and composite reliability (CR). The  $\alpha$  values for constructs are all more than 0.8 with the highest 0.946 indicating the measurement is reliable (Nunnally, 1978). The CR value for each scale exceeds the acceptable level of 0.6 (Bagozzi & Yi, 1988) ranging from 0.823 to 0.968, which indicated the measures for these constructs were highly reliable.

With validity, all indicators had significant standardized coefficient loadings (above 0.5) on their corresponding construct, and average variance extracted (AVE) values exceeded the threshold criterion of 0.5 (Bagozzi, Yi, & Phillips, 1991), which indicates convergent validity for each scale (Fornell & Larcker, 1981). The square roots of the AVE (the diagonal elements in Table 2) are larger than the off-diagonal elements at the level of significance (Hulland, 1999), meeting the criterion for discriminant validity (Fornell & Larcker, 1981).

Furthermore, discriminant validity was evaluated by the model fit indices using confirmatory factor analysis (CFA). According to Table 3, the 6-factor measurement model was better than all the other constraining models because all of the differences between them were higher than the critical value of 3.84 (Bagozzi & Yi, 1988). This suggests adequate discriminant validity between each construct. Moreover, the common method variance did not affect the outcome because the Harman's single factor was 42.17%, below the threshold of 50% (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

**Table 2**

Reliability, validity, correlations and descriptive statics of the variables.

	RP	AT	DO	AO	IS	EA	CA
RP	(0.774)						
AT	0.736**	(0.738)					
DO	0.709**	0.670**	(0.783)				
AO	0.736**	0.708**	0.695**	(0.737)			
IS	0.543**	0.472**	0.435**	0.530**	(0.865)		
EA	0.361**	0.330**	0.256**	0.363**	0.551**	(0.791)	
CA	0.051	0.039	0.007	0.088**	0.229**	0.267**	N.A.
<i>Mean</i>	4.325	4.402	4.667	4.330	4.211	2.905	0.903
<i>SD</i>	1.147	1.148	1.259	1.104	1.784	1.815	0.927
$\alpha$	0.845	0.825	0.826	0.866	0.946	0.943	N.A.
CR	0.855	0.823	0.826	0.968	0.947	0.943	N.A.
AVE	0.599	0.545	0.613	0.543	0.748	0.626	N.A.
<i>N of items</i>	4	4	3	6	6	10	1

Note: EA extracurricular activity, CA curriculum attendance, IS inspiration, RP risk propensity, AT ambiguity tolerance, DO dispositional optimism, AO alertness to opportunity,  $\alpha$  Cronbach's alpha, CR composite reliability, AVE average variance extracted N.A. not applicable. The figures on the diagonal are square roots of the AVE, and the figures on the triangle elements are correlations among the variables.

$N = 1428$ . \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; two-tailed test.

**Table 3**

Model fit of measurement model and path analysis model.

Measurement Model	$\chi^2$	df	$\chi^2/df$	$\Delta\chi^2/df$	RMSEA	CFI	TLI	SRMR
EA + IS + RP + AT + DO + AO	17683.371	495	35.724	922.7146***	0.156 [0.154, 0.158]	0.521	0.489	0.141
EA + IS + RP, AT + DO + AO	13230.317	494	26.782	670.5475***	0.134 [0.132, 0.136]	0.645	0.620	0.136
EA + IS, RP + AT, DO + AO	10264.434	492	20.863	535.1485***	0.118 [0.116, 0.120]	0.727	0.708	0.104
EA, IS, RP + AT, DO + AO	4680.225	489	9.571	93.06367***	0.077 [0.075, 0.080]	0.883	0.874	0.053
EA, IS, RP, AT, DO + AO	4265.244	485	8.794	84.5184***	0.074 [0.072, 0.076]	0.895	0.895	0.052
EA, IS, RP, AT, DO, AO	3842.652	480	8.006	–	0.070 [0.068, 0.072]	0.906	0.897	0.050
Path Analysis Model 1	$\chi^2$	df	$\chi^2/df$	$\Delta\chi^2/df$	RMSEA	CFI	TLI	SRMR
Proposed Model	0	0	–	–	0	1	1	0
Reversed Model	3139.233	6	523.206	523.206***	0.605 [0.587, 0.623]	0.38	–6.75	0.102
Interaction Model	1273.752	2	636.876	636.876***	0.667 [0.637, 0.698]	0.801	–7.48	0.031
Path Analysis Model 2	$\chi^2$	df	$\chi^2/df$	$\Delta\chi^2/df$	RMSEA	CFI	TLI	SRMR
Proposed Model	0	0	–	–	0	1	1	0
Reversed Model	3142.843	6	523.807	523.807***	0.605 [0.587, 0.623]	0.381	–7.77	0.093
Interaction Model	1299.323	4	324.831	324.831***	0.476 [0.455, 0.498]	0.798	–4.3	0.028

Note: The independent variables in path analysis model 1 were **EA** (extracurricular activity) and **CA** (curriculum attendance), and in path analysis model 2 were **CC** (compulsory curriculum attendance), **OC** (optional curriculum attendance), **AP** (practical extracurricular activity), **AT** (theoretical extracurricular activity). **Reversed Model** took four mindsets as mediators, **IS** (inspiration) as dependent variable. Interaction model included the interactions of inspiration and independent variables.  $\Delta\chi^2/df$  was the difference with proposed model.

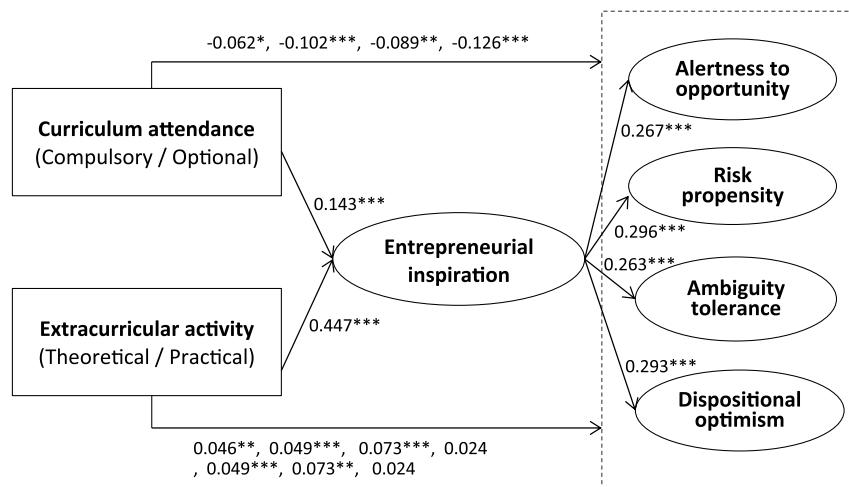
N = 1428. \* $p$  < 0.05; \*\* $p$  < 0.01; \*\*\* $p$  < 0.001; two-tailed test.

#### 4.2. Structural model and direct effect

**Fig. 2** presents the structural model with path coefficients and their statistical significance. The path coefficients of curriculum attendance (CA) to the four mindsets are all negative and significant, H1 is therefore not supported. The coefficients of extracurricular activities (EA) to the four mindsets are positive and significant for three of them, H2 is supported. The correlations of CA and EA to entrepreneurial inspiration (IS) are both positive and significant, and the coefficients from IS to the four mindsets are all positive and significant, therefore, H3, H4 and H5 are supported.

#### 4.3. Mediating effect of entrepreneurial inspiration

To conduct mediation analysis, it is necessary to report the assumptions of the mediation model as [Fairchild and Mackinnon \(2009\)](#) also recommend. As shown in **Table 3**, the proposed path analysis model 1 and model 2 were better than reversed and interaction model, so reverse causality effects and predictor  $\times$  mediator interaction effects are not severe. For each function in the path analysis models, we did several tests with Stata 14.0 to check the correctness of the models' functional form, multi-collinearity and homogeneity of error variance, and omitted variables. According to the results of the Ramsy RESET test, the path analysis models have no omitted variables. VIFs test showed there were no multi-collinearity problems in the mediating model because all variance inflation factors (VIFs) were below 2 ranging from 1.06 to 1.82. The results of White's test and Breusch-Pagan test showed some



**Fig. 2.** Results of the model with path coefficients and significance.

**Table 4**

The mediating effects of inspiration from EE to EM.

Variables	DV = IS		DV = RP		DV = AT		DV = DO		DV = AO	
	Estimate	S.E.								
Intercept	1.749***	0.206	2.457***	0.151	2.842***	0.164	2.875***	0.176	2.404***	0.145
Gender	-0.112	0.087	0.002	0.058	-0.033	0.059	-0.093	0.067	0.092	0.055
Age	0.132	0.081	0.054	0.058	0.074	0.059	0.035	0.067	0.058	0.054
Grade	-0.024	0.053	-0.008	0.039	-0.043	0.043	0.032	0.044	0.018	0.035
Institution 1	0.016	0.134	0.277***	0.081	0.366***	0.086	0.521***	0.099	0.232**	0.082
Institution 2	-0.046	0.092	0.019	0.065	0.027	0.069	0.160*	0.075	0.043	0.062
Major_ns	-0.009	0.172	-0.072	0.108	-0.146	0.118	0.037	0.135	-0.066	0.106
Major_eng	0.100	0.104	-0.010	0.072	0.012	0.078	0.057	0.083	0.058	0.070
Major_ss	-0.172	0.191	0.090	0.119	0.095	0.132	0.267	0.142	0.102	0.116
Major_bus	0.164	0.125	0.010	0.082	0.045	0.086	0.151	0.096	0.079	0.080
PEE	-0.152	0.155	0.049	0.106	-0.129	0.108	0.070	0.131	0.000	0.101
IEM	0.244***	0.030	0.127***	0.020	0.054***	0.021	0.085***	0.023	0.127***	0.019
CA	0.143***	0.044	-0.102***	0.029	-0.089**	0.031	-0.126***	0.035	-0.062*	0.029
EA	0.447***	0.024	0.049***	0.017	0.073***	0.018	0.024	0.019	0.046**	0.017
IS			0.296***	0.022	0.263***	0.023	0.293***	0.023	0.267***	0.020
R <sup>2</sup>	0.355	0.023	0.338	0.023	0.253	0.025	0.228	0.023	0.355	0.023
F-value	15.540***		14.604***		10.264***		10.080***		15.540***	
DIFF (CA-EA)	-0.304*** [-0.406, -0.200]	0.053	-0.151*** [-0.218, -0.084]	0.034	-0.162*** [-0.237, -0.088]	0.038	-0.149*** [-0.232, -0.068]	0.042	-0.304*** [-0.175, -0.038]	0.053
IND_CA			0.037** [0.013, 0.057]	0.012	0.033** [0.012, 0.051]	0.011	0.033** [0.012, 0.052]	0.011	0.035** [0.012, 0.054]	0.011
IND_EA			0.115*** [0.177, 0.244]	0.009	0.103*** [0.155, 0.220]	0.009	0.104*** [0.157, 0.224]	0.009	0.108*** [0.165, 0.229]	0.009

Note: The meanings of CA, EA, IS, RP, AT, DO, AO are as same as in [Table 2](#). Seven control variables are: Gender, Age, Grade, **Institution** (categorised as 1 = research university, 2 = non research university, vocational college as reference), **Major** (categorised as ns = natural science, eng = engineering, bus = business, ss = social science, humanity & art as reference), **PEE** prior entrepreneurial exposure, **IEM** initial level of entrepreneurial mindset. **DIFF (CA-EA)** the difference of path coefficients between CA and EA, **IND\_CA/IND\_EA** the mediating effect of IS from CA/EA to four mindsets.

N = 1428. \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001; two-tailed test. Numbers in [ ] are confidences at 95% level, and bootstrapping n = 10000.

evidence of heteroscedasticity of error variance, but it was not severe when we combined these with diagnostic plots.

We did the path analysis with WLS (weighted least square) in MPLUS. Product of coefficients strategies and bootstrapping (N = 10000) was also introduced in the process of mediation testing ([Preacher et al., 2007](#)). The results of path analysis are shown in [Table 4](#). The indirect coefficients from CA and EA to the four mindsets are positively significant respectively, and meanwhile the bootstrapping confidences are also significant. Hence, the indirect effect of IS are significant for both CA and EA. Finally, considering the direct effect of the independent variables, as the direct path coefficients of CA to the four mindsets is negatively significant, the mediating effect is very strong. However, the direct coefficients of EA are still positively significant, so IS a partial mediator. Therefore, H6 was supported.

#### 4.4. Contextual effect of educational attributes

The three educational attributes of EE are: learning experiences, type of course, and type of activity. According to [Table 4](#), the difference of path coefficients between CA and EA are all negatively significant, indicating extracurricular activity has a greater effect on entrepreneurial inspiration and the four entrepreneurial mindsets than curriculum attendance. Therefore, H7 was supported.

In [Table 5](#), Compulsory curriculum (CC), optional curriculum (OC), practical activities (AP), and theoretical activities (AT) are independent variables in the model. No multi-collinearity problems were found as all variance inflation factors (VIF) were below 4, with the highest at 3.63. The difference of coefficients between CC and OC are not significant except for RP, and the difference of coefficients between AP and AT are not significant except for IS (negative). Overall, there is no significant difference of effects of different type of course (compulsory or optional) and different type of activity (theoretical or practical), so H8 and H9 are not supported.

## 5. Discussion

### 5.1. The direct impact of entrepreneurship education on entrepreneurial mindset

The direct impact of EE on EM is complex. The results show that extracurricular activity has a positive influence on EM and improves students' risk propensity, ambiguity tolerance, and alertness to opportunity (though not for dispositional optimism). This is in line with the findings of [Neneh's \(2012\)](#) study, although in that study the author only examined creativity, motivation and risk

**Table 5**

The effects of the type of course and type of activity.

Variables	DV = IS		DV = RP		DV = AT		DV = DO		DV = AO	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	1.677***	0.207	2.449***	0.152	2.852***	0.167	2.852***	0.178	2.412***	0.147
Gender	-0.102	0.086	0.002	0.058	-0.036	0.059	-0.092	0.067	0.091	0.055
Age	0.131	0.080	0.051	0.058	0.071	0.059	0.031	0.067	0.056	0.054
Grade	-0.021	0.053	-0.018	0.039	-0.053	0.043	0.021	0.045	0.010	0.036
Institution 1	0.044	0.133	0.310***	0.082	0.386***	0.087	0.558***	0.101	0.249**	0.083
Institution 2	-0.023	0.093	0.035	0.066	0.033	0.070	0.176*	0.076	0.051	0.063
Major_ns	-0.030	0.172	-0.071	0.108	-0.138	0.118	0.039	0.136	-0.061	0.106
Major_eng	0.086	0.103	-0.016	0.072	0.010	0.079	0.050	0.084	0.056	0.070
Major_ss	-0.199	0.192	0.092	0.119	0.106	0.132	0.270	0.143	0.108	0.115
Major_bus	0.166	0.123	0.000	0.082	0.036	0.086	0.136	0.096	0.072	0.080
PEE	-0.126	0.154	0.050	0.105	-0.135	0.107	0.071	0.130	-0.003	0.100
IEM	0.236***	0.030	0.126***	0.020	0.055**	0.021	0.084***	0.023	0.128***	0.019
CC	0.329**	0.106	0.032	0.070	-0.048	0.078	-0.021	0.077	-0.004	0.069
OC	0.189*	0.081	-0.144**	0.053	-0.087	0.059	-0.157*	0.063	-0.066	0.052
AP	0.141***	0.035	0.018	0.024	0.067**	0.027	-0.019	0.030	0.042	0.024
AT	0.313***	0.039	0.029	0.026	0.001	0.031	0.042	0.033	0.000	0.025
IS			0.293***	0.022	0.264***	0.022	0.288***	0.023	0.267***	0.020
R <sup>2</sup>	0.364	0.023	0.336	0.023	0.251	0.024	0.225	0.023	0.324	0.024
F-value	15.609***		14.551***		10.315***		9.975***		13.427***	
DIFF(CC-OC)	0.139	0.130	0.175*	0.083	0.039	0.099	0.137	0.093	0.062	0.082
			[0.111, 0.394]		[0.012, 0.338]		[0.158, 0.230]		[0.043, 0.325]	[0.099, 0.220]
DIFF(AP-AT)	-0.172*	0.071	-0.011	0.047	0.066	0.055	-0.060	0.060	0.042	0.046
			[0.312, -0.034]		[0.104, 0.080]		[0.044, 0.172]		[0.178, 0.054]	[0.051, 0.129]
IND_CC			0.096**	0.032	0.087**	0.029	0.095**	0.032	0.088**	0.029
			[0.037, 0.164]		[0.034, 0.148]		[0.036, 0.162]		[0.034, 0.148]	
IND_OC			0.055*	0.025	0.050*	0.022	0.055*	0.024	0.051*	0.023
			[0.010, 0.107]		[0.009, 0.097]		[0.009, 0.105]		[0.009, 0.099]	
IND_AP			0.041***	0.011	0.037***	0.010	0.041***	0.011	0.038***	0.010
			[0.021, 0.063]		[0.019, 0.058]		[0.021, 0.064]		[0.019, 0.058]	
IND_AT			0.092***	0.013	0.083***	0.012	0.090***	0.013	0.084***	0.012
			[0.068, 0.118]		[0.060, 0.108]		[0.067, 0.118]		[0.062, 0.109]	

Note: The meanings of CA, EA, IS, RP, AT, DO, AO and control variables are as same as in [Table 4](#). CC Compulsory curriculum, OC optional curriculum, AP practical activities, AT theoretical activities. **DIFF (CC-OC)**, **DIFF (AP-AT)** the difference of path coefficients between CC and OC, AP and AT. **IND\_CC/IND\_OC/IND\_AP/IND\_AT** the mediating effect of IS from CC/OC/AP/AT to four mindset.

N = 1428. \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001; two-tailed test. Numbers in [ ] are confidences at 95% level, and bootstrapping n = 10000.

taking. This research indicates that education is a driving antecedent in the development of students' mindset.

However, the results revealed that curriculum attendance does not positively influence entrepreneurial mindsets. On the contrary, it negatively affects the four mindsets at a significance level. This finding is consistent with [Nabi et al. \(2018\)](#) argument that the effect of EE is variable and [Arranz et al. \(2017\)](#) finding that the role of curricular elements on entrepreneurial competences is heterogeneous and unequal among different institutions. A possible explanation for the contradictory results could be related to the pedagogy of EE because the design of course contents and teaching methods could affect the learning outcomes of students. EE courses provided by the sampling institutions in this study may be taught using knowledge-based contents and traditional approaches. This may be particularly significant in the Chinese context, in which traditionally, Chinese education has been based on an objectivist view of knowledge and in which the didactic passive transmission of information has been dominant in education ([Tan, 2017](#)); however, this is outside the scope of this study.

## 5.2. The mediating role of entrepreneurial inspiration

The results showed that EE has a positive impact on entrepreneurial inspiration, which in turn positively affects four specific mindsets of students. This is in line with [Nabi et al. \(2018\)](#) and [Souitaris, Zerbinati, and Al-Laham's \(2007\)](#) findings. This research illustrated that EE can inspire students to make their mindset more entrepreneurial.

This research also found that the mediating role of entrepreneurial inspiration exists in the relationship between EE and EM. When this was probed by distinguishing the different aspects of EE, varying results were found. For curriculum attendance, the mediation effect of inspiration is strong, while for extracurricular activity, the mediation effect is partial. The findings thus provide an explorative answer to [Nabi et al. \(2017\)](#) who proposed that the mediating role of inspiration in EE and its impact is under researched and warrants further examination.

### 5.3. The contextual role of educational attributes

The results indicate that extracurricular activity has a greater effect on both inspiration and the four mindsets than curriculum attendance. It confirmed the critical role of the type of learning experiences (curriculum attendance or extracurricular activity) in the link of EE-EM. This finding was supported by an earlier study of [Arranz et al. \(2017\)](#) who also found a difference between curricular and extracurricular education in the development of EI, but nevertheless presents some differences because in this study the impact indicator is EM rather than EI. Theoretically, extracurricular activity played a more important role in generating EE outcome because this kind of learning occurred in informal situations with institutional resources ([Laukkanen, 2000](#)) and relates to cognitive-emotional support and cultural awareness of entrepreneurship ([Fayolle & Gailly, 2015](#)) which could deeply inspire students to be more entrepreneurial.

However, this study could not find a significant effect difference of the type of course (compulsory or optional) on inspiration and mindsets. These findings conflict with that of [Karimi et al. \(2016\)](#) who concluded that students' intention was significantly raised by the elective course and that the rise of intention through compulsory coursework was not significant. In addition, contrary to expectation, the results demonstrated there is no significant effect of the type of activity (practical or theoretical) which is inconsistent with [Piperopoulos and Dimov's \(2015\)](#) findings. One plausible interpretation for the two results is that the role of type of course and type of activity probably varies depending on different EE outcomes because this study focused on mindset instead of intention. Another possible reason is that this study did not consider personal factors such as students' learning motivation (intrinsic or extrinsic) which would obviously influence the formation of mindset of students thus requiring further exploration in this area.

### 5.4. Theoretical and practical implications

This study has three implications for theory based on the conceptual model. Firstly, the results suggest that EM is an evolving learning outcome of EE and raises the question: can certain aspects of cognitive characteristics be taught and developed? EM is definitely not facts and skills to be learned but encompasses ways of thinking, reflecting deep cognitive structures of individuals ([Krueger, 2007](#); [Naumann, 2017](#)). The EE-EM link thus deserves further exploration.

Secondly, the results illustrated that inspiration is a critical indicator of EE impact and simultaneously an important predictor of EM. The role of inspiration in EE impact indicates a new proxy for assessing EE effectiveness indirectly through the emotional changes, which is consistent with [Lackéus \(2014\)](#). Nevertheless, it is not always sufficient to consider inspiration as an emotional factor and thus it is necessary to explore other variables of entrepreneurial emotion such as passion ([Cardon, Foo, Shepherd, & Wiklund, 2012](#)).

Finally, this study verified that curricular course has a weaker effect on EM than extracurricular activity, which may reflect the outcome of the pedagogical method of experiential learning in simulated or real-life entrepreneurial situations. This supports the assumption that pedagogical interventions might be a substantial reason for the inconsistencies in EE impact results. The findings indicate that it could be beneficial to explore the impact of pedagogical approaches on EE outcomes.

In terms of practical implication, the research findings are important for policy makers from government and higher education institutions. Firstly, it confirms the value of EE initiatives by the government and universities, which encourages government policymakers to support universities and colleges with further funding to ensure EE is accessible to all students. Secondly, as EE is helpful to develop students' inspiration and mindset, it should be integrated into the coherent framework of general education in universities to prepare more entrepreneurial students for future study, work, and living. Thirdly, as inspiration appears to be a crucial benefit from EE and a strong predictor of EM, instruction designers may focus more on inspiration triggers within curricula. Lastly, as extra curricula activities are more effective, these should be introduced in addition to mandatory entrepreneurship education. Accordingly, university program developers and implementers need to pay more attention to active and voluntary activities related to entrepreneurship.

## 6. Conclusions

### 6.1. Key findings

This research was designed to examine the impact of entrepreneurship education on students' entrepreneurial mindsets in higher education in China. To address the objective, a mediating model was designed to explore the relationship between EE and EM using a cross-sectional survey to collect data that supported both the measurement and the structural model. Key findings are manifested in the following aspects.

Firstly, the influences of EE are heterogeneous due to the multifaceted nature of learning experiences in higher education. Extracurricular activity positively affects students' EM, while curriculum attendance negatively affects that. Secondly, EE affects entrepreneurial inspiration which in turn stimulates students' EM, verifying the mediating role of entrepreneurial inspiration. Thirdly, students' involvement in extracurricular activity generates a positive influence on their EM greater than curriculum attendance, which supports the role of learning experience in the EE-EM link. Finally, the type of course (optional or compulsory) and the type of activity (theoretical or practical) did not have a significant impact on inspiration and mindset.

## 6.2. Contributions

The core theoretical contribution of this research is the highlighted impact of EE on EM as measured by investigating four variables of specific entrepreneurial mindsets. This study expands the analysis framework of EE impact research and deepens the understanding of EE impact outcomes that are deeply cognitive and prior to intention.

The second contribution is the two-dimensional nature of EE and its divergent effect on EM. This finding, with the insight into the inner part of EE, may be a possible explanation of why the results of EE research are sometimes conflicting in the literature (e.g. [Oosterbeek et al., 2010](#)). By unpacking the different two-dimensional effects of EE, this study makes our understanding more nuanced and precise regarding the effectiveness of EE.

Thirdly, the research highlighted a dynamic mechanism of EE impact on learning outcomes. A portrait of EE with a basic distinction between curricular and extracurricular becomes theoretically meaningful in explaining the EE impact outcomes. By considering the mediating variables in the model, the present study revealed that EE impact is to some extent emotional (inspiration) driven and pedagogical (learning experiences) sensitive which answered not only whether, but also how, EE affects EM in higher education settings.

Lastly, this research helps to shed a more nuanced light on an exogenous and influential factor (EE) in the formation of EM by confirming the relationship between EM and EE.

## 6.3. Limitations and future research

This research only addressed the impact of EE on EM within the framework of general education in China. However, intention and even actual action were not considered. Future research can combine intention into the model to verify whether EM is also a predictor of entrepreneurial intention.

This study examined the effect of EE on EM whilst considering the role of curriculum attendance and extra-curricular activity, using relatively simplistic dichotomous variables. Future research could build on this to explore other crucial factors that play a key role within EE, such as the contents of courses, pedagogical methods, teaching models and learning experience.

The data used within this research was collected from a range of institutions where the teaching and teaching approaches were potentially different. This allowed for the generalization of findings, but future research could look at the effectiveness of different teaching methods and pedagogical approaches in China.

It is accepted that whilst the results and conclusions in this research are based on cross-sectional survey data in a natural education setting, a longitudinal study or a quasi-experimental design with a control group would possibly offer new insights into the relationship between EE and EM.

A final limitation is that the samples were generated in only one province (Jiangsu) in China using a convenience sample and future research can extend the sample area and apply random sampling wider across the country.

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## Appendix. Measurement Instruments of Research Variables

### 1. Curriculum attendance (multiple choice)

Which of the following is in line with your actual situation?

- (1) I have not attended a course on entrepreneurship and no plans to attend in the future.
- (2) I have not attended a course on entrepreneurship but plan to attend in the future.
- (3) I am studying on a course related to entrepreneurship.
- (4) I have at least finished a compulsory course on entrepreneurship.
- (5) I have at least finished an optional course on entrepreneurship.

### 2. Extracurricular activity (7-point Likert scale)

Which of the following activities have you been involved in? Please recognize the extent of the impact of each activity that you involved in (1 = lowest, 7 = highest).

- (1) Entrepreneurship clubs
- (2) Entrepreneurship design competition
- (3) Successful entrepreneur's speech
- (4) Enterprise visit or internship
- (5) Face-to-face communication with an entrepreneur

- (6) Conferences or workshops related to entrepreneurship
- (7) Business simulators or games
- (8) Entrepreneurial incubation project
- (9) Entrepreneurial activity of resourcing or networking
- (10) Entrepreneurial spirit and values transmitted by the university or colleges

**3. Entrepreneurial inspiration (7-point Likert scale)**

Which of the following views or events that changed obviously your 'heart' and 'mind' and made you to be more entrepreneurial during your study? To what extent did such views or events made you to be more entrepreneurial (1 = lowest, 7 = highest)?

- (1) The views of a professor
- (2) The views of an external speaker
- (3) The views of a visiting entrepreneur
- (4) The views of classmates
- (5) The preparation for a business plan competition and the views of judges of the competition
- (6) Participation of an entrepreneurship club and the views of peers from the club

**4. Alertness to opportunity (7-point Likert scale)**

To what extent do you agree with each of the following (1 = strongly disagree, 7 = strongly agree)?

- (1) I have frequent interactions with others to acquire new information.
- (2) I am keen on looking for information.
- (3) I can recognize links between seemingly unrelated pieces of information.
- (4) I can hardly see connections between previously unconnected domains of information.
- (5) I can distinguish between profitable opportunities and non-profitable opportunities.
- (6) When facing multiple opportunities, I am difficult to select the good ones.

**5. Risk propensity (7-point Likert scale)**

To what extent do you agree with each of the following (1 = strongly disagree, 7 = strongly agree)?

- (1) I like to take chances, although I may fail.
- (2) I like waiting until things has been tested before I try it.
- (3) To earn greater rewards, I am willing to take higher risks.
- (4) I only like to implement a plan if its outcome is very certain.
- (5) I seek new experiences even if their outcomes may be risky.

**6. Ambiguity tolerance (7-point Likert scale)**

To what extent do you agree with each of the following (1 = strongly disagree, 7 = strongly agree)?

- (1) If I am uncertain about the responsibilities involved in a task, I get very anxious.
- (2) It really disturbs me when I am unable to follow another person's train of thought.
- (3) I can tolerate ambiguous conditions and unpredictable results.
- (4) Before any important task, I must know how long it will take.
- (5) A good task is one in which what is to be done and how it is to be done are always clear.

**7. Dispositional optimism (7-point Likert scale)**

To what extent do you agree with each of the following (1 = strongly disagree, 7 = strongly agree)?

- (1) In uncertain times, I would expect the best.
- (2) If something can go wrong with me, it will.
- (3) I am always optimistic about my future.
- (4) I hardly ever expect things to go my way.
- (5) I rarely count on good things happening to me.
- (6) Overall, I expect more good things to happen to me than bad.

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