

Antecedents and boundary conditions of entrepreneurial intentions: perspective of theory of planned behaviour

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Abstract

Purpose – This paper aims to examine the effects of perceived desirability for entrepreneurship (PDE) and perceived self-efficacy (PSE) on the entrepreneurial intentions (EI) of business students, with the moderation effect of entrepreneurial knowledge (EK) in the context of the theory of planned behaviour.

Design/methodology/approach – We used a self-administered survey of 200 students registered in the business schools of Pakistani universities. The causal association between the variables was estimated through SmartPLS by using hierarchical linear modelling.

Findings – The study findings indicate that PDE and PSE significantly influence EIs. Furthermore, EK significantly strengthens the nexus between PDE and EIs and between PSE and EIs. Those students who had already acquired self-efficacy and exhibited desirability for the business venture were more inclined towards entrepreneurship if they had acquired some EK and vice versa.

Research limitations/implications – This study reveals that a model of EIs is needed to configure the students' goals and motivations. Also, using new education programmes will help students acquire new knowledge for business startups. Further implications are also discussed.

Originality/value – This research fills a gap by using the moderating role of EK on the nexus between PDE, PSE and EIs, which has remained untouched in the educational sector.

Keywords Entrepreneurial intentions, Entrepreneurial knowledge, Perceived desirability for entrepreneurship

Paper type Research paper



1. Introduction

Entrepreneurship is considered to be the backbone of any economy and is explicitly attached to financial and social advancement worldwide (Pandit *et al.*, 2018). Despite the importance of entrepreneurship, entrepreneurship as an independent discipline is recognized as a hard skill (Drucker, 1985). Numerous factors trigger new businesses in society, including external and internal factors. External factors are attributed to important indicators in the society; however, internal factors are also very important (e.g. intentions of individuals to start their own entrepreneurial ventures). Entrepreneurial intention (EI; i.e. intentions to become independent businesspersons and entrepreneurs) is an important predictor of growth in private ventures (Ahmed *et al.*, 2020). However, the EI of individuals is a prominent predictor of becoming entrepreneurs that they can gauge and promote in the long term. Against this backdrop, the EI of venture capitalists is important. An enormous amount of research on the determinants of EI has been undertaken worldwide (Ahmed *et al.*, 2022). Some research studies were conducted conceptually, while others used empirical data to examine the external causal antecedents of individuals' EI (Alshebami, 2022). However, researchers have used psychological and traditional factors, which influence business startup and EI. For example, from a psychological perspective, researchers use factors such as personality traits and psychological capital as determinates of EI (Mahfud *et al.*, 2020). Other studies have examined the external factors from traditional point of view, such as through financial support, accounting literacy and knowledge of entrepreneurial support (Urban and Ratsimanetrimanana, 2019). Most of these studies have focused on developed economies, while emerging economies have received little attention. Emerging economies are different from developed economies in terms of infrastructure and government support for entrepreneurial ventures. Furthermore, prior studies have highlighted exclusively cognitive and traditional aspects. We investigate both the cognitive factors of perceived desirability for entrepreneurship (PDE) and perceived self-efficacy (PSE) and a traditional factor, entrepreneurial knowledge (EK). The former refers to the perceptions of individuals about their internal desires to become entrepreneurs while the latter reflects on the confidence they gained through experiences and prior practical involvement in any sort of entrepreneurial activities. EK has gained increasing popularity among academics around the world. This has stimulated the introduction of components in curricula from elementary to higher education that promote EK. Individuals with the capacity to be entrepreneurs may not be able to start entrepreneurial ventures if they do not recognize opportunities to achieve their desires (Hsu *et al.*, 2019).

We draw on the theory of planned behaviour (TPB; Ajzen, 1991), which emphasizes how social context complements the internal motivations that drive individuals' behaviour. The TPB provides a comprehensive theoretical framework, allowing us to identify the conditions in which EI leads to new venture creation. We agree that EI may establish the conditions necessary for initiating a new startup; however, it is not adequate because other factors also have important role in turning EI into a new startup. For this reason, entrepreneurship education has been widely acknowledged as an effective way to develop students' EI (Pittaway and Cope, 2007). With increasing recognition of the importance of EI, there is a growing trend in business to focus exclusively on entrepreneurship and business ventures. More emphasis on EI is given through these academic programmes (where EK is widely covered) to persuade and motivate students to start their own businesses (Tang *et al.*, 2020). Nowadays, students prefer to be their own bosses rather than work for someone else (Gurel *et al.*, 2010). Business schools must design and implement business-related courses (i.e. entrepreneurship) to develop students' ability to start new businesses and to motivate them to undertake entrepreneurial ventures, as well as provide opportunities by

establishing “business incubation centres”. These in-house business incubation centres provide initial startup support to business ventures when pragmatic ideas are shared by prospective entrepreneurs (Kiran and Bose, 2020).

In addition to these internally induced antecedents (i.e. PDE and PSE), the external factor of EK is a crucial factor for starting a new business. For instance, the role of background knowledge of the entrepreneurial field has been under researched (Ahmed *et al.*, 2022). A study conducted by Bhat and Singh (2018) revealed that EK significantly moderates the nexus between EI and its antecedents. Similarly, Entrialgo and Iglesias (2016) argued that EK strengthens the path between psychological factors and EI. Hence, the objective of this research is to examine the importance of the cognitive factors of PDE and PSE in EI under the boundary conditions of EK. In this context, we also examine the moderating role of EK between cognitive factors (i.e. PDE and PSE) and EI.

We reviewed several studies on the nexus between cognitive factors and EI (Ahmed *et al.*, 2022; Urban and Ratsimanetrimanana, 2019). However, these studies have mostly conducted in developed economies. Our research extends the literature and contributes to the TPB through empirical evidence gathered from reputed university students in an emerging market, Pakistan. We conducted this research among business students because they are assumed to adopt entrepreneurial ventures after their graduation. We used SmartPLS for data analyses and found that PDE, PSE and EK are important predictors of EI in the emerging economy of Pakistan. The findings of the current study are important for entrepreneurs by revealing the nexus between cognitive factors (i.e. PDE and PSE) and EI at different levels of EK. The implications of this research are important and deemed to be a valuable resource for university officials and academicians involved in the field of entrepreneurship.

Numerous theories have been proposed to explain the nexus between cognitive factors and EI; however, the theoretical basis of this study is founded on the TPB (Ajzen, 1991). The TPB viewpoint contends that intentions are affected largely by an individual’s desires, social norms and behaviour. The TPB has been widely examined from the lens of cognitive and traditional mechanisms. However, we contribute to this theory via empirical data that are collected from an emerging economy and through the use of both mechanisms for EI. Our model covers support the TBP in the context of an emerging economy and makes two key contributions to the existing body of knowledge, which enhance our understanding of the entrepreneurial practices of potential entrepreneurs. Firstly, this study uses the moderating role of EK between the nexus of PDE and EI, as well as between PSE and EI. Secondly, it provides new insights into the empirical evidence supporting the TPB and the moderating role of EK to justify amending the model to enrich the understanding of the intention generation process.

2. Literature review

2.1 Theoretical framework

As noted above, this study drew on the TPB (Ajzen, 1991). This theory argues that behaviour is the function of intention, which is the cognitive process and is affected by the subjective norms and perceptions of the feasibility of the behaviour. The theory further postulates that an individual’s positive or negative behaviour can be framed and influenced by the background factors they are experiencing, which serve as a stimulant that forces them to develop attitudes and, ultimately, behaviours. Behaviour is shaped by specific attitudes, which are cognitive in nature, along with subjective norms and perceived behavioural controls (Ajzen, 1991). Subjective norms surround the actual performance of a behaviour when it is perceived as feasible and an individual feel at ease to undertake that

behaviour (i.e. the behavioural controls). The theory further suggests that individuals' behaviour is largely influenced by their intentions and prior knowledge. This general framework helps us understand the mechanism through which behaviour is exhibited by cognitive attributes and also provides the boundary conditions for the effectiveness of the underlying mechanism in predicting behaviour. For example, PDE and PSE are cognitive attributes that serve as predictors of behaviour under study (i.e. EI). However, prior EK serves as the boundary conditions for the effectiveness of these two predictors in developing the desired behaviour (i.e. EI). Therefore, in this study, we conceptualize the relationship between attitude (i.e. PDE and PSE and behavioural intentions, meaning EI) as analogous to the TPB (Ajzen, 1991). However, building on the current model, we also included the intervening variable of subjective knowledge (i.e. EK), which serves as a moderator.

Moreover, we also considered the subjective norms, meaning how people think about their behaviour and whether such behaviour is encouraged or not (Ajzen, 1991). We address this issue by including some contextual and demographic factors in our model, which include prior affiliation with some kinds of businesses, running family businesses or taken any specific entrepreneurship courses? These factors largely influence individuals' professional decisions, such as accepting a job or starting a new business. Finally, the theory suggests considering the actual behaviour in the model; however, due to the non-availability of such data because it is non-existent, reliance on behavioural intention is sufficient to serve as a proxy for actual behaviour (Ajzen, 1991).

2.2 Entrepreneurial knowledge, higher education institutions and business incubation centres

There is an emerging emphasis on the inclusion of entrepreneurship courses in the academic programmes offered at higher education institutions, particularly business degree programmes offered at the undergraduate level. These efforts are supplemented and further strengthened through the creation of business incubation centres at the department level (Qureshi *et al.*, 2021). These centres work in collaboration with different academic departments in university and serve as a bridge between the students of national incubation centre (do Carmo and Lacruz, 2021). These centres also highlight some new areas for students and entrepreneurs, as they have close links with industry and know the priority areas. For example, skills in the area of supply chain management and novel technological advancements in the business practices preparing students to embrace the entrepreneurial opportunities in the industry. This process attracts individuals to establish new startups in low-risk areas (Ssekiziyivu *et al.*, 2021). The only thing researchers invest is their energy and effort to launch new startups. These initiatives are broadly described as driving forces towards innovation, which subsequently contribute to the economic development of any country. For this reason, many countries are now embracing entrepreneurship-related academic programmes.

Considering the importance of entrepreneurship, the critical conditions and stimuli that promote the EI among individuals have not yet been resolved (Liñán *et al.*, 2011). Is it the external environment or the internal desire to attempt entrepreneurship? The external environment includes educational programmes and incentives provided by the government and the educational institutions (Franco *et al.*, 2010). Internal desires are the result of people's perception and experiences of entrepreneurial success or failure (Gurel *et al.*, 2010). Specifically, there is still a research gap that warrants exploration of the nexus between business education programmes and EK, which is essential to trigger the desire of the individual incumbents to start their own businesses and entrepreneurial ventures (Liñán *et al.*, 2011).

In the USA, more than 2,000 EK courses were offered in more than 1,500 educational institutions as of 2005, which is very promising (Kuratko, 2005). The situation is also

promising in the Philippines, where in 2001, around 7,000 students were enrolled in EK courses in undergraduate programmes alone and where the enrolment rate increased to 9,000 in 2003 (Kalalo and David, 2004). In Pakistan, almost all educational institutions offer such courses as a built-in course in business-related undergraduate programmes. However, this type of course is multidisciplinary in nature and is borrowed by other disciplines, particularly the computer sciences programmes, for which entrepreneurial skills are important. This borrowing is due to the provision of the business incubation centre facilities, which are usually provided to engineering students' projects (NBEAC, 2010). These courses increase students' propensity to start their own businesses after completing their degree programmes, and there is evidence that some begin businesses even before the completion of their degree programmes (Franco *et al.*, 2010). Individuals' propensity to establish startups is influenced largely by their EI. In the context of TPB, EK, EI, PDE and PSE are essential factors contributing to entrepreneurial success.

EK is an important factor in terms of human skills; it is a necessary condition for professional initiatives and ultimately contributes to entrepreneurial ventures, which augment the economic performance of a country (Widding, 2005). EK encompasses the conceptual understanding of the different functions and processes involved in entrepreneurship (Pittaway and Cope, 2007). It also enables individuals to recognize and anticipate the opportunities available to pursue in accordance with the needs of society. Multi-faceted approaches are used to measure this construct in individuals. For example, information about the different functions of entrepreneurship in starting a business venture according to society's needs is sometimes required, particularly in the form of products, services and other prerequisites of a business startup (Widding, 2005). In addition, important aspects of EK are the need for recognition, the analysis of opportunities and threats posed by the external environment and the strengths and weaknesses prevailing in the internal environment.

EIs refers to a subtle factor that cannot be easily gauged in individuals but can be described as the individual's willingness and desire to engage in endeavours to start their own business (Souitaris *et al.*, 2007). EI is subtle because it represents an internal state of the mind that exhibits the individual's intentions and can be gauged only once it has been implemented in a concrete form, (i.e. through a suitable venture creation idea; Ghezzi, 2019). We draw on the TPB to understand the links between EI and the predictors of EI. According to the TPB, any behaviour is logically pursued and depends upon reasoned thinking, and the anticipated outcomes are also considered when making decisions (Ajzen, 1991). The basic factors of the TPB are the attitudes that direct individuals' intentions, and these attitudes are considered to be the precursors of their behaviours (Ajzen, 1991). In this study, intentions are framed as a function of individuals' desirability and of their capabilities and confidence in their capabilities. The former is termed the PDE, while the latter is termed the PSE (Ajzen, 1991). These two types of perceptions of an individual's internal state are the attitudes that further develop the requisite and resultant behaviours of becoming successful entrepreneur. PDE is the internal factor that represents an individual's attitude, which is based on the likely internal and external personal outcomes of the entrepreneurial venture. PSE is the individual's own confidence about the success of the venture, which is based solely on their own strengths (Krueger *et al.*, 2000). The theory suggests that the external factors are also important in defining the boundary conditions to effectively predict the outcome of the entrepreneurial venture. One of these factors is considered to be the skills an individual acquires to start their own business, which is possible only through the EK, and EK is imparted through entrepreneurial courses taught in undergraduate programmes in universities (Krueger *et al.*, 2000). We draw on the TPB to develop our hypotheses for this

study. All the hypotheses are developed and augmented by supporting arguments in the following sections.

2.3 Perceived desirability for entrepreneurship and entrepreneurial intentions

Previous studies demonstrated that individuals' EI depends largely upon the individual's desire to undertake the business venture (Abou Chakra *et al.*, 2022; Otache *et al.*, 2021). According to the external environment approach, individuals are encouraged by their peers, teachers, seniors and other family members to undertake entrepreneurial ventures; they not only persuade them but also develop their desire to take up initiatives, thereby developing some positive attitudes towards business ventures. Positive views regarding starting a business venture have been demonstrated to be valid predictors of EI (Bazan *et al.*, 2019). In other words, it is argued that individuals who have high positive interest in and desire to become entrepreneurs after considering the positive outcomes of business ventures are likely to exhibit high degrees of EI (Esfandiar *et al.*, 2019). Furthermore, the TPB also suggests that an individual's PDE is increased by the anticipation of positive outcomes of the business venture, thereby increasing individuals' intentions to pursue their entrepreneurial desires (Krueger *et al.*, 2000). Similarly, Bazzy *et al.* (2018) concluded that PDE plays an essential role in EI. In the context of Pakistan, Ali and Yousuf's (2019) research revealed that PDE contributes significantly to EI. In a recent study, Otache *et al.* (2021) concluded that PDE significantly drives students' EI. as a result, we can argue that PDE leads to increased EI in individuals. Therefore, we hypothesize the following:

- H1.* There is a positive relationship between the perceived desirability and the EI of individuals.

2.4 Perceived self-efficacy and entrepreneurial intentions

The other important predictor of EI is PSE. Self-efficacy is an individual's confidence in their capabilities to undertake tasks. Individuals with high levels of self-efficacy are more confident about their capabilities and less worried about their personal weaknesses (Niles *et al.*, 2022). They foresee positive results from their endeavours, which motivates them to undertake these ventures, and they are more comfortable with such initiatives when they are confident about the positive outcomes (Krueger *et al.*, 2000). Research has shown a positive relationship between a high degree of PSE and EI (Bazzy *et al.*, 2018). Individuals' competence levels give them positive feelings about their entrepreneurial ventures and serve as the source of positive cognitive feelings towards these ventures (Liñán *et al.*, 2011). Researchers have concluded that PSE contributes significantly to EI (Ali and Yousuf, 2019; Bazzy *et al.*, 2018). Similarly, Elnadi and Gheith (2021), in the context of Saudi Arabia, found that PSE contributes directly to EI. A recent study conducted by Neneh (2022) also found that PSE plays an essential role in EI. Based on these arguments, we developed our next hypothesis, which is stated below:

- H2.* There is a positive relationship between an individual's PSE and their EI.

2.5 Entrepreneurial knowledge and entrepreneurial intentions

According to the TPB (Ajzen, 1991), the individual's intentions and decisions depend upon their attitudes towards that behaviour. However, the theory also emphasizes the external environmental factors, which define the boundary conditions for the attitudes' influence on behaviour (Dionysis *et al.*, 2022). Researchers also suggests that the association between

attitudes and behaviours is not straightforward, as some boundary conditions and other external factors determine how and when these attitudes are successfully transformed into the behaviour (Ahmed *et al.*, 2022). The attitudes included in our study are PDE and PSE, both of which lead towards the behaviour in question: EI (Dissanayake, 2013). However, some researchers also argued that the requisite knowledge of entrepreneurial ventures and knowledge of the functionalities of entrepreneurial ventures are important in determining whether these internal cognitive factors will successfully lead to the desired behaviour, meaning EI (Allen *et al.*, 2021). Against this backdrop, EK is an important factor that will help in understanding the nexus between attitude and behaviour. Accordingly, the following hypothesis is developed:

- H3. There is a positive relationship between EK gained at the undergraduate level and individuals' EI.

2.6 The moderating role of entrepreneurial knowledge

The level of education and exposure to educational programmes tend to strengthen an individual's attitudes, perceived competence and self-confidence to start a venture (Debarliev *et al.*, 2022). According to Fayolle and Degeorge (2007), students who have EK are more likely to understand not just the innate human resources required and the challenges associated with entrepreneurship but also its potential benefits (Duncan-Horner *et al.*, 2021). Prior researchers revealed that individuals who have more EK and skills show keen interest in new startups than those with less EK (Entrialgo and Iglesias, 2016). Furthermore, Uygun and Kasimoglu (2013) claimed that individuals with more EK, including knowledge about external factors such as market growth, about the regulations relevant to starting their own business and about how to allocate funds, are more inclined towards starting their own businesses (Uygun and Kasimoglu, 2013). Knowledge about external factors is gained through customized entrepreneurial courses undertaken in university education (Entrialgo and Iglesias, 2016). A research study conducted by Bhat and Singh (2018) revealed that EK significantly moderates the nexus between the antecedents of EI and EI. Similarly, the research of Entrialgo and Iglesias (2016) also argued that EK strengthens the path between psychological factors and EI. The moderating role of EK in defining the boundary conditions for the association between the EI and the PDE needed to start a business and the PSE needed to successfully pursue the business in the context of the TPB. Thus, drawing on these arguments, our next hypotheses are as follows:

- H4. Individuals who possess EK are more likely to transform their perceived desirability into EI.

- H5. Individuals who possess EK are more likely to transform their PSE into EI.

Note: PDE \times EK and PSE \times EK are the interaction terms created for scrutinizing the moderation effect of the EK on the nexus between PDE and PSE, respectively, on EI (see Figures 1 and 2). In addition, the control variables are the student's age, Cumulative Grade Point Average (CGPA), Course (whether they have undertaken an entrepreneurship course), Business (are they doing any business?) and Family Business (is the student involved in a family business?). This model is a slightly modified version of the conceptual model used by Roxas (2014). The relationship between the variables is conceptualized according to the underpinning theory, TPB.

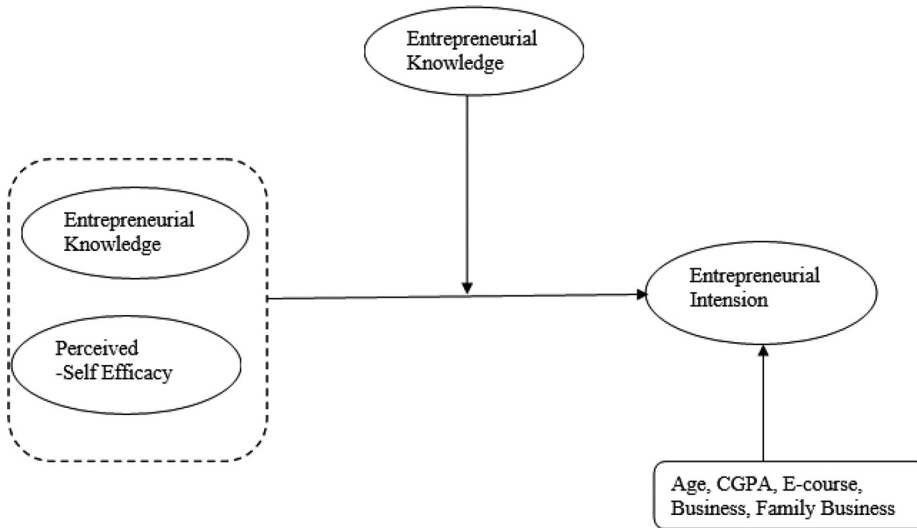


Figure 1.
Statistical model of
the study

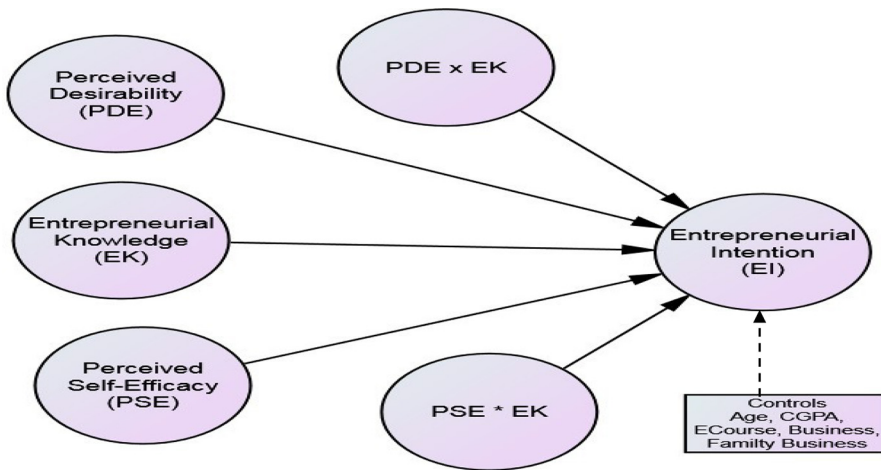


Figure 2.
Statistical model of
the study

3. Methods

3.1 Sample and data collection

We collected data from 200 students in undergraduate business education programmes of reputable universities of Pakistan located in the Islamabad and Rawalpindi regions (International Islamic University, Comsat University, Bahria University, Air University, Foundation University and Fatima Jinnah Women University). The 200 students were aligned with two components of entrepreneurship-related experiences: one is courses in entrepreneurship, and the other is exposure to businesses in the form of a six week-long internship programme. The latter component is organized usually in the last semester of the

programmes. In addition, the students were also aligned with the business incubation centres of the universities, where they were briefed about the facilities and support given to new business startups. The second component is non-contrived (i.e. non-controlled environment) arrangements for the students, in which they choose an industry and observe its functioning of the industry, particularly its internal functioning. In the first part, the students are required to complete a business plan that they could pursue after completion of their degree programmes. Different programmes offer this course, it is usually taken course after the fourth semester; therefore, data were collected from the students who were in their sixth or later semester to ensure they had had the chance to take this entrepreneurship course. However, students who dropped or did not register for this course for any reason were also included in this study to identify the differential effects of the entrepreneurship course. Data were collected during the fall semester immediately following the summer break to ensure that the students had undertaken internships during the summer session. To collect data, 450 questionnaires were distributed to the students enrolled in the business courses. A total of 225 questionnaires were returned, of which only 200 were completed (with a response rate of 44.44%).

3.2 Measurement instruments

Hard copies of the questionnaire were distributed among students enrolled in business programmes at Pakistani universities. To ensure the scale's validation and reliability and relevance to the current study, we adopted established scales from previous studies based on the TPB. All the scales were composed of multiple items measured on a seven-point Likert-type scale. The details of the measures used in this study are provided in the next sections.

3.2.1 Dependent variable. EIs: EI was measured by five items with a seven-point Likert scale (1 – strongly disagree to 7 – strongly agree) developed by [Chen et al. \(1998\)](#) This measurement was used to gauge the intentions of individuals in starting their own businesses. The respondents were asked to rate their willingness and intention to start their own entrepreneurial ventures after completing their degree programmes, for example, (i) "I am interested in setting up my own business", and (ii) "I am not interested in undertaking a regular paid job".

3.2.2 Independent variables. EK: EK was measured by six questions measured on a seven-point Likert scale developed and used by [Fayolle and Degeorge \(2007\)](#); 1–strongly disagree to 7–strongly agree). These items sought information about the extent of the individual's knowledge about different aspects and stages of business startups. For example, the items included (i) "I have sufficient knowledge about commercializing a business idea" and (ii) "I have sufficient knowledge about the problems faced by new startups".

PDE: PDE was measured by four items with a seven-point Likert-type scale (ranging from 1–very unattractive to 7–very attractive) based on the work of [Krueger et al. \(2000\)](#). In these items, the individual's perception of the desirability of entrepreneurship as a profession was sought, for example, (i) "How attractive is it for you to start your own business?" and (ii) "How much do you like to pursue your own business?"

PSE: PSE was measured using five items and a seven-point Likert-type scale (ranging from 1–very hard to 7–very easy) developed by [Krueger \(1993\)](#). The individual's beliefs and confidence about their capabilities to engage in an entrepreneurial venture were sought. The items included (i) "How hard do you think it would be to start your own business?" and (ii) "How hard it is for you to accumulate finances for your business startup?"

3.2.3 *Control variables.* In the current study, the age, gender and educational background of the respondents were used as control variables, as suggested by [Van Gelderen et al. \(2015\)](#).

4. Empirical results

4.1 *Descriptive statistics*

Analysis of the descriptive statistics, such as mean, standard deviation, skewness and kurtosis, were conducted in SPSS. The outcomes of descriptive statistics ([Table 2](#)) indicate that PSE has a high mean value (3.7089), while PDE has a lower mean score (3.0275). EK has a high standard deviation value (0.44625), and PDE has lower standard deviation value (0.28554). Additionally, the scores of skewness and kurtosis confirm the absence of normality issues, as all scores lie within the threshold level of $-/+2$, in accordance with [George \(2011\)](#).

4.2 *Common method bias*

Because the data were collected on a self-report basis and data on all the variables were collected from a single source, the results are subject to common method bias (CMB; [Podsakoff et al., 2003](#)). Thus, as a precautionary measure and post hoc test, we used Harman's one-factor test with a Promax rotation to determine whether the data could be at risk of CMB. The results showed that the first factor was responsible for only 24% variation in the data, and hence, there was no threat of CMB, as suggested by [Podsakoff et al. \(2003\)](#); i.e. any single factor should not account for 50% or more variation in the data).

4.3 *Confirmatory factor analysis*

Measurement models underwent a reliability and validity assessment using SmartPLS software. Confirmatory factor analysis was conducted to determine the validity of the constructs used in this study. The data fit well to the model, with the goodness of fit showing the following results: CFI = 0.90, GFI = 0.97, RMSEA = 0.45 and RMR = 0.40. Further details about the loadings are provided in [Table 1](#) below. The convergent validities of all the constructs are established as the average variance extracted (AVEs) for all constructs greater than 0.50 ([Hair et al., 2011](#)). In addition, for the discriminant validity, three criteria are used (i.e. the cross-loadings, AVEs and inter-correlation comparisons, as suggested by [Fornell and Larcker \(1981\)](#) and the HTMT heterotrait–monotrait (HTMT) ratio of the correlations between the variables ([Henseler et al., 2016](#)). The first criterion for the discriminant validity is met i.e. the cross-loadings of the items to the other constructs/factors were very low compared to the loadings to their own factors supports the discriminant validity. According to the second criterion, the square root of the AVE of any factor/construct should be greater than its correlation with other constructs. [Table 2](#) shows that the square root of the AVEs of the constructs are greater than the intercorrelation of that construct with others, which also fulfils the second criterion of the discriminant validity. The third criterion is more conservative and is estimated based on the HTMT ratios of the correlations between the constructs. According to [Henseler et al. \(2016\)](#), the HTMT ratios should be less than 0.85 to establish discriminant validity. The results of the HTMT ratios of the correlation test are provided in parentheses in [Table 2](#). No variable has an HTMT ratio of 0.85 or greater; hence, the discriminant validity of all the constructs is established.

The students were nested in the classes because the data were collected from multiple classes; therefore, to control the idiosyncratic effect of the classes, we used hierarchical linear

| Constructs with the items | Items | Factors loadings |
|---|------------------|------------------|
| <i>Entrepreneurial knowledge (EK)</i> | AVE | 0.62 |
| | Cronbach's Alpha | 0.72 |
| "I have sufficient knowledge of the legal requirements to start a business" | | 0.70 |
| "I know how to find the resources (e.g. financial) to set up a business" | | 0.69 |
| "I have sufficient knowledge to organize a business" | | 0.80 |
| "I have sufficient knowledge in marketing a product/service" | | 0.90 |
| "I have sufficient knowledge in commercializing a business idea" | | 0.88 |
| "I have sufficient knowledge in managing a business" | | 0.76 |
| <i>Perceived desirability (PDE)</i> | AVE | 0.79 |
| | Cronbach's Alpha | 0.64 |
| "How attractive is it for you to start your own business?" | | 0.75 |
| "If you started your own business, how would you feel about doing it?" | | 0.78 |
| "If you started your own business, how tense would you be?" | | 0.76 |
| "If you started your own business, how enthusiastic would you be?" | | 0.90 |
| <i>Perceived self-efficacy (PSE)</i> | AVE | 0.63 |
| | Cronbach's Alpha | 0.87 |
| "How practical is it for you to start your own business?" | | 0.90 |
| "How hard do you think it would be to start your own business?" | | 0.80 |
| "If you started your business, what do you think about the workload?" | | 0.70 |
| "If you started your own business, how certain of success are you?" | | 0.76 |
| <i>Entrepreneurial intention (EI)</i> | AVE | 0.63 |
| | Cronbach's Alpha | 0.79 |
| "I am interested in setting up my own business" | | 0.70 |
| "I have considered setting up my own business" | | 0.89 |
| "I am prepared to set up my own business" | | 0.87 |
| "I am going to try hard to set up my own business" | | 0.76 |
| "How soon are you likely to set up your own business?" | | 0.74 |

Table 1.
Constructs' items and
their relevant
loadings

Notes: AVE = average variance extracted. All the factors have AVE > 0.50, therefore, the convergent validity is ensured. Cronbach's Alpha is greater than 0.70 for all the constructs therefore, the reliability of the constructs is established. EK, PDE, PSE and EI are the abbreviations of the constructs. Entrepreneurial knowledge, perceived desirability, perceived self-efficacy and entrepreneurial intention, respectively

modelling (HLM) to test the multi-level hypotheses. The moderation analysis was conducted through structural equation modelling (SEM) using the SmartPLS software. PLS-SEM is useful for non-normal data and other statistical procedures that are not supported in CB-SEM (Marcoulides *et al.*, 2009). Numerous qualities make the PLS-SEM more appropriate than other software for this study. Moderation is more easily judged in the PLS-SEM compared to the CB-SEM, which is not responsive to the moderation path (Chin *et al.*, 2003). In addition, Chin *et al.* (2013) concluded that the interaction term approach is better applied in PLS-SEM to assess the product and moderating role. We used software developed by Bryk and Raudenbush (1992) to estimate the multi-level hypotheses. Following Bryk and Raudenbush (1992) suggestions, we used a 2-1-1 model to scrutinize the moderation analysis. Before testing the cross-level hypotheses of the study, a null model was tested to measure intra-company variance ($\tau_{00}/\tau_{00} + \sigma_2$). The results of the null model were approximately 25% between-class variance in the case of a dependent variable (i.e. EI) that warrants the use of HLM to examine the proposed cross-level relationships of the study. The results are presented in Table 3.

Table 2.
Fornell and Larcker
HTMT ratio of
correlations criteria
for discriminant
validity

| Variable name | Mean | SD | Entrepreneurial knowledge | Perceived desirability | Perceived self-efficacy | Entrepreneurial intention |
|---------------------------|--------|---------|---------------------------|------------------------|-------------------------|---------------------------|
| Entrepreneurial knowledge | 3.2782 | 0.44650 | 0.787 (0.453) | | | |
| Perceived desirability | 3.0275 | 0.28554 | 0.450 (0.564) | 0.800 (0.567) | | |
| Perceived self-efficacy | 3.7089 | 0.42528 | 0.430 (0.465) | 0.254 (0.376) | 0.794 (0.343) | |
| Entrepreneurial intention | 3.6057 | 0.43409 | 0.234 (0.367) | 0.421 (0.546) | 0.564 (0.657) | 0.794 (0.454) |

Notes: The values in the diagonal cells are the square root of the respective AVEs of the construct. And the off-diagonal values are the correlations of the constructs with other constructs. The Diagonal values (i.e. the square root of the AVEs) are greater than the correlations, therefore, according to the criteria of [Fornell and Larcker \(1981\)](#), the discriminant validity of the constructs are established. In addition, the values mentioned in the parenthesis are the HTMT ratios of the correlations between the variables, which should be less than 0.85 to establish the discriminant validity. Since all the values in parenthesis are less than 0.85, therefore, according to [Henseler \(2016\)](#), the discriminant validity of the constructs is established

| Level and variables | Null Model | Model 1 | Model 2 | Model 3 |
|---------------------|---------------|----------------|----------------|-----------------|
| Intercept | 3.80 0 (0.07) | 3.21 (0.06) | 3.49 (0.07) | 3.48 (0.06) |
| Class size | | -0.01 (0.01)** | -0.01 (0.01)** | -0.01 (0.00)*** |
| Class CGPA | | 0.01 (0.01)** | -0.01 (0.01)** | 0.01 (0.01)** |
| <i>Level 2</i> | | | | |
| Age | | 0.01 (0.02)** | 0.01 (0.01)** | 0.01 (0.02)** |
| Gender | | -0.02 (0.06) | -0.03 (0.08) | -0.03 (0.07) |
| EK | | | 0.94 (0.04)** | 0.52 (0.01)** |
| PDE | | | 0.93 (0.03)** | 0.41 (0.08) |
| PSE | | | 0.02 (0.03)** | 0.12 (0.01)** |
| PDE*EK | | | | 0.09 (0.03)** |
| PSE*EK | | | | 0.07 (0.03)** |
| Pseudo R^2 | | 0.20 | 0.63 | 0.12 |
| σ^2 | 0.71 | | | |
| τ_{00} | 0.18 | | | |
| χ^2 | 192.86*** | 121.99*** | 92.29*** | 183.47*** |

Notes: p -values are reported in parentheses (); σ^2 represents variance in individual level residuals; τ_{00} represents variance in organizational level residuals. Pseudo R^2 was calculated by using formula given by [Kreft et al. \(1998\)](#). * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; Classes $n = 4$; students $n = 200$. Age – Actual age of the respondent; gender, 1–male, 2–female; CGPA – actual CGPA obtained till last semester; entrepreneurship course studied 1–No, 2–Yes; doing own business, 1–No, 2–Yes; family doing business 1–No, 2–Yes

Table 3.
Results of
hierarchical linear
modelling – EI is
dependent variable

4.4 Hypotheses testing

In $H1$, we hypothesized that PDE has a significant positive influence on EI; as shown in [Table 3](#), Model 2, PDE significantly contributes to EI ($\beta = 0.93, p = 0.03$). Therefore, the $H1$ of the study is substantiated. Similarly, in $H2$, we hypothesized that PSE has a significant positive impact on students' EI. The results are provided in [Table 3](#), Model 2, and show that PSE has a significant positive influence on EI ($\beta = 0.82, p = 0.03$). Therefore, the $H2$ of the study is substantiated. In the next hypothesis, we predicted that EK has a significant positive effect on EI. These results indicate that cognitive aspects of individuals, such as PDE and PSE, play an important role in developing their entrepreneurial behaviour.

The better individuals feel about their entrepreneurial ventures, the more willing they are to undertake those ventures. The results provided in Table-3, Model 2, show that EK has a significant positive impact on EI ($\beta = 0.94, p = 0.04$). Therefore, *H3* is also substantiated.

In the moderation analysis, we first checked the main effects of the moderating variables on the dependent variable, which are provided in Table 2, Model 2, and are elaborated above. In the next step, we developed the standardized variables for those moderator variables and created the interaction terms with EK [i.e. (PDE * EK) and (PSE * EK)] to determine the moderating effect of EK on the relationship between PDE and EI, as well as between PSE and EI. The results are provided in Table 2, Model 3. To substantiate *H4*, we hypothesized the moderating effects of EK on the relationship between PDE and EI. The interaction effect of PDE and EK on EI is significant ($\beta = 0.09, p = 0.03$). Therefore, *H4* is substantiated. Furthermore, *H5* was also tested in Model 3, and the results show that EK moderates the nexus between students' PSE and EI ($\beta = 0.07, p = 0.03$). Therefore, *H5* is also substantiated.

Further results suggested that the class size has a negative relationship with EI. This is attributed to the fact that larger classes are less useful, not only in the entrepreneurship but in all types of learning. Therefore, classes should be reduced from their current sizes to achieve reasonable class strength. In addition, gender has no effect on EI. It is a binary variable and could not differentiate between male and female participants' intention to start businesses; in other words, they are equally interested in starting their own businesses. It can be seen that the class CGPA has a positive impact on students' EI.

5. Discussion

This research examined the impact of PDE and PSE on the EI of students undertaking undergraduate programmes in the leading universities of Pakistan. Furthermore, the moderating role of EK between PDE and EI and between PSE and EI was investigated. To scrutinize the proposed research model, hierarchical linear modelling and SmartPLS were used.

Firstly, the findings showed that PDE and PSE have a significant influence on EI. These results indicate that the cognitive aspects of PDE and PSE in individuals play an important role in developing their entrepreneurial behaviours. The better they feel about their entrepreneurial ventures, the more willing they are to undertake those ventures. In the context of the TPB, it has been opined that other external factors such as EK and prior experience of running business define the conditions for cognitive feelings to result in the desired behaviour (Entrialgo and Iglesias, 2016). These results parallel the findings of Liñán *et al.* (2011), who concluded that cognitive aspects such as PDE and PSE are significantly related to EI. Similarly, Ali and Yousuf (2019) found that PDE and PSE significantly contribute to EI. In another recent studies, Otache *et al.* (2021) and Neneh (2022) found that PDE and PSE play an essential role in students' EI. Similarly, these results are in line with the studies of Elnadi and Gheith (2021) and Neneh (2022), who found that PSE plays an essential role in and contributes directly to EI. These results are also supported by the TPB. This theory argues that cognitive capabilities are important predictors of behaviour and intentions.

Secondly, this paper sheds light on the moderating effects of EK on the nexus between PDE and EI as well as between PSE and EI of the students. The empirical findings of this study indicate that EK significantly strengthens the nexus between PDE and EI and between PSE and EI. These results are congruent with the findings of Roxas (2014), who claimed that knowledge obtained from an entrepreneurial course has the potential to modify one's mental models and raise one's self-confidence, thus increasing one's proclivity to engage in entrepreneurial endeavours. These results are also supported by Bhat and Singh (2018), who

claimed that EK significantly moderates the nexus between the antecedents of EI and EI. Similarly, the research of [Entrialgo and Iglesias \(2016\)](#) also supports our findings, concluding that EK strengthens the path between psychological factors and EI.

This study offers valuable guidelines and insights for academics, practitioners and government officials who want to review the effectiveness of their countries' existing systems and make changes to foster an entrepreneurial mindset in individuals. The TPB was used to develop the model of this study, which argued that cognitive capabilities are important predictors of the behaviour and intentions. We validated these propositions by examining the effect of individuals' PDE and PSE, both of which are cognitive attributes. The theory proposes further boundary conditions, which are the relevant capabilities and confidence attained through knowledge of the relevant factors that contribute to the success of the entrepreneurial ventures. Making such bold decisions about starting entrepreneurial ventures requires not only personal capabilities but also much financial investment, which comes with high levels of risk. This is particularly important in the context of a developing country such as Pakistan, where financial support from the government is limited. Therefore, these cognitive attributes are important precursors to success in starting entrepreneurial ventures.

The biggest contribution of this study was to initiate a discussion about the models used in entrepreneurial cognition research. This study clearly showed that the EI model must be further questioned and that further attention must be paid to the impact of goals and motivation, as well as the use of new education programmes to help students acquire both businesses understanding and transferable skills and competences. This suggests that such programmes often equate entrepreneurship with new venture creation or small business management and thus teach about entrepreneurship and enterprise rather than educating for entrepreneurship. Only rarely is the focus on increasing the skills, attributes and behaviours of successful entrepreneurs in their students ([Kirby, 2004](#)). This knowledge enables the development of evidence-based plans and programmes designed to stimulate the transition from intention to action or from aspiring to active entrepreneurs. Such programmes can be built around explaining the attenuating impact of national culture, for example, by exposing aspiring entrepreneurs to different cultures at the country or regional levels (in foreign countries or different regions of the same country with relevant differences in culture) or to different social groups with cultural values suitable for EI–action translation (such as consecutive entrepreneurs).

6. Conclusion

Entrepreneurial ventures and business activities are the backbones of any economy. To encourage more business activities within the economy, government facilitates the private sectors by providing more conducive business environment. In addition to the government initiatives, universities also play their role in producing the rights skill sets in the forms of the business graduates with sufficient EK, which develops their intentions to start their own businesses. The EI of university students is the best way to create a dynamic and sustainable economy that is fuelled and sustained by entrepreneurial and innovative activities. Therefore, understanding the EI of especially undergraduate business students, who will act as managers and executives of the future, may provide insights into future entrepreneurship potential. The formation of EI is a main topic in entrepreneurship research, and EI is often used as an alternative to entrepreneurial action. However, EI often does not transform into action. This study builds on the TPB to address how an individual's PDE, EK and PSE complement EI to affect transitions into entrepreneurship. Using a quantitative approach, we demonstrated the causal link between PSE, PDE, EK and EI. Our findings

show that the translation of EI into subsequent behaviour is contingent on EK, by which EI is inspired. Fruitful extensions of our study would be to acquire an even more fine-grained look at culture by exploring a regional context or exploring the formal institutional environment and its impact on the process of translating EI into startup behaviours.

A number of limitations are associated with this study, and they suggest avenues for future research. Firstly, a limitation of this study concerns the generalizability of our results. Although students of undergraduate business education programmes are well suited for modelling EI processes, our sampling frame may limit the external validity of our findings. Because the data were collected from a few universities, other universities should also be considered for data collection to ensure generalizability of the study. In addition, in other fields of study, these intentions should be measured and studied in the context of the TPB. The data could have been collected from various sources to avoid the CMB, as this is the best way to avoid this type of bias. For example, the managers of the workplaces where these students completed internships could have been contacted regarding the entrepreneurial orientation and knowledge of these students. It would also be feasible to continue this study by collecting data from private universities in Pakistan to determine whether differences exist between private, public and foreign universities.

Secondly, entrepreneurship is fostered in all professions (Pandit *et al.*, 2018). Hence, it would be interesting for future research to investigate students from other schools and universities, especially in the pure science disciplines, such as engineering and medicine. In this manner, a comparison of intentions to initiate businesses in the future between students from social sciences and pure sciences could be conducted. A third limitation of our study is methodological, insofar as EI was measured after the actual behaviour had occurred, which is a common limitation of many studies based on the TPB (Ahmed *et al.*, 2022; Urban and Ratsimanetrimanana, 2019). As such, the study could have used a longitudinal design to explore the effect of EK on EI, as well as what studies do after completing their studies. Such a study could be conducted after tracking the current pool of students through the alumni registration process, and data could be collected at a later stage to determine the true causal relationship between the variables of the study. Future research may consider these aspects of a longitudinal research design while conducting studies in the context of the TPB, as behaviour cannot be gauged through the intentions of students alone.

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