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Relationships between locus of control, theory of planned behavior, and cyber entrepreneurial intention: The moderating role of cyber entrepreneurship education

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ABSTRACT

The study aimed to examine the determinants of cyber entrepreneurial intention by integrating the perspectives of the theory of planned behavior (TPB), locus of control, and cyber entrepreneurship education. Data collected from 242 valid respondents were analyzed against the research model using the partial least squares structural equation modeling. The findings revealed that internal locus of control facilitates perceived behavioral control, subjective norms, and attitudes, which, in turn, increase cyber entrepreneurial intention. Furthermore, cyber entrepreneurship education was shown to have a positive moderating effect on the relationships between attitudes and intention and between subjective norms and intention, and a negative moderating effect on the relationship between perceived behavioral control and intention. This study represents a pioneering effort to investigate the determinants of cyber entrepreneurial intention by extending the theory of planned behavior. The results support locus of control as a cognitive personality trait that facilitates the cognition constructs of the theory of planned behavior in the context of cyber entrepreneurship. Furthermore, cyber entrepreneurship education was shown to moderate the relationships between TPB cognition constructs and cyber entrepreneurial intention. The findings of this study provide several important theoretical and practical implications for cyber entrepreneurship education.

1. Introduction

The continued growth of e-commerce (EC) and the evolution of mobile telecommunication technologies are driving the growth of cyber entrepreneurship (Chang, Wang, Lee, & Yu, 2018; Wang, Lin, Yeh, Li, & Li, 2016). Key advantages of online businesses over traditional brick-and-mortar firms include lower startup costs, broader geographical reach, and greater interactivity with customers (Davis, 2013; Engard, 2016; Wang et al., 2016). Policies and cyber entrepreneurship-related courses have been proposed in countries

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such as India, Taiwan, and China to promote the growth and development of cyber entrepreneurship (Brevity, 2018; Chang et al., 2018; Horwitz, 2017). The challenges of the COVID-19 pandemic have fueled cyber entrepreneurship and created many new opportunities (Tajvidi & Tajvidi, 2021). Despite the upsurge in cyber entrepreneurship and related government support, intention to start an internet-based business remains low among the general population. For example, in the 2020/2021 GEM Global Report, the Global Entrepreneurship Research Association reported that only 15.5% of adults in Taiwan intended to start a business in the following three years. Furthermore, key statistics related specifically to cyber entrepreneurship fuel concerns about the continued robust development in internet-based business sector. For example, a recent study found that over 90% of online business startups fail within the first 120 days due to inadequate internet-marketing knowledge and skills (Skeldon, 2019). Therefore, identifying the key drivers of cyber entrepreneurial intention is necessary to better develop and deliver cyber entrepreneurship education.

The numerous studies on entrepreneurial intention in the literature address a broad range of issues (Fayolle & Liñán, 2014). However, little attention has been paid to cyber entrepreneurial intention. The antecedents of cyber entrepreneurial intention have been investigated from the perspective of self-efficacy theory (Wang, Tseng, Wang, & Chu, 2020) and by integrating personality traits and self-determination theory (Wang et al., 2016), social cognitive theory and goal setting theory (Chang et al., 2018), and self-efficacy theory and positive psychology (Chang, Shu, Wang, Chen, & Ho, 2020). However, to the best of the authors' knowledge, no prior research has been developed to examine the theory of planned behavior (TPB) in the current research context, which represents a significant gap in the literatures, as management complexity is greater in cyber entrepreneurship than in traditional entrepreneurship contexts. Cyber entrepreneurs today must choose from among many channel options (e.g., websites, Internet kiosks, social media, mobile apps; Shen, Li, Sun, & Wang, 2018; Zhang, Ren, Wang, & He, 2018) and learn to use and integrate these channels to orchestrate a unified customer experience (Verhoef, Kannan, & Inman, 2015). Furthermore, they must adapt to constantly changing information technology (IT) to better satisfy the needs of their consumers. Also, managing a virtual team of people with differing cultural backgrounds can be difficult (Tajvidi & Tajvidi, 2021). Thus, cyber entrepreneurs require great dedication and perseverance throughout their process of starting and maintaining online ventures. This adheres to the TPB assumption of volitional control as a prerequisite behavior. The reason why some people have low cyber entrepreneurIAL intention even under supportive environmental conditions is explained under TPB as their having weak cognition toward cyber entrepreneurship.

Personality has also been identified as factor affecting cognition and behavioral intention toward cyber entrepreneurship. Locus of control has been examined frequently in the entrepreneurship context (e.g., Hsiao, Lee, & Chen, 2016; Schjoedt & Shaver, 2012; Sebora, Lee, & Sukasame, 2009) due to its cognitive focus (Lefcourt, 1992; Ng, Sorensen, & Eby, 2006). The ability of locus of control to facilitate entrepreneurial cognition has been examined previously, with findings pointing to locus of control as the personality trait most influential in forming entrepreneurial intention through the three attitudinal dimensions of TPB (Munir, Jianfeng, & Ramzan, 2019). However, to the best of the authors' knowledge, no prior research has examined whether locus of control functions as a personality trait able to facilitate TPB cognition in the context of cyber entrepreneurship. This is an issue that deserves greater attention because cyber entrepreneurship has high rate of failure (Skeldon, 2019) and high management complexity (Tajvidi & Tajvidi, 2021) and because locus of control is a key driver of EC business success (Sebora et al., 2009).

As reported in a meta-analytic study (Bae, Qian, Miao, & Fiet, 2014), the relationship between entrepreneurship education and entrepreneurial intentions has been addressed in numerous studies. However, few studies have investigated the role of entrepreneurship education in facilitating intention and entrepreneurial performance in the context of cyber entrepreneurship (Wang et al., 2016, 2020; Yeh, Lin, Wang, Wang, & Lo, 2021). Because entrepreneurship education should cultivate attitudes and cognitive skills for entrepreneurship via pedagogical programs and processes (Fayolle, Gailly, & Lassas-Clerc, 2006), examining the effectiveness of cyber entrepreneurship education in strengthening the link between cognition and intention regarding cyber entrepreneurship is important. Furthermore, as, under the TPB, willingness to pursue cyber entrepreneurship is determined by an individual's volitional power, whether cyber entrepreneurship education facilitates volitional power in the context of initiating an online business (specifically, whether cyber entrepreneurship education strengthens the cognition-intention link proposed in the TPB) is also an important issue to examine.

In light of the above, this research was designed to investigate the drivers of cyber entrepreneurial intention by integrating the TPB, locus of control theory, and literature on cyber entrepreneurship education. Specifically, we examine whether locus of control can facilitate perceived behavioral control, attitudes, and subjective norms regarding cyber entrepreneurship, which in turn affect cyber entrepreneurial intention. Furthermore, the moderating role of cyber entrepreneurship education on the relationship between intention and perceived behavioral control, subjective norms, and attitudes was investigated. This research makes several contributions to the TPB. First, this study was the first to explore TPB in the context of cyber entrepreneurship and to propose locus of control as a key cognitive personality trait facilitating the TPB cognition constructs of attitudes, subjective norms, and perceived behavioral control as well as to elucidate the underlying mechanisms. Second, this study shifts the TPB empirical examination from traditional entrepreneurship (Fayolle & Liñán, 2014) to the cyber entrepreneurship context. Third, the moderating role of cyber entrepreneurship education on the relationships between TPB cognition constructs and cyber entrepreneurial intentions is an issue that has received little attention to date. Lastly, based on the findings, guidelines are provided for improving the effectiveness of cyber entrepreneurship courses.

2. Theoretical foundations

2.1. The theory of planned behavior

The TPB is a widely popular conceptual framework used in the study of human behavior (Ajzen, 2001, 2002). An assumption of this

theory is that, as most human behaviors are under volitional control, intention to perform a certain behavior is a good predictor of actual behavior (Fishbein & Ajzen, 1975, p. 369). Intention in this study was defined as an internal state guiding a person's experience and attention toward a method of behaving or a specific object. Moreover, the amount of effort planned to be used to perform a particular behavior is presumed to reflect intention (Ajzen, 1991, p. 181).

The TPB postulates that intention is shaped by perceived behavioral control, attitudes, and subjective norms related to performing a behavior (Ajzen, 1991), where attitude toward a behavior is influenced by perceptions of the desirability of adopting that behavior, which is facilitated by beliefs regarding likely outcomes and the valence of outcome evaluations (Armitage & Conner, 2001). Subjective norms may be defined as perceived group pressures associated with performing certain behaviors that are cultivated by normative beliefs, i.e., the normative expectation of others regarding a certain behavior (Ajzen, 2002). Finally, perceived behavioral control is defined as the degree to which performing a certain behavior is easy or difficult, as influenced by control beliefs, which represent the extent to which a person believes the presence of facilitating or hindering factors influences whether a behavior may be performed (Ajzen, 2002). In the context of entrepreneurship, attitude is the positive or negative evaluations of an individual concerning the construction of a new business; subjective norms refer to an individual's perception of the social pressure and expectations given by significant others, family, and friends to start/not start a new business; and perceived behavioral control refers to the degree of control that an individual self-perceives to have over the process of creating a new business (Fretschner & Weber, 2013).

The TPB has been used in numerous studies to predict entrepreneurship-related behavior (Bird, 1988; Kolvereid, 1996; Kolvereid & Isaksen, 2006; Krueger & Carsrud, 1993). In a literature review article, TPB was identified as a key model used to guide the current academic understanding of how entrepreneurial intention is formed, while empirical evidence generally supports its application in entrepreneurial contexts (Fayolle & Liñán, 2014). For instance, the transitive likelihood of career choice intention in students whose families run a business was found to be significantly determined by the independence motive and the degree of entrepreneurial self-efficacy (Zellweger, Sieger, & Halter, 2011). In the context of entrepreneurial awareness education, entrepreneurial attitude is a key driver of entrepreneurial intention, while perceived behavioral control over entrepreneurial tasks is not (Fretschner & Weber, 2013). Using a longitudinal dataset, Kautonen, Gelderen, and Fink (2015) concluded that the TPB is a valid theory to explain the emergence of business start-up behavior because perceived behavioral control, subjective norms, and attitudes all significantly influence intention and jointly explain 59% of the variance in intention, which is significantly beyond the typical level of variance (30–45%) explained in previous studies on entrepreneurship. While there are many studies of entrepreneurship in the literature, few have applied the TPB in the context of cyber entrepreneurship.

2.2. Locus of control

Locus of control is a continuum reflecting individual beliefs regarding the degree to which the consequences of an event are within that individual's control (internal locus of control) or not (external locus of control; Rotter, 1966). A high internal locus of control reflects the belief that one's skills, effort, and ability can change outcomes and that s/he can control their fate (Rotter, 1966). Conversely, a high external locus of control reflects the belief that external forces determine one's outcomes and that fate is controlled by chance or luck (Lii & Wong, 2008; Rotter, 1966). Along with emotional stability, self-esteem, and generalized self-efficacy, internal locus of control is one of the core traits of self-evaluation (Judge & Bono, 2001). Moreover, locus of control is conceptually independent of perceived behavioral control (Ajzen, 2002), as the former is a personality trait while the latter is a perception.

The conceptualization of the locus of control construct by Rotter and the revised I-E scale (Levenson, 1974) have been examined comprehensively in the managerial and organizational literature (Durand & Nord, 1976; Kets de Vries, 1977; Spector, 1982), with meta-analytic results indicating internal locus of control, along with other core self-evaluation traits, to be a highly effective predictor of job performance and job satisfaction (Judge & Bono, 2001). Locus of control is now widely accepted as one of the most influential characteristics of entrepreneurship (Rotter, 1966; Brockhaus, 1980; Poon, Ainuddin, & Junit, 2006).

The results of previous studies indicate that locus of control is associated with entrepreneurial outcomes. Among the founder, e-service, and external factors, locus of control as subsumed under the founder factors is seen as most crucial for e-commerce success (Sebora et al., 2009). Locus of control is important for both entrepreneurial entry and exit, has substantial explanatory power (Caliendo, Fossen, & Kritikos, 2014), and is related to the development of entrepreneurial intention (Krueger, 2009; Monsen, Urbig, Renko, El Tarabishy, & Schjoedt, 2010). In research on management education, locus of control has been shown to predict entrepreneurial intention in vocational high school students (Tentama & Abdussalam, 2020) and to influence the entrepreneurial intention of college students positively via entrepreneurial self-efficacy (Uysal, Karadağ, Tuncer, & Şahin, 2021). However, few studies have investigated whether locus of control is involved in facilitating cyber entrepreneurial intention. Although one previous study took up this issue using the Big Five personality traits (Wang et al., 2016), core evaluation traits such as locus of control have yet to be examined. The digital environment that must be navigated by cyber entrepreneurs is more complex than that facing traditional entrepreneurs. Thus, the relationship between locus of control and cyber entrepreneurial intention deserves closer examination.

2.3. Cyber entrepreneurship

Cyber entrepreneurship as a modern and emerging concept has been proposed in entrepreneurial studies. This new type of activity was introduced in twenty-first century and relies heavily on the technology (Tajvidi & Tajvidi, 2021). The term cyber refers to an environment where business activities are conducted, which is defined by William Gibson (Holeton, 1998). Cyber entrepreneurship can also be called internet entrepreneurship (Wang et al., 2020) since the Internet is frequently used as the technology to start the business (Tajvidi & Tajvidi, 2021). Alternatively, it is called digital entrepreneurship as entrepreneurs establish their businesses based

on innovative ideas and IT within a digital economy (Kollmann, 2008). This research uses the term cyber entrepreneurship since it is used the most frequently in past studies (e.g., Chang et al., 2020; Tajvidi & Tajvidi, 2021; Wang et al., 2016). Cyber entrepreneurship may be defined as any Internet-based business practice where entrepreneurs start their businesses online and conduct business transactions and exchange data using IT, especially over Internet platforms (Matlay, 2004; Tajvidi & Tajvidi, 2021; Wang et al., 2020). Compared with traditional entrepreneurship, engaging in cyber entrepreneurship is generally cheaper (Chang et al., 2020; Tajvidi & Tajvidi, 2021; Wang et al., 2020), less limited by geographical boundaries, easier to enter and exit (Tajvidi & Tajvidi, 2021; Wang et al., 2020), and more IT intensive (Tajvidi & Tajvidi, 2021; Wang et al., 2020). The study of cyber entrepreneurship is in its infancy, with most studies focused on the facilitation of cyber entrepreneurial intention (Chang et al., 2020; Wang et al., 2016, 2020).

2.4. Cyber entrepreneurial intention

There remains a lack of consensus regarding the definition of entrepreneurial intention in the new business formation literature (Thompson, 2009), with previous definitions focusing, respectively, on a person's judgment regarding the chances of possessing one's business (Crant, 1995), the degree of commitment to creating a new business (Krueger, 1993), the degree of interest in new business creation (De Clercq et al., 2013; Fitzsimmons & Douglas, 2011; Krueger, Reilly, & Carsrud, 2000), and the level of effort associated with carrying out entrepreneurial behavior (Liñán & Chen, 2009). Wang et al. (2016), referencing Crant (1995), defined cyber entrepreneurial intention as an individual's evaluation of the likelihood of new EC business creation and ownership. Chang et al. (2018) followed Liñán and Chen (2009) in defining cyber entrepreneurship as the level of effort associated with carrying out cyber entrepreneurial behavior. Because Liñán and Chen's (2009) definition was subsumed under the TPB framework, which is consistent with the aim of this study, the definition of cyber entrepreneurial intention used in Chang et al. (2018) was adopted in this study.

Studies on entrepreneurial intention may be distinguished into five categories (Fayolle & Liñán, 2014). The first examines the development of entrepreneurial intention using core theoretical models such as Ajzen's (1991) TPB, Shapero and Sokol's (1982) model of the entrepreneurial event, and Bird's (1988) model for implementing entrepreneurial ideas, of which the former two have received wide empirical support. The second examines whether entrepreneurial intention is facilitated by personal-level variables. As revealed by a meta-analytic review, four of the Big Five personality dimensions (consciousness, emotional stability, openness to experience, and extroversion) relate to entrepreneurial intention (Zhao, Seibert, & Lumpkin, 2010). The third category examines the effectiveness of entrepreneurship education on entrepreneurial intention. Based on a meta-analytic review, entrepreneurship education and entrepreneurial intention share a slightly significant and positive correlation (Bae et al., 2014). The fourth category examines the role of context and institutions in forming entrepreneurial intention (see Engle, Schlaegel, & Dimitriadi, 2011; Moriano, Gorgievski, Laguna, Stephan, & Zarafshani, 2012). The fifth category (which has received the least attention to date) examines whether entrepreneurial intention may be transformed into behaviors. Shirokova, Osiyevskyy, and Bogatyreva (2016) found a positive correlation between entrepreneurial intention and the scope of start-up activities that student entrepreneurs engage in, and thus proposed several moderators, including family entrepreneurial background, age, gender, general country uncertainty avoidance, and university entrepreneurial environment.

The antecedents of cyber entrepreneurial intention have been investigated in several previous studies. Extrinsic and intrinsic cyber entrepreneurial motivations facilitate cyber entrepreneurial intention (Wang et al., 2016). Both cyber entrepreneurial self-efficacy and goal commitment have direct and positive effects on cyber entrepreneurial intention (Chang et al., 2018). Cyber entrepreneurial self-efficacy facilitates cyber-entrepreneurial intentions for non-IT students and positive thinking positively moderates the relationship between cyber entrepreneurial self-efficacy and cyber-entrepreneurial intentions (Chang et al., 2020). Internet entrepreneurial self-efficacy can facilitate internet entrepreneurial intention for online entrepreneurs (Wang et al., 2020). However, the number of studies examining this issue in the context of cyber entrepreneurship is a small fraction of those examining the antecedents of entrepreneurial intention. Therefore, this issue deserves greater attention to advance the academic understanding of cyber entrepreneurship.

2.5. Cyber entrepreneurship education

Entrepreneurship education has been categorized in various ways in the literature. Liñán (2007) proposed four types: entrepreneurial dynamism education, continuing education for entrepreneurs, entrepreneurial awareness education, and start-up education. Haase and Lautenschläger (2011) proposed two types, including education for entrepreneurship and education about entrepreneurship, with the former focused on delivering practical knowledge to students and the latter focused on equipping students with theoretical knowledge regarding the success and failure factors of entrepreneurship, effects of entrepreneurship, and entrepreneurs. Ilonen, Heinonen, and Stenholm (2018) proposed three types, including learning through entrepreneurship, learning for entrepreneurship, and learning about entrepreneurship, with the first focused on learning how to become an enterprising individual, the second focused on training up entrepreneurs by delivering practical knowledge to students, and the third focused on training up new entrepreneurship educators by providing theoretical knowledge on the success and failure factors of entrepreneurship, effects of entrepreneurship, and entrepreneurs.

Entrepreneurial education is crucial to cultivating entrepreneurial intention, entrepreneurship-related knowledge and skills (e.g., local network contacts, business planning capabilities), perceived desirability, self-efficacy, and the dynamic behavior necessary to manage business growth (Liñán, 2007). Moreover, adopting an entrepreneurial mindset and engaging with the content of entrepreneurship education can increase intention to become an entrepreneur (Peltier & Scovotti, 2010). In the aforementioned literature review, Fayolle and Liñán (2014) found that entrepreneurship education facilitates positive attitudes and intentions toward

entrepreneurship in students. Also, a meta-analytic review found a significantly positive correlation between entrepreneurship education and entrepreneurial intention (Bae et al., 2014).

All of the issues addressed above clearly require further investigation in the context of cyber entrepreneurship. The few studies that have been conducted in this context found that cyber entrepreneurship education facilitated entrepreneurial intentions and entrepreneurial performance via self-efficacy (Wang et al., 2020; Yeh et al., 2021). However, the moderating effects of cyber entrepreneurship education have received little attention. To the best of the authors' knowledge, only one prior study has investigated the moderating role of cyber entrepreneurship education on the relationships between entrepreneurial motivations (i.e., intrinsic and extrinsic motivations) and cyber entrepreneurship education, with the results showing partial support (Wang et al., 2016). In addition, the moderating role of cyber entrepreneurship education on the cognition-intention link regarding cyber entrepreneurship has not yet been examined. This research was designed to help address this gap in scholarly understanding.

2.6. Hypothesis development

The tenet of the theory of self-verification postulates that people favor others to view them as they see themselves, regardless of the valence of their self-views. People who see themselves as likeable tend to try to encourage others to perceive them as likeable, while people who view themselves as dislikable tend to try to encourage others to perceive them as unlikeable (Swann, 2011). People pursue self-verification to make their life experience more predictable and coherent and less stressful (Swann, 2011). The findings of McCarty and Shrum (2001) indicate that internal locus of control makes individuals think they can do something to change their environment, and that their pro-environmental actions are worthwhile. In the context of cyber entrepreneurship, internal-locus-of-control individuals tend to demonstrate a high propensity toward pursuing cyber entrepreneurship and to be willing and able to self-direct in the pursuit of opportunities (Lumpkin & Dess, 1996). Based on the theory of self-verification, high internal-locus-of-control individuals want other people to perceive them as highly influential and as willing and able to confront the challenges associated with cyber entrepreneurship. Thus, these individuals tend to show positive attitudes toward cyber entrepreneurship, aggressively seek related assistance/support from people in their social networks (e.g., friends, relatives, coworkers; Hsiao et al., 2016; Luthans, Avey, Avolio, Norman, & Combs, 2006), and actively cultivate their own skills and competencies to overcome related challenges (Hsiao et al., 2016; Luthans & Youssef, 2007). Based on the above, internal locus of control may be presumed to facilitate the establishment of perceived behavioral control, subjective norms, and attitudes in the context of cyber entrepreneurship, while the reverse should be true for external locus of control. Based on Rotter's (1966) definition, higher (lower) locus of control indicates higher external (internal) locus of control. Thus, the following hypotheses were developed:

H1. Locus of control negatively influences attitudes toward cyber entrepreneurship.

H2. Locus of control negatively influences subjective norms regarding cyber entrepreneurship.

H3. Locus of control negatively influences perceived behavioral control over cyber entrepreneurship.

Based on the TPB (Ajzen, 1991; 2002), perceived behavioral control over a behavior, subjective norms in performing a behavior, and attitudes toward performing a behavior foster a person's intention toward that behavior. In the current research context, when people have a positive attitude toward cyber entrepreneurship, other people in their social network support them in the process of cyber entrepreneurship, and people perceive it easy to pursue cyber entrepreneurship, these can facilitate cyber entrepreneurial intention. Thus, the following hypotheses were developed:

H4. Attitudes toward cyber entrepreneurship positively influence cyber entrepreneurial intention.

H5. Subjective norms regarding cyber entrepreneurship positively influence cyber entrepreneurial intention.

H6. Perceived behavioral control over cyber entrepreneurship positively affects cyber entrepreneurial intention.

Based on the TPB, human behavior is driven by behavioral, normative, and control beliefs, while perceived behavioral control, attitudes, and subjective norms are facilitated by control, behavioral beliefs, and normative beliefs, respectively. Perceived behavioral control, attitudes, and subjective norms together generate behavioral intention and, subsequently, behavior (Ajzen, 2002). Certainty is defined as the degree to which individuals are certain about their beliefs and is a key cognitive characteristic that moderates the cognition-intention link in the TPB (Bassili, 1996; Cooke & Sheeran, 2004). Moreover, certainty is believed to moderate positively the effects of perceived behavioral control, attitudes, and subjective norms on behavioral intention (Cooke & Sheeran, 2004; Trafimow, 1994). The findings of past studies indicate that training and education positively affect entrepreneurship self-efficacy (Florin, Karri, & Rossiter, 2007; Mueller & Goić, 2003), which is known to strengthen the level of certainty regarding entrepreneurial cognition. In the context of cyber entrepreneurship, when people receive more cyber entrepreneurship education, they tend to increase their related knowledge and capabilities, which increases their self-efficacy and, in turn, may increase self-perceived certainty. Thus, it may be inferred that cyber entrepreneurship education strengthens perceived behavioral control-intention, subjective norms-intention, and attitudes-intention relationships, which supports the following hypotheses:

H7a. Cyber entrepreneurship education positively moderates the effect of attitudes toward cyber entrepreneurship on cyber entrepreneurial intention.

H7b. Cyber entrepreneurship education positively moderates the effect of subjective norms regarding cyber entrepreneurship on cyber entrepreneurial intention.

H7c. Cyber entrepreneurship education positively moderates the effect of perceived behavioral control over cyber entrepreneurship on cyber entrepreneurial intention.

The research model used to guide this study was developed based on the aforementioned hypotheses and is shown in Fig. 1.

3. Methodology

Following Neuman (2011), research type was described in this study in terms of: dimensions of use and audience, purpose of research, within or across cases, single or multiple points in time, and the data collection technique. This study is classified as basic research because it was designed to advance knowledge about cyber entrepreneurship education. This study is classified as causal research because it was designed to extend the TPB by integrating the literature on locus of control and cyber entrepreneurship education. This study is classified as across-case and cross-sectional research because it collected information from a large number of cases at one point in time. Furthermore, quantitative data were collected for this study. Details regarding sample and data collection and research instruments are provided below.

3.1. Sample and data collection

Purposive sampling and an online survey were used to collect data. A questionnaire link was added to the questionnaire board (Q_ary) of PTT, which is the largest bulletin board system in Taiwan and is one of the primary online platforms used by university students. University students were invited to join the online survey, including students in the college of management and other colleges/departments. As an incentive, those respondents who successfully completed the questionnaire were enrolled in a lottery to receive a gift certificate worth NT$100 (approx. US$3.60). The data were collected from November 2017 to December 2017, with a total of 249 responses collected. Two hundred and forty-two valid survey responses were obtained after excluding those with incomplete answers.

The sample characteristics are described in Table 1. Most of the participants were female (58.7%), 18–25 years old (83.0%), enrolled in an undergraduate program (70.3%), and earned a monthly income $\leq$ NT$20000 (79.8%). Of all the students, 57% came from college of management. Slightly more than half (54.5%) had previously attended a university-level EC course.

3.2. Research instrument

The items used to measure locus of control in this study were adapted from Carducci (2009), who used the short version (10 items) of Rotter's (1966) scale. Each item consisted of two statements: one for external control (A) and one for internal control (B). For each item, the participants were asked to choose which statement (A or B) best described themselves, with A answers coded as 1 and B answers coded as 0. Thus, the total possible locus of control score ranged from 0 to 10, with lower scores representing higher internal locus of control and higher scores representing higher external locus of control. The locus of control items in this scale are shown in Table 2.

Following Finn and Kayande (2004), items for all of the constructs were adapted to fit the research context. Items pertaining to cyber entrepreneurial intention, perceived behavioral control over cyber entrepreneurship, subjective norms regarding cyber entrepreneurship, and attitudes toward cyber entrepreneurship were adapted from Liñán and Chen (2009) and measured with 6, 6, 3, and, 5, respectively. The scale, originally designed for traditional entrepreneurship, was revised/reworded to fit the cyber entrepreneurship context. The scale of Liñán and Chen (2009) was selected for adaptation and use in this study, as this scale has previously demonstrated acceptable cross-cultural validity in Taiwan and Spain and uses the TPB as its theoretical basis. Scoring was done on a seven-point Likert scale, with responses anchored by 1 (strongly disagree) and 7 (strongly agree).

Following Wang et al. (2016), cyber entrepreneurship education was measured in this study using disciplinary difference as a proxy. Students were categorized into two groups based on having (not having) taken a university EC course based on the following

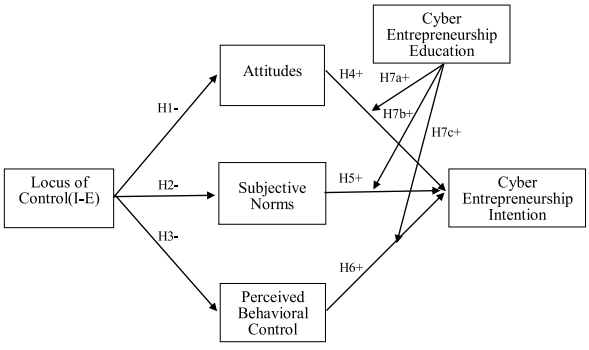

Fig. 1. Research model. Note: EC is the acronym for e-commerce; Path coefficients are standardized. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Disciplinary difference is a proxy for cyber entrepreneurship education.

Table 1
Sample characteristics.

Variable	Level	Count	Proportion (%)
Gender	Male	100	41.3
	Female	142	58.7
Age	18–25	201	83.0
	26–30	27	11.2
	31–35	11	4.6
	36 and above	3	1.2
Education	Current undergraduate student	170	70.3
	Current graduate student	72	29.7
Monthly Income (NT)	20000 and below	193	79.8
	20001-40000	34	14.0
	40001-60000	13	5.4
	60001 and above	2	0.8
College of Management	Yes	138	57.0
	No	104	43.0
Disciplinary Difference	E-commerce (EC) course taken	132	54.5
	E-commerce (EC) course not taken	110	45.5

Notes: N = 242; NT = New Taiwan Dollar.

Table 2
Short-version of Rotter's (1966) I-E scale.

Question	Choice
Q1	A. Many of the unhappy things in people's lives are partly due to bad luck.
	B. People's misfortunes result from the mistakes they make.
Q2	A. There will always be wars, no matter how hard people try to prevent them.
	B. One of the major reasons why we have wars is because people don't take enough interest in politics.
Q3	A. Without the right breaks one cannot be an effective leader.
	B. Capable people who fail to become leaders have not taken advantages of their opportunities
Q4	A. Many times exam questions tend to be so unrelated to course work that studying is really useless.
	B. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
Q5	A. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
	B. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.
Q6	A. Getting a good job depends mainly on being in the right place at the right time.
	B. Becoming a success is a matter of hard work; luck has little or nothing to do with it.
Q7	A. It is hard to know whether or not a person really likes you.
	B. How many friends you have depends upon how nice a person you are.
Q8	A. It is difficult for people to have much control over the things politicians do in office.
	B. With enough effort we can wipe out political corruption.
Q9	A. Sometimes I can't understand how teachers arrive at the grades they give.
	B. There is a direct connection between how hard I study and the grades I get.
Q10	A. There's not much use in trying to please people; if they like you, they like you.
	B. People are lonely because they don't try to be friendly.

Note: This scale is adapted from p. 417 of Carducci (2009).

justifications with regard to cyber entrepreneurship. First, students with an academic background in IT are better able to predict the needs and preferences of online customers (Millman, Li, Matlay, & Wong, 2010). Second, "e-commerce & internet marketing" is a key dimension of cyber entrepreneurship education (Wang et al., 2020). Third, the main reason for over 90% of EC start-up failures is lack of knowledge and skills in internet marketing, which is a key topic covered in EC courses (Skeldon, 2019).

A small group of three students currently attending an EC course at university and two professors with expertise in the area of cyber entrepreneurship were invited to evaluate the survey tool (online questionnaire) as a pretest. Following Hardesty and Bearden (2004), this group was provided with the definitions of the key research constructs and asked to indicate whether the items in the initial pool reflected these constructs. The feedback from the pretest revealed that all of the items adequately represented the intended constructs, with each item identified by over 50% of group members as "completely representative", supporting face validity (Hardesty & Bearden, 2004; Saxe & Weitz, 1982). Any items found to be ambiguous were modified based on group consensus. The finalized items are shown in Table 3. The research instrument was further validated for research use by the ethics committees.

4. Results

4.1. Analysis of data

Structural relationships among the constructs may be estimated using either partial least squares structural equation modeling (PLS-SEM) or covariance-based structural equation modeling (CB-SEM; Hair, Hult, Ringle, & Sarstedt, 2016), with PLS-SEM preferred

Table 3
Construct reliability and convergent validity.

Item	Standardized Item Loadings
Attitudes (α = 0.94, CR = 0.95)	
A career as a cyber entrepreneur is attractive for me.	0.89
Being a cyber entrepreneur would entail great satisfaction for me.	0.91
If I had the opportunity and resources, I'd like to start an online firm.	0.89
Among various options, I would rather be a cyber entrepreneur.	0.92
Being a cyber entrepreneur implies more advantages than disadvantages to me.	0.84
Subjective Norms (α = 0.93, CR = 0.96)	
My friends approve of my decision to create an online firm.	0.94
My close family approve of my decision to create an online firm.	0.93
My colleagues approve of my decision to create an online firm.	0.94
Perceived Control (α = 0.93, CR = 0.94)	
I can control the creation process of a new online firm.	0.90
To start an online firm and keep it working would be easy for me.	0.84
I believe I would be completely able to start an online business.	0.90
If I tried to start an online firm, I would have a high probability of succeeding.	0.79
It would be very easy for me to develop an idea for an online business.	0.83
I know the practical details to start an online firm.	0.86
Cyber Entrepreneurial Intention (α = 0.97, CR = 0.98)	
I am ready to do anything to be a cyber entrepreneur.	0.86
I will make every effort to start and run my own online firm.	0.92
I have very seriously thought of starting an online firm.	0.95
I am determined to create an online firm in the future.	0.96
My professional goal is to become a cyber entrepreneur.	0.96
I have a firm intention to start an online firm some day.	0.95

Note: All factor loadings are significant at $p < 0.001$.

when the research goal is to find key determinants (Hair, Ringle, & Sarstedt, 2011). Because the aim of this study was to examine the drivers of cyber entrepreneurial intention by integrating the TPB and locus-of-control personality trait, PLS-SEM was applied in data analysis. Moreover, PLS-SEM is preferred when it is impossible to meet the stricter assumptions of traditional multivariate techniques (CB-SEM). The results of the normality tests (i.e., the Shapiro-Wilk and Kolmogorov-Smirnov test) showed that all of the items deviated significantly from normality (ps < 0.001; Hair et al., 2016; Hair, Hollingsworth, Randolph, & Chong, 2017), suggesting that a nonparametric approach (PLS-SEM) rather than a parametric approach (CB-SEM) be used to analyze the data (Hair et al., 2016).

SmartPLS 3 was used for data analysis (Ringle, Wende, & Becker, 2015). The PLS-SEM results were reported following the guidelines of Hair et al. (2017) and mainly comprise two models. The measurement model was examined by assessing discriminant validity, convergent validity, and internal consistency reliability. Internal consistency reliability was evaluated by using Cronbach's α and composite reliability (CR). CR and Cronbach's α values must both be greater than 0.7 (Hair et al., 2017), and convergent validity is supported if all of the item loadings are greater than 0.70 and the values of the average variance estimator (AVE) for every construct is greater than or equal to 0.50 (Fornell & Larcker, 1981).

Discriminant validity was examined using two approaches. The first used Fornell and Larcker's (1981) criterion, with discriminant validity supported when the square root of AVE estimates of a pair of constructs surpass the construct correlation. The second used Heterotrait-Monotrait (HTMT) ratios, with discriminant validity supported when the upper bound for acceptable discriminant validity is 0.90 (Henseler, Ringle, & Sarstedt, 2015). Because 10 binary items were used to measure locus of control in this study, KR-20 was used to assess internal consistency reliability with an acceptable threshold value of 0.60 (García, Ramírez, & Jariego, 2002). Furthermore, because the score for locus of control was calculated based on Carducci (2009), the locus of control construct was specified using one indicator reflecting the total number of A answers for all 10 items. Thus, the AVE and CR values for locus of control could not be calculated in this study.

After confirming the acceptability of the measurement model, the structural model was tested using a nonparametric bootstrap procedure. Following Hair et al. (2016), to test the moderation hypotheses (i.e., H7a, H7b, and H7c), three interaction terms and one moderator (i.e., disciplinary difference) were modeled to influence cyber entrepreneurial intention. A two-stage approach was used to generate the interaction terms, as the constructs were all reflective and the objective was to determine whether or not the moderator showed a significant effect (Hair et al., 2016). The bootstrap sample size was set to 5000 (Hair et al., 2017). Because all of the research hypotheses were directional, one-tailed tests were conducted.

4.2. Measurement model

The KR-20 value for the locus of control construct was calculated as 0.60, which is close to the value achieved by Rotter (1966) in the original scale and thus considered acceptable (García et al., 2002). As shown in Table 3, the reliabilities for all of the constructs measured on Likert scales were >0.7, demonstrating acceptable internal consistency reliability (Hair et al., 2017). The standardized loadings for the items were all significant ($p < 0.001$) and >0.7 (Hair et al., 2017). As shown in Table 4, all of the constructs had AVE values > 0.5 (Hair et al., 2017), demonstrating convergent validity. Furthermore, as indicated in Table 4, the square root of AVE estimates for all pairs of constructs surpassed the corresponding estimates of the construct correlations (Chin, 1998) and all of the

HTMT ratios were below the 0.90 threshold (Hair et al., 2017; Henseler et al., 2015), demonstrating discriminant validity.

In addition, common method bias was assessed because all of the measures in this study were self-reported. A full collinearity test, which is equivalent to the common method bias test, was conducted following Kock and Lynn (2012) and Kock and Gaskins (2014). The full collinearity estimates for attitudes, subjective norms, perceived behavioral control, discipline difference, the attitudes X discipline difference interaction term, the subjective norm X discipline difference interaction term, and the perceived behavioral control X discipline difference interaction term were 2.05, 2.49, 2.73, 1.20, 1.81, 2.08, and 2.34, respectively. As these estimates are all below the 3.33 threshold, the risk of common method bias is not severe in this study.

4.3. Structural models

The value and level of significance of each coefficient and R^2 of each endogenous construct are presented in Fig. 2. Locus of control was found to negatively influence attitudes ($\beta = -0.12$, $p < 0.05$, [−0.22, −0.01]), subjective norms ($\beta = -0.18$, $p < 0.01$, [−0.29, −0.07]), and perceived behavioral control ($\beta = -0.17$, $p < 0.01$, [−0.27, −0.06]). Thus, H1-H3 were supported. Attitudes ($\beta = 0.32$, $p < 0.001$, [0.23, 0.41]), subjective norms ($\beta = 0.19$, $p < 0.01$, [0.08, 0.29]), and perceived behavioral control ($\beta = 0.45$, $p < 0.001$, [0.35, 0.53]) were found to positively influence cyber entrepreneurial intention. Thus, H4–H6 were supported.

With regard to the results of the moderation analysis, the moderator disciplinary difference was shown to have a positively significant effect on cyber entrepreneurial intention ($\beta = 0.08$, $p < 0.05$, [0.02, 0.14]), indicating that taking an EC course enhances intention to start an internet business. The interaction term between attitudes and disciplinary difference was shown to have a positive effect on cyber entrepreneurial intention ($\beta = 0.17$, $p < 0.001$, [0.09, 0.25]), indicating that disciplinary difference has a positive moderating effect on the relationship between attitudes and cyber entrepreneurial intention. Specifically, taking an EC course enhances the effect of attitudes on intention to start an internet business (vs. none). Thus, H7a was supported. The interaction term between subjective norms and disciplinary difference was shown to affect cyber entrepreneurial intention positively ($\beta = 0.10$, $p < 0.05$, [0.01, 0.20]), indicating that disciplinary difference has a positive moderating effect on the relationship between subjective norms and cyber entrepreneurial intention. Specifically, taking an EC course enhances the effect of subjective norms on intention to start an internet business (vs. none). Thus, H7b was supported. However, contrary to the authors' expectation, the interaction term between perceived behavioral control and disciplinary difference yielded a significantly negative effect on cyber entrepreneurial intention ($\beta = -0.10$, $p < 0.05$, [−0.18, −0.01]), indicating that disciplinary difference has a negative moderating effect on the relationship between perceived behavioral control and cyber entrepreneurial intention. Specifically, taking an EC course reduces the effect of perceived behavioral control on intention to start an internet business (vs. none). Thus, H7c was not supported.

The R^2 values for cyber entrepreneurial intention were reported to evaluate the predictive capabilities of the research model. R^2 values of 0.25, 0.50, and 0.75 for endogenous constructs should respectively be interpreted as weak, moderate, and strong (Hair et al., 2016). The R^2 value of cyber entrepreneurial intention in this study was calculated as 0.77. As an alternative assessment, the Q^2 value, which reflects the out-of-sample predictive power of the research model, was calculated as well. The Q^2 value of cyber entrepreneurial intention in this study was calculated as 0.62, which is far greater than the threshold of 0 (Hair et al., 2016). Thus, the drivers of this research model are able to predict cyber entrepreneurial intention to a substantial degree.

5. Discussion

The growth of e-commerce and advancements in information and communication technology and mobile technology, together with related government policies and educational courses (Chang et al., 2018), are facilitating increased participation in cyber entrepreneurship. Moreover, the COVID-19 pandemic has further expanded opportunities to engage in cyber entrepreneurship (Tajvidi & Tajvidi, 2021). However, a supportive environment for cyber entrepreneurship does not necessarily translate into a higher degree of cyber entrepreneurial intention among the public. Thus, understanding the factors that motivate people to increase their intention to start an online business is important.

As human behavior is facilitated by environmental factors as well as personal factors (Lewin, 1939), the latter may best explain the phenomenon of low intention with regard to cyber entrepreneurship when the environment is favorable. In this study, the personal factors of interest were selected based on the TPB and the theory of locus of control, both of which treat personality traits/volitional power as key drivers of behavior. The findings revealed that individuals with high internal locus of control tend to have high perceived behavioral control, subjective norms, and positive attitudes regarding cyber entrepreneurship, increasing their intention to start an online business.

This study investigated the moderating role of cyber entrepreneurship education on TPB cognitions and cyber entrepreneurial

Table 4
Examining discriminant validity.

Construct	1	2	3	4
1. Attitude	**0.89**			
2. Subjective Norm	0.58 (0.62)	**0.94**		
3. Perceived Control	0.67 (0.71)	0.72 (0.77)	**0.85**	
4. Entrepreneurial Intention	0.72 (0.75)	0.71 (0.74)	0.81 (0.86)	**0.93**

Notes: N = 242; HTMT ratios are in parentheses; the square root of average variance extracted (AVE) estimates are shown on the diagonal (in bold).

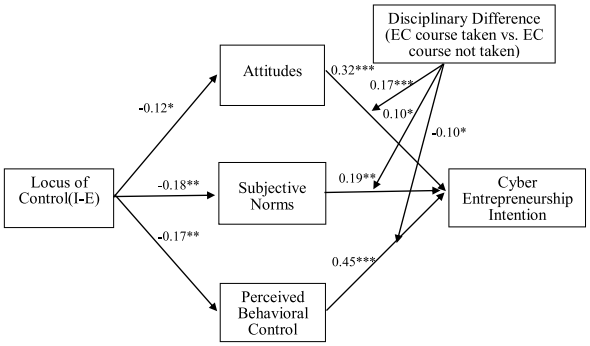

Fig. 2. Hypotheses test results.

intention. The findings revealed a positive moderating effect of cyber entrepreneurship education on the relationships between attitudes and cyber entrepreneurial intention and between subjective norms and cyber entrepreneurial intention. Surprisingly, cyber entrepreneurship education was shown to have a negative moderating effect on the relationship between perceived behavioral control and cyber entrepreneurial intention, which was contrary to the hypothesized direction and to previous research on entrepreneurship (e.g. Shahab, Chengang, Arbizu, & Haider, 2019). The relevant implications of these findings for theory and practice are discussed below.

5.1. Theoretical implications

The TPB has been applied in prior studies primarily to explain entrepreneurial intention in university students (e.g., Al-Jubari, Hassan, & Liñán, 2019; Shi, Yuan, Bell, & Wang, 2020). This research contributes to scholarly understanding by extending the TPB to the context of cyber entrepreneurship. Given the differences between traditional and cyber entrepreneurship (Tajvidi & Tajvidi, 2021; Wang et al., 2020), the findings from research on traditional entrepreneurship are not directly transferable to the cyber entrepreneurship context. The findings of this research point to perceived behavioral control as the key driver of predicting behavioral intention in the cyber entrepreneurship context, whereas attitude was singled out in prior studies as the key driver in the traditional entrepreneurship context (e.g., Al-Jubari et al., 2019; Shi et al., 2020). This discrepancy may be attributed to the differences in management complexity. As noted in the Introduction, cyber entrepreneurship involves a high degree of management complexity, making perceived behavioral control a key driver of cyber entrepreneurial intention.

This research extends the TPB to the context of cyber entrepreneurship by identifying locus of control as a personality trait that is a key antecedent of TPB cognitions (perceived behavioral control, attitudes, and subjective norms). In this study, self-verification theory (Swann, 2011) was used to bridge locus of control and the TPB to explain the mechanism. Locus of control as a personality trait activates the TPB cognitions via self-verification. Specifically, high internal-locus-of-control people tend to show positive attitudes toward cyber entrepreneurship, to engage in impression management with other people in their social network to demonstrate that they are capable of doing cyber entrepreneurship, and to equip themselves with relevant knowledge and skills to be fully prepared to participate in cyber entrepreneurship. However, it is presumed that this self-verification process is applicable only to core self-evaluation traits and not to all types of personality traits, because core self-evaluation traits refer to individuals' bottom-line self-evaluations (Judge & Bono, 2001) and are thus more likely to trigger the self-verification process.

Although locus of control has previously been utilized to predict entrepreneurial intention (e.g., Krueger, 2009; Monsen et al., 2010; Tentama & Abdussalam, 2020; Uysal et al., 2021), this study applies it in the cyber entrepreneurship context, proposing that locus of control is, via the mechanism of self-verification, an effective predictor of entrepreneurship-related cognitions (i.e., perceived behavioral control, attitudes, and subjective norms) that facilitate cyber entrepreneurial intention. Thus, this study contributes to the theory of locus of control by describing a more-complete psychological process linking locus of control to behavioral intention in the cyber entrepreneurship context. The current literature is unclear as to whether locus of control is conceptually different from perceived behavioral control. Rotter (1966) found these two concepts to be similar, and proposed the perceived locus of control construct, while Ajzen (2002) found locus of control to be conceptually distinct from perceived behavioral control. The findings of this study concur with Ajzen (2002), as locus of control was found to drive TPB cognitions, and these constructs were found to have discriminant validity.

Beyond supporting the findings of prior studies that cyber entrepreneurship education enhances cyber entrepreneurial intention (Wang et al., 2016, 2020), this research further contributed to the cyber entrepreneurship education research by examining the moderating role of cyber entrepreneurship education in facilitating the effects of TPB cognitions on cyber entrepreneurial intention. To the best of the authors' knowledge, only one study, which used a different theoretical foundation (the theory of motivation/self-determination; Wang et al., 2016), has previously investigated the moderating role of cyber entrepreneurship education. This study obtained mixed results regarding the moderating effect of certainty on the cognition-intention link in the TPB. In this study, cyber entrepreneurship education was found to relate to certainty, as cyber entrepreneurship education facilitates cognitions regarding cyber entrepreneurship. More specifically, our findings revealed cyber entrepreneurship education can facilitate the

attitudes-intention and subjective norms-intention linkages. These results are consistent to those obtained in Cooke and Sheeran's (2004) meta-analytic study. One unexpected empirical finding was that cyber entrepreneurship education negatively moderated the relationship between perceived behavioral control and cyber entrepreneurial intention, suggesting directions for theoretical modifications to the TPB. One explanation for this finding is the confounding effect of temporal stability, which is referred to as the degree to which cognitions are constant with the passage of time (Sheeran, Orbell, & Trafimow, 1999). Specifically, to make accurate predictions of behavior, perceptions of behavioral control must be consistent over time (Ajzen, 1996). Based on this, it may be inferred that temporal stability positively moderates the perceived behavioral control-intention link, which was confirmed empirically by Cooke and Sheeran (2004). The focus of this study was on examining the cyber entrepreneurship intention of university students. Because some students have lower temporal stability regarding their cognition in cyber entrepreneurship than would-be entrepreneurs and nascent entrepreneurs, this low temporal stability may attenuate the effect of perceived behavioral control on intention. Another possible reason is the gap between perceived behavioral control and actual abilities. Perceived behavioral control reflects the perception and confidence of an individual in their ability to perform a target behavior successfully (Ajzen, 1991). Heavy internet users and over-confident individuals usually overestimate their abilities and have relatively higher levels of perceived behavioral control and intention toward cyber entrepreneurship. Through cyber entrepreneurship education, learners may acquire the necessary knowledge, skills, and competences to start an online business and may perceive their behavioral control more accurately. Therefore, cyber entrepreneurship education was found to negatively moderate the effect of perceived behavioral control on cyber entrepreneurial intention. Ilonen et al. (2018) also found that, while entrepreneurial education may not increase the willingness of students to create new businesses, it may increase their knowledge, skills, and human capital.

5.2. Practical implications

The following guidelines to help business educators design effective cyber entrepreneurship courses are based on the findings of this study.

First, not every individual is suited for cyber entrepreneurship. Thus, cyber entrepreneurship educators should tailor course materials according to the personality traits of their students. Although internet-based firms have generally have significantly lower start-up costs than brick-and-mortar firms, launching an online venture requires great forethought and presents challenges with respect to gaining exposure to sufficient numbers of target customers while competing with other online competitors, interacting with customers to establish trust in the absence of face-to-face interactions, and remaining sensitive and familiar with new internet technologies and media. We posit that high internal-locus-of-control individuals are able to meet the above challenges better than their high external-locus-of-control peers. Therefore, cyber entrepreneurship educators must tailor their course materials and content to reflect their students' overall locus-of-control profile. A short survey using the I-E scale may be conducted prior to or during the first class for this purpose. If, for example, the average I-E score is < 5 (indicating higher average internal locus of control), instructors may arrange more-challenging course activities to teach e-commerce. For instance, students may be asked to develop cyber entrepreneurship plans, present these to a group of real investors and EC practitioners, and put them into practice using online platforms such as Shopify and WordPress. Alternatively, if the average I-E score is > 5 (indicating higher than average external locus of control), the aforementioned project may be too demanding, increase student pressure, and reduce learning effectiveness. Therefore, instructors may reduce the levels of difficulty, challenge, and cognitive loading in the final project by creating a supportive learning environment via online social networks (e.g., Facebook Group, Line Group), as these students tend to perceive that environment affects performance. Teaching assistants and EC practitioners with adequate domain knowledge and technical skills may also be invited to join the course to help students effectively confront and overcome problems. In addition, instructors may invite successful cyber entrepreneurs to share their success stories, providing anecdotal evidence and practical insights to help students construct a positive mindset toward cyber entrepreneurship.

Second, as cyber entrepreneurship education strengthens the positive effects of cyber entrepreneurship cognitions on cyber entrepreneurial intention, educators should design their course content to ensure that students are equipped with relevant knowledge and skills. Cyber entrepreneurship education is still in the early stages of development and implementation, and additional courses are required that do more than rehash traditional theoretical frameworks and knowledge about EC. Also, students require more practical knowledge that helps them harness the power of new technologies to create value for customers in online settings. Customers today tend to connect with firms via disparate online channels such as websites, blogs, Facebook pages, mobile instant messaging apps, and Instagram. Thus, when designing cyber entrepreneurship courses, educators should instruct students on to how to use these new media and tools to interact with customers in a learning-by-doing manner.

5.3. Limitations and future research

This study was affected by several limitations. First, this study used a student sample, meaning that these findings should not be generalized to other populations. Future studies may test the proposed framework and validate our findings on populations of would-be entrepreneurs or nascent entrepreneurs. Second, this study used a proxy (i.e., having taken/not taken a university EC course) to represent cyber entrepreneurship education. However, cyber entrepreneurship education covers various courses such as leadership, business operation, and international trade law, which may limit the generalizability of findings. Identifying courses that fully represent cyber entrepreneurship education is difficult, and, like this study, past studies have also used representative courses as proxies (e.g., Wang et al., 2016). EC courses may be presumed to adequately represent cyber entrepreneurship education because e-commerce and internet marketing is a dominant dimension in this type of education (Wang et al., 2020). Furthermore, lack of

internet marketing knowledge and skills is a key reason for many online businesses failures (Skeldon, 2019), and internet marketing is included in the course content of EC courses. Thus, using a representative EC course helps ease generalizability concerns. In addition to EC courses, future studies should include more courses related to leadership, business operation, and international law to fully represent cyber entrepreneurship education. Third, this study measured locus of control using Rotter's (1966) I-E scale. While the internal consistency of this scale was acceptable in this study, some critics have pointed out that the I-E scale is multidimensional. Future studies may consider applying Bonnett and Furnham's (1991) economic locus of control scale or Levenson's (1974) IPC scale to examine the proposed relationships. Fourth, the effect of the self-verification process on the relationship between personality traits and TPB cognitions and intention may be generalized to other core self-evaluation traits. Locus of control was the only trait examined in this study, and future studies should investigate the self-verification process using other core self-evaluation traits.

Author statement

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Timmy H. Tseng: Writing – original draft.
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