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# Attitude toward entrepreneurship, perceived behavioral control, and entrepreneurial intention: dimensionality, structural relationships, and gender differences

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## Abstract

Drawing on the theory of planned behavior, the main purpose of this cross-sectional study was to identify gender-related differences in the levels of and the interrelations among attitude toward entrepreneurship, perceived behavioral control, and entrepreneurial intention using multi-group structural equations modeling in which the dimensions of these constructs were disentangled and treated as latent variables that were indirectly inferred from multiple indicators. The sample of the study consisted of 441 Greek tertiary education undergraduate information technology students. The results showed that attitude consists of two components—one instrumental and one affective; perceived behavioral control is comprised of two factors—perceived self-efficacy and perceived controllability; and entrepreneurial intention is best represented by three factors—choice intention, commitment to entrepreneurship, and nascent entrepreneurship. The findings indicated further that affective attitude and perceived self-efficacy are by far the strongest predictors of intention, thus highlighting the role of emotions in the entrepreneurial process. Our work revealed also that the relationship between commitment to entrepreneurship and nascent entrepreneurship is stronger in men than in women. Conceiving nascent entrepreneurship as a proxy for entrepreneurial behavior, this finding implies that gender is a moderator of the entrepreneurial intention-action translation. Despite its limitations, this study makes some important contributions and implications to the literature of entrepreneurship. These and future research suggestions are also discussed.

**Keywords:** Entrepreneurship, Attitude, Perceived behavioral control, Intention, Gender, Structural equations

**JEL classification:** L26 - Entrepreneurship, J24 - Human Capital, Skills, Occupational Choice, Labor Productivity, M13 - New Firms, Startups

## Introduction

In light of the growing recognition of the role of entrepreneurship as a decisive factor for economic development and as key enabler of innovation (Acs & Audretsch, 2003; Audretsch & Thurik, 2001, 2004; Engle et al., 2010; European Commission, 2012;

Fayolle & Todorov, 2011; Lazear, 2005), theorizing and research have started to focus, since many years ago, their attention on developing models for understanding and potentially predicting entrepreneurial behavior. The theoretical models that dominated for the last three decades of entrepreneurship research are the intention-based models of entrepreneurial behavior (Hindle, Klyver, & Jennings, 2009; Krueger, Reilly, & Carsrud, 2000; Schlaegel & Koenig, 2014), of which Ajzen's (1985, 1991) Theory of planned behavior (TPB) emerged as one of the most prominent and one of the most frequently cited models for understanding, predicting, and changing human social behavior (Ajzen, 2012; Krueger & Brazeal, 1994).

The basic argument underlying the entrepreneurial intention models is that entrepreneurship is a planned, volitionally controlled behavior that is inherently intentional rather than instinctive, in which individuals develop entrepreneurial intentions over time before initiating actions to create a new venture and making the entry decision (Ajzen, 1985; Ajzen & Fishbein, 1980; Autio, Keeley, Klofsten, Parker, & Hay, 2001; Bird, 1988; Katz & Gartner, 1988; Krueger et al., 2000; Krueger & Carsrud, 1993). Recognizing that starting a business is an intentional act, entrepreneurial intention can be seen as a strong predictor of planned behavior toward venture creation (Autio et al., 2001; Bird, 1988; Davidsson, 1995; Fayolle, 2007; Fayolle & Gailly, 2004; Fayolle, Gailly, & Lassas-Clerc, 2006; Kolvereid, 1996b; Krueger et al., 2000; Lee & Wong, 2004; Shapero & Sokol, 1982). Since behavioral intentions are a proxy for real behavior (Lepoutre, van den Berghe, Tilleuil, & Crijns, 2011; Tausch & Becker, 2013), entrepreneurial intention models have sought to identify the antecedents of such intentions (Ajzen, 1985, 1991; Davidsson, 1995; Krueger, 1993; Krueger et al., 2000; Krueger & Brazeal, 1994; Shapero & Sokol, 1982).

The TPB assumes that the immediate antecedent of a specific voluntary deliberative behavior is a person's intention to engage in the behavior, while intention follows from the person's attitudes, subjective norm, and perceived behavioral control (PBC) which are the proximal antecedents of a behavioral intention. TPB suggests that the more favorable the attitude and subjective norm, and the greater the PBC, the stronger should be the person's intention to perform the behavior in question. Finally, given a sufficient degree of actual control over the behavior, people are expected to carry out their intentions when the opportunity arises (Ajzen, 2006). Both theoretical justification and empirical evidence suggest that attitude (e.g., Goethner, Obschonka, Silbereisen, & Cantner, 2009), PBC (e.g., Schlaegel & Koenig, 2014), and entrepreneurial intention (e.g., Thompson, 2009) should be considered and treated as multidimensional constructs.

One of the research streams in the entrepreneurship literature and, in specific, in the entrepreneurial intention literature has been the role of gender in the formation of entrepreneurial intentions. Research data suggest that career patterns vary across genders and that despite the increased participation of women in the enterprise sector, there are still almost twice as many male entrepreneurs (Shinnar, Giacomini, & Janssen, 2012; Shirokova, Osiyevskyy, & Bogatyreva, 2016; Zampetakis, Bakatsaki, Litos, Kafetsios, & Moustakis, 2017; Zhao, Seibert, & Hills, 2005). This is mainly attributed to the perception of entrepreneurship as something most suited to males who are widely perceived as being more predisposed to engage into entrepreneurial activity than women and as possessing qualities or characteristics, such as independence, aggressiveness, autonomy, and courage, typically considered

essential for entrepreneurship (Shinnar et al., 2012; Shirokova et al., 2016; Zhao et al., 2005). Although some scholars argue that there are little or no gender differences in entrepreneurship, evidence from review and meta-analytic studies in the framework of the TPB indicates that in general, compared to females, males exhibit more positive attitudes toward entrepreneurship; report higher levels of subjective norm, PBC, and intention; have a higher preference for entrepreneurship; and are more active in the process of launching a venture (Haus, Steinmetz, Isidor, & Kabst, 2013; Kolvereid, 1996b; Maes, Leroy, & Sels, 2014; Nowiński, Haddoud, Lančarič, Egerová, & Czeglédi, 2019; Schlaegel & Koenig, 2014; Shinnar et al., 2012; Shirokova et al., 2016; Sitaridis & Kitsios, 2019; Verheul, Thurik, Grilo, & van der Zwan, 2012; Zampetakis et al., 2017; Zhao et al., 2005).

The main objective of the study was to detect gender differences in the levels of and the interrelations among attitude, PBC, and intention using multi-group structural equations modeling in which the dimensions of these constructs are disentangled and modeled as latent factors composed of multiple indicators. To our knowledge, the work reported in this article is one of the first attempts in the field of entrepreneurship research—if not the first one—to explore the potential direct and moderating effects of gender on the TPB constructs disentangling the underlying dimensions of these constructs and adopting multi-group structural equations modeling in which the variables under investigation are conceptualized as latent constructs inferred from multiple indicators. By analyzing the constructs as latent variables allowed controlling for random measurement error and obtaining unbiased and more robust estimates of effects, thus increasing the predictive power of our models. Our results showed also that disentangling underlying factors of the TPB variables is very important for advancing our understanding of intention formation, as it allowed determining which dimensions of the antecedent variables dominate in the prediction of the dimensions of entrepreneurial intention and, thus, which of these dimensions should be addressed and enhanced toward fostering the intention to launch a business venture. In addition, the disentanglement of the entrepreneurial intention components revealed that women are less likely than men to convert their entrepreneurial intentions into start-up activities, thus offering an explanation for the particularly marked gender difference in entrepreneurship rates.

## **Theoretical framework and research hypotheses**

### **Conceptual and operational definitions**

#### ***Attitude toward entrepreneurship***

Attitude toward a behavior refers to “the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question” (Ajzen, 1991, p. 188). In the entrepreneurship context, attitude toward self-employment has been defined as “the difference between perceptions of personal desirability in becoming self-employed and organizationally employed” (Souitaris, Zerbinati, & Al-Laham, 2007, p. 570). For Liñán and Chen (2009, p. 596), “attitude toward start-up is the degree to which the individual holds a positive or negative personal valuation about being an entrepreneur.” Theorists have argued for a distinction between two components of attitude: affective/experiential attitude, on the one hand, referring to feelings or emotions (e.g., joy, satisfaction), and drives engendered by the prospect of performing a behavior; and

instrumental/cognitive attitude, on the other hand, referring to beliefs, thoughts, or rational arguments (Ajzen, 1991; Fernandes & Proença, 2013; French et al., 2005; Goethner et al., 2009; Kraft, Rise, Sutton, & Roysamb, 2005; Lawton, Conner, & Parker, 2007; Rhodes & Courneya, 2003; Trafimow & Sheeran, 1998; Yan, 2014).

Based on the argumentation outlined above, the following hypothesis was formulated and tested in the study:

*H1.* Attitude toward entrepreneurship is a two-dimensional construct consisting of an instrumental and an affective component.

### ***Perceived behavioral control***

PBC is considered as the most controversial construct in the TPB in part because of the inconsistency in the empirical findings related to its influence on intention and in part because of the disagreement regarding its conceptualization and operationalization (Yap, Othman, & Wee, 2013). The PBC concept, when introduced by Ajzen (1991) as another antecedent factor that can predict intention, was defined as a “person’s perception of the ease or difficulty of performing the behavior of interest” (Ajzen, 1991, p. 183). Initially, Ajzen (2002) conceived PBC as a unidimensional construct, almost equivalent to Bandura’s (1977, 1982) social learning construct of self-efficacy which is an individual’s perception of his or her capability to execute courses of action required to deal with prospective situations. The view that PBC and self-efficacy are essentially similar constructs led a number of researchers to replace in their studies PBC with self-efficacy (Kolvereid & Isaksen, 2006; Krueger et al., 2000; Liñán, Urbano, & Guerrero, 2011; Moriano, Gorgievski, Laguna, Stephan, & Zarafshani, 2012; van Gelderen et al., 2008).

Other researchers (e.g., Armitage & Conner, 2001; Kraft et al., 2005), however, have noticed and provided evidence that PBC, as conceived by Ajzen (2002), has two constituting elements: self-efficacy and perceived controllability. Self-efficacy encompasses internal control factors such as knowledge and skills and reflects one’s perception about the ease or difficulty of undertaking a specific behavior, as well as one’s confidence in his or her ability to perform the behavior. On the other hand, perceived controllability encompasses external control factors, such as resources, opportunities, and potential barriers, and reflects one’s perception that the execution of behavior is entirely up to him or her. Thus, the prevailing view today is that PBC is separated into perceived self-efficacy and perceived controllability, with perceived self-efficacy measured in terms of perceived difficulty and perceived confidence (e.g., Ajzen, 2002; Armitage & Conner, 2001; Courneya, Conner, & Rhodes, 2006; Kraft et al., 2005; Schlaegel & Koenig, 2014).

Based on these considerations, we put forward and tested the following hypothesis regarding the structure of PBC:

*H2.* PBC is a two-dimensional construct composed of perceived self-efficacy—based on perceptions of difficulty and confidence—and perceived controllability—based on perceptions of having control over the behavior or about the extent to which performing the behavior is up to the actor.

### ***Entrepreneurial intention***

The term “intention” has been defined by various authors in convergent ways. A generic definition of behavioral intention is provided by Ajzen (2011, p. 1122), for whom intentions represent “indications of a person’s readiness to perform a behavior.” In the entrepreneurial context, a general definition is that entrepreneurial intention is the state of mind that directs and guides a person’s attention, experience, actions, goal setting, communications, commitment, organization, and other kinds of work toward the enactment of entrepreneurial behavior (Bird, 1988; Boyd & Vozikis, 1994; Fini, Grimaldi, Marzocchi, & Sobrero, 2012). For Thompson (2009), entrepreneurial intention is not a binary “yes or no” decision; rather, it extends along a nomological continuum, ranging from mere preference for self-employment over paid employment to commitment to an entrepreneurial career, and finally to nascent entrepreneurship.

Preference for entrepreneurship, which according to Kolvereid (1996a, 1996b) and Verheul et al. (2012) reflects what Ajzen and Fishbein (1980) have called “choice intention,” is also referred to as “latent entrepreneurship” defined as an individual preferring to be self-employed instead of being a salaried employee (Grilo & Irigoyen, 2006; Kolvereid, 1996a, 1996b; Verheul et al., 2012). Being the first stage in the entrepreneurial process, latent entrepreneurship is a necessary but not sufficient condition for an individual to engage in the entrepreneurship paradigm, since a latent entrepreneur may have the will and drive to become an entrepreneur but does not always take concrete actions to start-up a new firm (Atasoy, 2015; Grilo & Irigoyen, 2006; Thompson, 2009). The second stage in the entrepreneurial process is an individual’s commitment to the entrepreneurial endeavor and the start-up process. Commitment to entrepreneurship reflects Ajzen and Fishbein’s (1980) view that intention is choice with commitment and is characterized by the mindset that one is focused to create a business venture (Welsch, Liao, Pistrui, Oksöy, & Huang, 2003). The final stage in the entrepreneurial intention formation, referred to as “nascent entrepreneurship,” is the transition from commitment to gestation which consists of activities associated with the start-up effort (Reynolds et al., 2005; van der Zwan, Thurik, & Grilo, 2010). Such activities include gathering knowledge by attending seminars on entrepreneurship, building social and financial capital, planning for facilities and equipment, and shaping and refining an idea for a new product or service (Aldrich & Martinez, 2001; Korunka, Frank, Lueger, & Mugler, 2003; McGee, Peterson, Mueller, & Sequeira, 2009; Reynolds, 1997). This dynamic view of entrepreneurial intention formation, as a process that occurs over time and consists of escalating levels of entrepreneurial involvement, has been described as “entrepreneurial ladder” (van der Zwan et al., 2010)

Based on this logic, we put forward and tested the following hypothesis regarding the structure of entrepreneurial intention:

*H3.* Preference for entrepreneurship, commitment to an entrepreneurial career, and nascent entrepreneurship represent distinct ordered stages of the entrepreneurial intention formation process.

### **Relations of intention to attitude and perceived behavioral control**

Extant research and meta-analytic reviews provide strong empirical support for the TPB as a powerful model for explaining and understanding entrepreneurial intention

formation and behavior (Autio et al., 2001; Engle et al., 2010; Iakovleva, Kolvereid, & Stephan, 2011; Liñán et al., 2011; Liñán & Chen, 2009; Liñán, Nabi, & Krueger, 2013; Maes et al., 2014; Schlaegel & Koenig, 2014). The many studies that have examined the fit of the TPB in the domain of entrepreneurship have commonly concluded that both attitude and PBC are significant predictors of intention. Studies have been also conducted which attempted to disentangle the components of attitude and PBC so as to examine their relative importance in the prediction of intention. Across a variety of settings, perceived self-efficacy and affective attitude turned out to have a stronger relationship with intention as compared to perceived controllability (Ajzen, 2002; Armitage & Conner, 2001; Huang & Chen, 2015; Kraft et al., 2005) and instrumental attitude (Conner, McEachan, Taylor, O’Hara, & Lawton, 2015; Courneya et al., 2006; French et al., 2005; Huang & Chen, 2015; Keer, 2012; Kraft et al., 2005; Trafimow et al., 2004), respectively.

Within the domain of entrepreneurship, our literature review located a very limited number of studies exploring the potential differential effects of the components of attitude and PBC on entrepreneurial intention. Table 1 shows the correlations reported in these studies between entrepreneurial intention and the components of attitude and PBC, while Table 2 shows the standardized  $\beta$  coefficients from the components of attitude and PBC to entrepreneurial intention.

Based on this evidence, the following hypotheses for the relations of entrepreneurial intention to attitude toward entrepreneurship and PBC were proposed:

*H4.* Affective attitude is a stronger predictor of entrepreneurial intention than instrumental attitude.

*H5.* Self-efficacy is a stronger predictor of entrepreneurial intention than perceived controllability.

**Gender effects on attitude, perceived behavioral control, and intention**

Evidence exists that gender has a significant albeit weak effect on attitude and PBC (Haus et al., 2013). However, the findings concerning the effect of gender on entrepreneurial intention are somewhat contradictory. Shneor and Jenssen (2014) reviewed 51 articles covering analyses of 60 independent samples and found that 21 samples across studies identified a direct effect of gender on entrepreneurial intentions; 35 of the samples failed to detect such an effect, while the remaining samples were split by gender and traced gender differences. In another meta-analysis of 30 studies with 52,367 individuals from different countries conducted by Haus et al. (2013), it was found that

**Table 1** Correlations reported in the literature between entrepreneurial intention and the components of attitude and PBC

Study	N	AA ↔ I	IA ↔ I	PSE ↔ I	PC ↔ I
Goethner et al. (2009)	496	0.51	0.22		
Tognazzo, Gianecchini, and Gubitta (2017)	1589			0.57	0.47
Brändle, Berger, Golla, and Kuckertz (2018)	753			0.20	0.13

*N* sample size, *AA* affective attitude, *IA* instrumental attitude, *PSE* perceived self-efficacy, *PC* perceived controllability, *I* intention. “↔” denotes correlation

**Table 2** Standardized  $\beta$  coefficients reported in the literature from the components of attitude and PBC to entrepreneurial intention

Study	N	AA $\rightarrow$ I	IA $\rightarrow$ I	PSE $\rightarrow$ I	PC $\rightarrow$ I
Goethner et al. (2009)	496	0.18 to 0.32	0.05 to 0.06		
Farkas and Gubik (2013)	5677			0.94	0.37
Botsaris and Vamvaka (2016)	227	0.63	0.27		
Tognazzo et al. (2017)	1589			0.15 to 0.18	0.04 to 0.05

N sample size, AA affective attitude, IA instrumental attitude, PSE perceived self-efficacy, PC perceived controllability, I intention. In the study of Farkas and Gubik (2013), the construct used to represent controllability was locus of control, while some of the items assessing self-efficacy were actually measuring entrepreneurial self-efficacy. " $\rightarrow$ " denotes standardized  $\beta$  coefficient

gender had no significant direct effect on intention. A plausible explanation for these inconsistencies may be that in some studies, gender was treated as independent variable whose effect on intention was fully mediated by other intervening variables, while in other studies, gender was treated as a moderator variable (Shneor & Jenssen, 2014).

Among studies which demonstrated a direct effect of gender on entrepreneurial intention are those by Zhao et al. (2005), Shinnar et al. (2012), Schlaegel and Koenig (2014), and Shirokova et al. (2016), while studies in which attitude and/or PBC acted as mediating variables between gender and entrepreneurial intention include those by Kolvereid (1996b) and Maes et al. (2014). Significant moderating effects of gender were reported in the studies conducted by Shirokova et al. (2016) and Shinnar et al. (2012). In the former study, gender moderated the relationship between entrepreneurial intention and nascent entrepreneurship which was found stronger for males than for females. In the latter study, gender moderated the relationship between perceived barriers and entrepreneurial intention, such that in the Western countries of USA and Belgium, men showed a stronger negative relationship compared with women, while in China, the opposite pattern was observed. In contrast to the studies of Shirokova et al. (2016) and Shinnar et al. (2012), a study by Nowiński et al. (2019) found no significant differences in the impact of entrepreneurial self-efficacy on the entrepreneurial intentions of female and male students.

Table 3 presents correlations reported in the literature between gender and the TPB constructs, while Table 4 displays the standardized  $\beta$  coefficients from gender to the TPB constructs.

Based on the aforementioned literature, the following hypotheses were set up concerning the effects of gender.

*H6.* There exist significant but weak effects of gender on attitude, PBC, and entrepreneurial intention with the effect of gender on intention mediated by its proximal antecedents.

**Table 3** Correlations reported in the literature between gender and the TPB constructs

Study	N	Gender	A	PBC	I	AA	PSE	NE
Kolvereid (1996b)	143	Male = 1, female = 0	0.13	0.13	0.37			
Zhao et al. (2005)	265	Male = 1, female = 2			-0.20			
Schlaegel and Koenig (2014)	114,007	Male = 0, female = 1	-0.04	-0.04	-0.06	-0.11	-0.13	
Shirokova et al. (2016)	70,164	Male = 0, female = 1		-0.09	-0.14			-0.10
Zampetakis et al. (2017)	1800	Male = 1, female = 2	-0.13	-0.17	-0.18			

N sample size, A attitude, PBC perceived behavioral control, I intention, AA affective attitude, PSE perceived self-efficacy, NE nascent entrepreneurship

**Table 4** Standardized  $\beta$  coefficients reported in the literature from gender to the TPB constructs

Study	N	Gender	G → A	G → PBC	G → AA	G → I
Zhao et al. (2005)	265	Male = 1, female = 2				−0.17
Shinnar et al. (2012)	761	Male = 1, female = 0				0.063 to 0.167
Schlaegel and Koenig (2014)	114,007	Male = 0, female = 1	−0.04	−0.04	−0.10	−0.05
Maes et al. (2014)	437	Male = 0, female = 1	−0.17	−0.19		
Shirokova et al. (2016)	70,164	Male = 0, female = 1				−0.01

N sample size, G gender, A attitude, PBC perceived behavioral control, AA affective attitude, I intention. "→" denotes standardized  $\beta$  coefficient

H7. The relations of intention to attitude and PBC are stronger for male students than for female students.

## Method

### Sample

The hypotheses of this cross-sectional study were tested using a convenience sample of 441 Greek tertiary education undergraduate information technology students attending University of Thessaly, in Greece. The academic staff members, who participated indirectly in the study by administering the questionnaire during their regular classes, were informed of the purpose and potential benefits of the research. All questionnaires were distributed and administered during class lectures (paper and pencil version) and were completed anonymously in the classroom to ensure confidentiality. Participation in the study was voluntary. Data were collected in the spring of 2016. Before the analyses were performed, data were checked and cleaned for missing data and out-of-range values or non-permitted values in the instrument. A total of 24 questionnaires were discarded as a result of this validation process, leaving 417 (191 males, 226 females) to be included in further analysis. The mean age and standard deviation of the students was 20.9 (SD = 1.9) years. The age range was 18–29 years old.

### Measures

The survey questionnaire was prepared based on validated and reliable measurement scales found in the literature. The items of the questionnaire along with their sources and their theoretically designated factors are presented in the [Appendix](#). All items were measured on a 7-point Likert scale ranging from "1 = total disagreement" to "7 = total agreement." A high score on an item indicated a high degree of agreement with the statement; a high score on a factor indicated more of the construct.

The two dimensions of attitude (affective and instrumental) were assessed with five items, four of which were from the Entrepreneurial Intention Questionnaire (Liñán & Chen, 2009) and one of which was adopted from Maes et al. (2014). The scale tapping the 3 components of intention (choice intention, commitment, and nascent entrepreneurship) contained 14 items, 4 of which were from Liñán and Chen (2009), 4 were from Kolvereid and Isaksen (2006), 3 were from Thompson (2009), 2 were from McGee et al. (2009), and 1 item was from van Gelderen et al. (2008). The measure of PBC consisted of nine items out of which two were adopted from Guerrero, Lavín, and Álvarez

(2009), three were taken from Kolvereid (1996b), two were obtained from Grundstén (2004), and Autio et al. (2001), one was adopted from Liñán and Chen (2009), and one item was self-constructed.

### Statistical analyses

The hypotheses of our study were tested employing multi-group structural equations modeling using AMOS (Arbuckle, 2012) with maximum likelihood estimation based on covariance matrix and raw data. Following researchers' recommendations (Hair, Black, Babin, & Anderson, 2010; Kline, 2010), a two-step approach of SEM was adopted for the study. First, the measurement model was tested and validated by means of confirmatory factor analysis (CFA). The underlying structural model was then assessed. Fit indices used to determine goodness of fit included the ratio  $\chi^2/df$  ( $< 5$  adequate fit (Kline, 2010; Marsh & Hovecar, 1985)), the comparative fit index (*CFI*;  $> 0.90$  adequate fit (Bentler, 1990; Hu & Bentler, 1999)), the Tucker-Lewis index (*TLI*;  $> 0.90$  adequate fit (Hu & Bentler, 1999; Tucker & Lewis, 1973)), and the root mean square error of approximation (*RMSEA*;  $< 0.08$  reasonable fit,  $< 0.10$  acceptable fit (Browne & Cudeck, 1993)).

Because attitude, PBC, and intention are well-established constructs in the relevant literature, and their validity has been adequately documented both theoretically and empirically, competing measurement models of these constructs were comparatively assessed using CFA. CFA is a theory-driven modeling technique that can be used to conduct formal statistical tests for comparing alternative factorial structures of behavioral constructs with multiple indicators based on prior knowledge (Lahey et al., 2012; Schreiber, Nora, Stage, Barlow, & King, 2006). By asking the question "Is this the structure of this set of indicators?", CFA allows for testing multiple competing hypotheses regarding the dimensionality of a construct, thus gaining deeper insights into its structure, especially if the competing models are derived from related theory about the structure of the construct (Smith, 2007). Nested models were compared using chi-square difference tests, while non-nested models were compared using the Akaike information criterion (*AIC*) and the expected cross-validation index (*ECVI*), with lower values of *AIC* and *ECVI* generally indicating a better-fitting model than do larger values (Brown, 2006; Hagenaars & McCutcheon, 2002; Kaplan, 2000).

A fundamental assumption of the maximum likelihood estimation of structural equation models is that the data are sampled from a multivariate normal distribution. While all of the 28 observed variables (items) involved in the analyses exhibited univariate normality since their skewness and kurtosis values ranged within the threshold  $\pm 1.5$ , multivariate normality was violated as evidenced by Mardia's normalized coefficient of multivariate kurtosis which was found equal to 47.732. Thus, the dataset was analyzed for multivariate outliers with the Mahalanobis distance, and as a result, 67 surveys were deleted, leaving a sample size of 350. Mardia's statistic for the new complete dataset and each of its 2 subgroups by gender was less than 15 suggesting moderate departure from multivariate normality (Cunha, 2012; Hong, Peng, O'Neil, & Wu, 2013; McMurtry, 2004; Woodard, Salthouse, Godsall, & Green, 1996). Thus, maximum likelihood estimation was considered appropriate to analyze our datasets, since our structural equations models are theory-driven and sample size is reasonably

large (Curran, West, & Finch, 1996; DiLalla, 2000; Huba & Harlow, 1987; Olsson, Foss, Troye, & Howell, 2000; Wang, Fan, & Willson, 1996; Weston & Gore, 2006).

## Results

### The measurement model

The validity and reliability of our measures were examined using CFA, in which each of the 28 measurement items was allowed to load on only its a priori factor, while the error terms associated with each item were assumed to be uncorrelated. The alternative models tested, along with their fit statistics for comparison, are presented in Table 5.

The AIC and ECVI values in Table 1 indicate that the best fitted model was model 0, in which attitude consisted of two components—instrumental attitude and affective attitude; PBC comprised of two factors—perceived self-efficacy and perceived controllability; and entrepreneurial intention was represented by three factors—choice intention, commitment to entrepreneurship, and nascent entrepreneurship. The best fitted model 0 had a good fit to the data in an absolute sense ( $\chi^2/df=2.3$ ,  $TLI=0.94$ ,  $CFI=0.95$ ,  $RMSEA=0.060$ ). However, the above goodness-of-fit indices were achieved by allowing the error terms of three pairs of items to correlate. This was considered acceptable on the basis of the corresponding modification indices, the similarities in the content and wording of the items involved, and the fact that the correlated residuals were associated with indicators of the same construct (Evans, Glendon, & Creed, 2007; Joreskog & Sorbom, 1988). Moreover, the model with uncorrelated residuals represented a significantly worse fit to the data than the model with correlated residuals ( $\Delta\chi^2=330.794$ ,  $\Delta df=3$ ,  $p<0.001$ ). In the best fitted model, all factor loadings were significant and well above 0.50 (Hair et al., 2010), ranging between 0.63 and 0.93. Moreover, the squared multiple correlations of all indicators ranged from 0.40 to 0.86,

**Table 5** Competing factor models of attitude, perceived behavioral control, and intention

Model	AIC	ECVI
Model 0 ATT: two components—IA, AA PBC: two components—PSE, PC INT: three components—CI, COM, NAS	898.387	2.574
Model 1 ATT: one component PBC: two components—PSE, PC INT: three components—CI, COM, NAS	924.287	2.648
Model 2 ATT: two components—IA, AA PBC: one component INT: three components—CI, COM, NAS	898.549	2.575
Model 3 ATT: two components—IA, AA PBC: two components—PSE, PC INT: one components	1417.621	4.062

IA instrumental attitude, AA affective attitude, PSE perceived self-efficacy, PC perceived controllability, CI choice intentions, COM commitment to entrepreneurship, NAS nascent entrepreneurship

indicating that a large proportion of variance was accounted for in each indicator by its underlying factor.

Having verified a satisfactory measurement model, scale scores were obtained by taking the average of the items for each scale. Table 6 reports the Cronbach alpha reliabilities, the average variances extracted (AVE), and the correlations for the seven latent variables identified from the measurement model. As can be seen in Table 6, the correlations of the dimensions of attitude and PBC with intention are similar in pattern with those reported in the literature. Note that the dimensions of attitude seem to be more strongly related to the dimensions of intention than the dimensions of PBC. The data in Table 6 show also that internal consistency coefficients (Cronbach's alpha) of all individual latent variables exceeded the recommended threshold level of 0.70, ranging between 0.81 and 0.95, suggesting that the measures for the constructs were highly reliable (Chin, 1998; Field, 2005; Nunnally & Bernstein, 1994).

Next, convergent and discriminant validity were tested using AVE and the Fornell and Larcker (1981) criterion. As evident in Table 6, convergent validity was supported as all AVE values were higher than the acceptable threshold 0.5. Discriminant validity was also confirmed, since, with only one exception, the square root of the AVE from each construct (shown on the diagonal in Table 6) is greater than the correlations in the corresponding row and column. The only exception was the correlation between perceived self-efficacy and perceived controllability which turned out to be slightly greater than the minimum of the two AVE values for the corresponding constructs. However, this finding is consistent with Ajzen's (2002) view that perceived self-efficacy and perceived controllability are two separate constructs, yet comprising together the higher-order concept of PBC.

These results verify hypotheses H1, H2, and H3 and are consistent with the view that attitude, PBC, and intention should not be considered, nor measured, as unidimensional constructs. Thus, treating and using their dimensions as distinct variables in a structural model is justified.

In a paper focusing on the structural relationships among behavioral beliefs, attitude, and intention, Botsaris and Vamvaka (2016) have provided evidence for the factorial validity and reliability of the scales used in our study to assess attitude and intention, as

**Table 6** Reliabilities, average variances extracted, and interrelations among attitude, perceived behavioral control, and intention

Construct	$\alpha$	AVE	1	2	3	4	5	6	7
Attitude									
1. Instrumental attitude	0.82	0.70	(0.83)						
2. Affective attitude	0.86	0.68	0.75	(0.82)					
Perceived behavioral control									
3. Perceived self-efficacy	0.93	0.70	0.53	0.58	(0.84)				
4. Perceived controllability	0.81	0.60	0.48	0.54	0.85	(0.77)			
Intention									
5. Choice intention	0.86	0.57	0.67	0.75	0.63	0.57	(0.76)		
6. Commitment to entrepreneurship	0.95	0.76	0.57	0.72	0.59	0.52	0.69	(0.87)	
7. Nascent entrepreneurship	0.88	0.58	0.43	0.48	0.43	0.40	0.47	0.55	(0.76)

SD standard deviation,  $\alpha$  Cronbach's alpha, AVE average variances extracted. Numbers within parentheses are the square roots of the AVEs. All correlations are significant at 0.001 level (two-tailed)

predicted in our hypotheses H1 and H3. However, in their study, Botsaris and Vamvaka (2016) examined the dimensionality of each of the two constructs—attitude and intention—separately, while the constructs examined in our study—attitude, intention, and PBC—were all included in one measurement model. Moreover, our study adds to the results of Botsaris and Vamvaka (2016) by providing evidence for the convergent and discriminant validity of the entrepreneurial constructs under investigation.

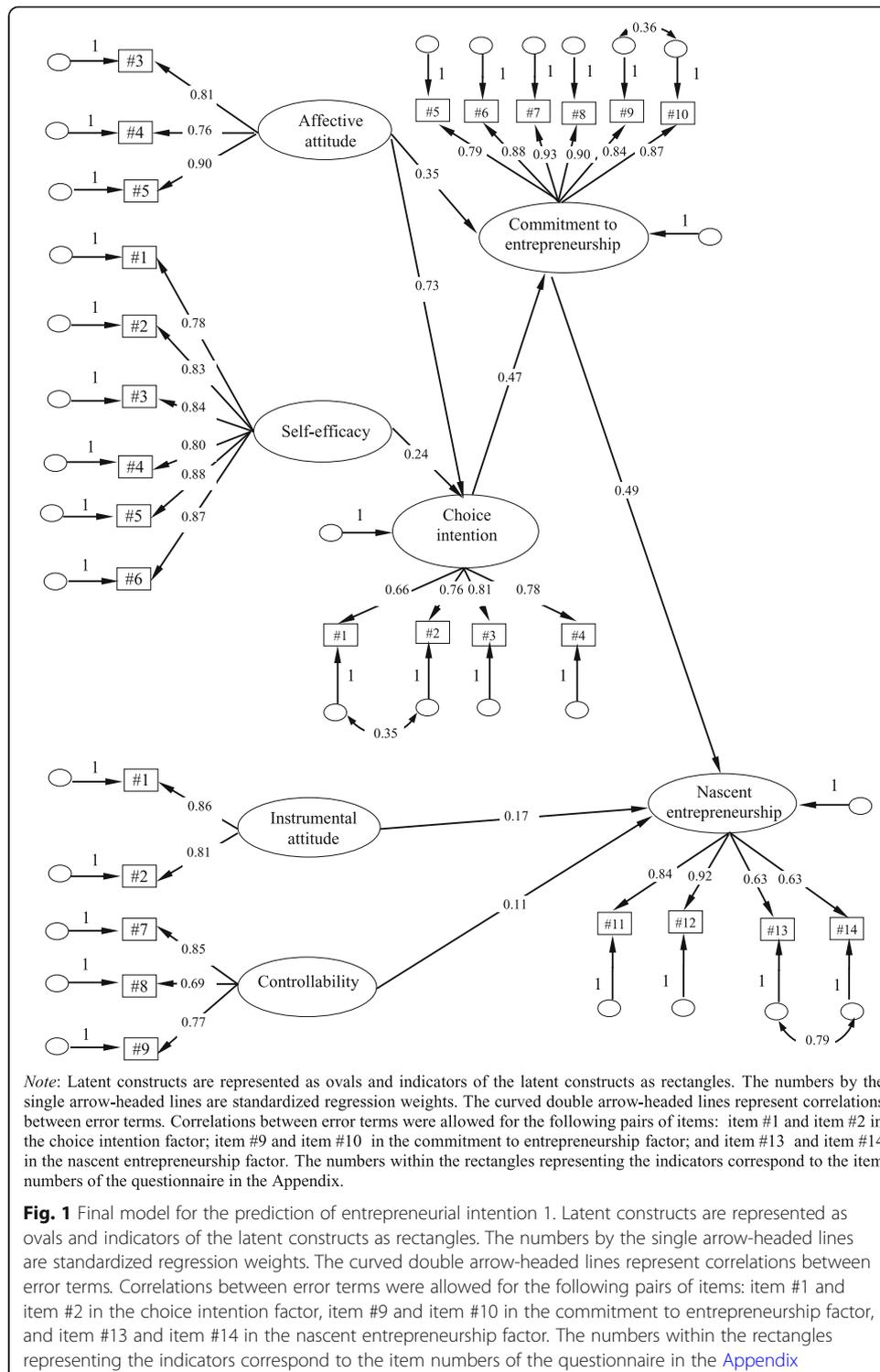
### The structural model

Having ascertained that the measurement model was valid, we then evaluated the structural model, proceeding in two steps. First, the hypothesized theoretical model of entrepreneurial intention was tested, and in a second step, this model was trimmed by deleting non-significant paths (critical ratio < 1.96). In the hypothesized theoretical model, direct paths were allowed from the dimensions of attitude and PBC, which are seen as proximal intention predictors (Fishbein & Ajzen, 2010), to choice intention, commitment to an entrepreneurial career, and nascent entrepreneurship. As choice intention is considered to be predominant over behavioral intention (Botsaris & Vamvaka, 2016; Kolvereid, 1996a; Verheul et al., 2012), direct paths were also postulated from choice intention to commitment to an entrepreneurial career and nascent entrepreneurship. Finally, it was hypothesized that commitment to an entrepreneurial career exerts a direct effect on nascent entrepreneurship on the basis of the view that intention is assumed to be the immediate antecedent of behavior for which nascent entrepreneurship acts as a natural proxy (Bali moune-Lutz & Garelo, 2015).

The hypothesized theoretical model fitted the data adequately. However, not all postulated direct paths from the dimensions of attitude and PBC to the dimensions of intention were statistically significant, and therefore, a sequence of models were tested by removing one non-significant path at a time from the hypothesized theoretical model. The model with all non-significant paths removed is depicted in Fig. 1. This model had a very good fit to the data ( $\chi^2/df = 2.3$ ,  $TLI = 0.94$ ,  $CFI = 0.95$ ,  $RMSEA = 0.060$ ).

As shown in Fig. 1, the significant paths were from affective attitude to choice intention ( $\beta = 0.73$ ,  $p < 0.001$ ) and commitment ( $\beta = 0.35$ ,  $p = 0.005$ ), from instrumental attitude to nascent entrepreneurship ( $\beta = 0.17$ ,  $p = 0.03$ ), from self-efficacy to choice intention ( $\beta = 0.24$ ,  $p < 0.001$ ), from choice intention to commitment ( $\beta = 0.47$ ,  $p < 0.001$ ), and from commitment to nascent entrepreneurship ( $\beta = 0.49$ ,  $p < 0.001$ ). The path coefficient from controllability to nascent entrepreneurship, equal to  $\beta = 0.11$ , was marginally significant ( $p = 0.07$ ). As it follows from Fig. 1, the direct effects of the dimensions of attitude on the dimensions of intention are similar in pattern with those reported in the literature, and this is also the case for the dimensions of PBC. Note also that different dimensions of attitude and PBC affect different dimensions of intention through different direct and indirect paths.

Table 7 reports the total effects for those paths found significant in the final model. As can be observed in Table 7, affective attitude, in terms of total effects, had the strongest influence on intention followed by perceived self-efficacy. Perceived controllability was the least significant predictor of intention. These results verify hypotheses H4 and H5 and are consistent with those reported in the literature (Goethner et al., 2009;



Tognazzo et al., 2017). Overall, the model accounted for 83.1%, 63.1%, and 47.3% of the variance in choice intention, commitment to an entrepreneurial career, and nascent entrepreneurship, respectively.

To highlight the importance (in terms of explanatory power for intention) of specifying the dimensions of the TPB variables as latent constructs (i.e., error free) instead of

**Table 7** Total effects of attitude and perceived behavioral control on intention

Construct	Controllability	Self-efficacy	Affective attitude	Instrumental attitude
Choice intention	0.000	0.264	0.676	0.000
Commitment to entrepreneurship	0.000	0.130	0.672	0.000
Nascent entrepreneurship	0.096	0.054	0.278	0.140

using summative scores as observed variables, an additional model was tested in which the dimensions of the TPB constructs were measured as averages of their respective indicators. This additive model explained much less of the variation in choice intention (63%), commitment to an entrepreneurial career (59.1%), and nascent entrepreneurship (33.7%) than the latent model. Another model was also estimated in which the dimensions of attitude and PBC were averaged to produce an overall score for each of these two constructs. The explanatory power of this entangled model was marginally lower than that of the additive model (choice intention, 61.9%; commitment to an entrepreneurial career, 55.8%; nascent entrepreneurship, 32.5%). These results suggest that the most significant contribution of conceptualizing the constructs involved in a model as latent variables measured by observable indicators lies on obtaining a robust model with much better fitting performance than the additive model, while the major contribution of disentangling the dimensions of the constructs lies on the identification of those dimensions which are most important for predicting the outcome variables.

#### Gender differences in the levels of and the interrelations among attitude, perceived behavioral control, and intention

Table 8 presents the correlations among gender, attitude, PBC, and intention. As can be seen in Table 8, the correlations of gender (0 = male, 1 = female) with attitude, PBC, and intention are in the expected direction (i.e., negative) and fall within the range of those reported in the literature.

Table 9 presents the means and standard deviations of the constructs examined in this study by gender. The data in Table 9 show that relative to women, men have more positive attitudes toward entrepreneurship, report higher levels of perceived behavioral control, have a higher preference for entrepreneurship, and are more strongly committed to entrepreneurship and more engaged in gestation activities associated with business start-up. However, significant effects of gender were obtained only for perceived

**Table 8** Correlations among gender, attitude, perceived behavioral control and intention

	1	2	3	4	5	6	7	8
1 Gender	1.00							
2 Instrumental attitude	-0.08	1.00						
3 Affective attitude	-0.08	0.75	1.00					
4 Perceived self-efficacy	-0.10	0.53	0.58	1.00				
5 Perceived controllability	-0.10	0.48	0.54	0.85	1.00			
6 Choice intention	-0.08	0.67	0.75	0.63	0.56	1.00		
7 Commitment to entrepreneurship	-0.07	0.57	0.72	0.59	0.52	0.69	1.00	
8 Nascent entrepreneurship	-0.09	0.43	0.48	0.43	0.40	0.47	0.55	1.00

0 = male, 1 = female

**Table 9** Means and standard deviations of attitude, perceived behavioral control, and intention by gender

Construct	Males		Females	
	Mean	SD	Mean	SD
Attitude				
1. Instrumental attitude	4.51	1.46	4.30	1.31
2. Affective attitude	4.74	1.52	4.52	1.41
Perceived behavioral control				
3. Perceived self-efficacy	3.93	1.29	3.69	1.25
4. Perceived controllability	3.98	1.34	3.70	1.27
Intention				
5. Choice intention	3.99	1.42	3.77	1.48
6. Commitment to entrepreneurship	3.95	1.60	3.73	1.55
5. Nascent entrepreneurship	2.75	1.47	2.49	1.37

SD standard deviation

controllability ( $t(348) = 1.968, p = 0.050$ ). The effect of gender on perceived self-efficacy—the other component of PBC—approached statistical significance ( $t(348) = 1.804, p = 0.072$ ). The difference between males and females in nascent entrepreneurship activities approached also significance ( $t(348) = 1.664, p = 0.097$ ). These effects were confirmed by testing a structural equations model derived by including gender in the model illustrated in Fig. 1 and placing seven direct paths between gender and the other constructs in the model. The results of the analysis showed a significant but weak direct path from gender to perceived controllability ( $\beta = -0.12$ , critical ratio = 1.988,  $p = 0.047$ ). The direct path from gender to perceived self-efficacy approached statistical significance ( $\beta = -0.10$ , critical ratio = 1.825,  $p = 0.068$ ), while the remaining five direct paths turned out to be non-significant. These effects of gender are consistent in size and pattern with most of the findings provided in the literature (e.g., Haus et al., 2013) and support hypothesis H6 that there exist significant but weak effects of gender on entrepreneurial intention and its proximal predictors favoring males. As predicted in hypothesis H6, the effects of gender on entrepreneurial intention were fully mediated by PBC.

In order to examine the potential moderating effects of gender on the relationships among attitude, PBC, and intention, we split the sample into two groups (male, female) and used a two-stage multi-group comparison approach as suggested in the literature (Brown, 2015; Canel & Voltmer, 2014; Maitland, Dixon, Hultsch, & Hertzog, 2001; Manganari, Siomkos, Rigopoulou, & Vrechopoulos, 2011; Myers, Calantone, Page Jr., & Taylor, 2000; Steenkamp & Baumgartner, 1998; Wang, 2017). First, measurement invariance was tested across gender by specifying the same factorial structure (i.e., the same pattern of fixed and free factor loadings) for each group (configural invariance) and, then, equating the factor loadings in the two groups (metric invariance). Second, following measurement invariance, structural invariance was tested by comparing a hierarchical sequence of nested models derived by constraining pairs of path coefficients to be equal across the two groups, one pair at a time. Nested models were compared using the chi-square difference test.

While measurement invariance was established, structural invariance was not supported across gender inasmuch as the path coefficient from commitment to nascent entrepreneurship was significantly stronger ( $\Delta\chi^2 = 3.877, \Delta df = 18, p = 0.049$ ) for males

( $\beta = 0.56$ ) than for females ( $\beta = 0.45$ ). This moderating effect of gender is consistent with that reported in the study of Shirokova et al. (2016) and verifies hypothesis H7.

## Discussion

The main aim of this research was to determine the independent and moderating effects of gender on the dimensions of attitude toward entrepreneurship, perceived behavioral control, and entrepreneurial intention.

Concerning the dimensionality of the constructs examined in the study, our results were consistent with theoretical speculations and prior empirical research and show that the TPB constructs under investigation are multidimensional. Although the TPB predictors of intention were traditionally conceptualized and measured as one-dimensional constructs, Ajzen (2006), who developed the TPB, suggested that each of the proximal predictors of intention in his model comprises two dimensions which should be treated and measured separately (for measurement issues, see also Francis et al., 2004). In line with this reconceptualization of the TPB model, which has been labeled “two-component” model of the TPB (Conner & Sparks, 1995), our findings confirmed that attitude is best conceptualized as consisting of two components: one affective and one instrumental component. The construct of PBC is best described by a two-factor solution, with the one factor representing perceived controllability and the other factor perceived self-efficacy; the latter measured with items assessing perceived difficulty and perceived confidence. In the complete two-component TPB model, subjective norm—which is not examined in this research—is also composed of two components: an injunctive component and a descriptive component. Moreover, our results showed that entrepreneurial intention is best represented by three factors—choice intention, commitment to entrepreneurship, and nascent entrepreneurship. A few studies have so far investigated the factorial validity of the complete “two-component” TPB model, and even fewer have attempted to compare the predictive ability of these components on intention (e.g., Courneya et al., 2006; Huang & Chen, 2015; Yap et al., 2013). The results of these studies, which were mostly concentrated on predicting health and exercise behavior, indicate that the complete two-component TPB model fits the data better than the traditional TPB model does (Huang & Chen, 2015). None of the studies applying the complete “two-component” TPB model, however, have attempted to disentangle the factors comprising entrepreneurial intention, as our research did.

Furthermore, our findings revealed interesting structural relationships regarding the relative importance of the components of attitude and PBC in the prediction of the components of intention. The direct and indirect effects between the variables that are included in the verified structural model suggest that the dimensions of attitude and PBC are differentially linked to the dimensions of intention. The data in Table 3 show that in terms of total effects, affective attitude was the strongest predictor of intention, followed by perceived self-efficacy, while perceived controllability exerted the least effect on intention.

As far as the effects of the dimensions of PBC on the dimensions of intention are concerned, in line with most previous relevant literature, our findings indicate that perceived self-efficacy is a stronger predictor of intentions than perceived controllability (Ajzen, 1991; Fayolle, 2007). An explanation for the superiority of self-efficacy over controllability in the prediction of entrepreneurial intention offers the argument that self-efficacy is an internal measure of PBC, whose core attribute is self-confidence that is feeling able to achieve desired outcomes. Such feelings or beliefs are what result in

intrinsic motivation, which is the main driving force of entrepreneurship (Broadhead-Fearn & White, 2006; Khalil, 2011). The findings regarding the relative importance of the components of PBC as predictors of intention showed also that the dimensions of PBC affect different dimensions of entrepreneurial intention. Specifically, self-efficacy turned out to be a weak to moderate, significant direct predictor of only choice intention (standardized direct effect = 0.24,  $p < 0.001$ ). In contrast, none of the three direct paths placed between perceived controllability and the three components of intention were significant at the conventional  $p < 0.05$  level. Only the direct effect of perceived controllability on nascent entrepreneurship reached statistical significance (standardized direct effect = 0.11,  $p < 0.1$ ). A plausible explanation for why perceived self-efficacy turned out to influence choice intention can be derived from Bandura's (1977) self-efficacy theory which posits that perceived self-efficacy is a major determinant of one's choice of activities. This is because people tend to engage in activities in which they feel competent and confident, while they tend to avoid behaviors they perceive as exceeding their skills and coping capability. While perceptions of efficacy influenced choice intention, perceptions of controllability influenced nascent entrepreneurship. At this point, we note that in the TPB model, PBC not only affects an individual's intention to perform a behavior, but also can directly influence the behavior itself along with intention (Ajzen, 2006). Thus, an explanation for the effect of perceived controllability on nascent entrepreneurship may offer the view that nascent entrepreneurship acts as a natural proxy for behavior (Bali moune-Lutz & Garelo, 2015).

Regarding the effects of the dimensions of attitude on intention, our results, being also consistent with those in prior studies, provided evidence that affective attitude is a much stronger predictor of entrepreneurial intention than instrumental attitude. The TPB is an extension of Fishbein and Ajzen's (2010) theory of reasoned action (TRA), which did not include PBC as a proximal determinant of intention. Based on the presence of the term "reasoned" in the TRA name and the presumption of an expectancy-value model of attitude-behavior relationship, Trafimow et al. (2004) argue that it would be reasonably expected that instrumental attitude would exert a stronger effect on intention than affective attitude does. However, many other researchers (e.g., Baron, 2008; Cardon, Grégoire, Stevens, & Patel, 2013; Hayton & Cholakova, 2012; Morris, Kuratko, Schindehutte, & Spivack, 2012; Nabi, Liñán, Fayolle, Krueger, & Walmsley, 2017) have contested both theoretically and empirically the dominance of instrumental attitude over affective attitude in predicting entrepreneurial intention, arguing that entrepreneurship is an emotional journey of the heart. They also underpin that positive feelings toward entrepreneurship increase an individual's ability of opportunity recognition, add to his/her persuasiveness, enhance one's ability to respond effectively to the highly demanding entrepreneurial environment, tolerate high levels of stress, and contribute to the development of a positive disposition and of an entrepreneurial mindset. Along a similar vein, Carayannis and Formica (2008) include intense emotions among the motivations necessary for entrepreneurship, the others being capacity to think for oneself, self-confidence, and sense of autonomy, independence, and risk-taking.

The main aim of our study was to examine gender both as an independent variable predicting the TPB constructs and as a moderator of the relationships among these constructs. The independent effects of gender obtained in our study suggest that there exist significant albeit weak gender differences in some of the constructs involved in

the TPB model favoring men. Specifically, our results indicated that compared to their female counterparts, male students display higher levels of perceived self-efficacy and perceived controllability, and are more involved in business gestation processes. These effects of gender are in agreement both size-wise and pattern-wise with the findings reported in published research. Being consistent with those studies which have found that the effect of gender on entrepreneurial intention is mediated either mainly or only by PBC (e.g., Kolvereid, 1996b; Maes et al., 2014), the effect of gender on entrepreneurial intention in our study is also exerted indirectly through its influence on perceived controllability and perceived self-efficacy. The moderating effects of gender indicated that all but one of the relations of the dimensions of intention to the dimensions of attitude and PBC were gender-invariant. The one exception was the relationship between commitment to entrepreneurship and nascent entrepreneurship which was found stronger in men than in women. This moderating effect of gender, which is consistent with that reported in the study of Shirokova et al. (2016), suggests that women less frequently than men translate entrepreneurial intention into entrepreneurial action. Thus, while men and women seem to be equally committed to an entrepreneurial career, men are more engaged in gestation activities associated with business start-up. A likely explanation for this finding is that compared to men, women face more difficulties in attempting to establish a new business, exhibit lower levels of internal control, tend to view themselves and their environment less favorably, and perceive increased barriers to new venture creation (Liñán & Fayolle, 2015; Shirokova et al., 2016; Tsai, Chang, & Peng, 2016; Verheul et al., 2012). These gender effects may, in turn, undermine women's PBC which, alongside with entrepreneurial intention, affects actual behavior. As a result, the process of moving from intention to action may be hampered.

## **Contributions, implications, limitations, and research suggestions**

### **Contributions**

Our study contributes to the literature on entrepreneurship examining the relations among gender, attitude, perceived behavioral control, and intention within the TPB in several ways.

*First*, our study overcomes two limitations of previous work on the TPB, concerning the measurement of the constructs and the statistical technique applied to test the associations among them. Previous studies have mostly used aggregate measures of the constructs and linear regression models which do not allow identifying indirect and complex effects. In contrast, in our study, the associations among the aforementioned variables were tested by conducting structural equations modeling analyses, in which attitude, PBC, and intention were treated as latent constructs inferred from multiple indicators. By analyzing the constructs as latent variables in a structural equations model allows controlling for random measurement error and obtaining unbiased and more robust estimates of effects, thus increasing the predictive power of the model (Green, Salovey, & Truax, 1999; Liñán et al., 2013).

*Second*, in line with the theoretical and empirical literature, which shows that entrepreneurship is a highly emotional endeavor, our study highlights the role of affect in the entrepreneurial process. Our findings provide evidence that affective attitude and perceived self-efficacy are by far the strongest predictors of intention, in that order.

These results underpin how important it is to disentangle the components comprising attitude and PBC. Doing so allows us to examine whether each component of these constructs is differentially related to entrepreneurial intention. In contrast, calculating an aggregate score for a scale measuring a multidimensional construct may mask potential significant differences between the effects of its constituent factors. Studies investigating how emotions influence entrepreneurship constitute a relative recent theoretical and empirical research stream. However, these studies are fragmented and scarce (Grichnik, Smeja, & Welp, 2010; Nabi et al., 2017). Addressing emotions in the entrepreneurial process by disentangling attitude and PBC into their separate components, our study contributes to filling the gap on the role of affect in key aspects of entrepreneurship.

*Third*, this study adds to the existing literature addressing the influence of gender on the entrepreneurial process by showing that women are less likely than men to convert their entrepreneurial intentions into start-up activities. This finding may explain in part the large gender gap in the number of women business owners to men. Along with the weak to negligible relationship between gender and entrepreneurial intention, it also indicates that differences in the motivational predictors of entrepreneurial intention in the framework of the TPB cannot alone explain the particularly marked gender difference in entrepreneurship rates. Haus et al. (2013) argue that these differences seem to emerge at the action stages of the entrepreneurial process rather than at the intention formation stage.

### **Implications**

This study presents some important theoretical implications and provides useful practical suggestions for educators and policy-makers. At the theory level, the emotional constructs of affective attitude (Ajzen, 1991) and perceived self-efficacy (Bandura, 1997) were found to be the strongest determiners of entrepreneurial intention. This result sheds light on how affect relates to entrepreneurship, a topic of intense research in recent years whose rapid development has led to theoretical inconsistencies and empirical gaps (Delgado-García, De Quevedo-Puente, & Blanco-Mazagatos, 2015). It also suggests that toward fostering entrepreneurial intention, both its cognitive and affective antecedents should be addressed and enhanced. Therefore, entrepreneurship education programs should not only include management courses like those offered by a Business School which aim to increase competence in the form of business skills, but also should focus on fostering self-confidence and developing positive emotions toward entrepreneurship.

Our work has further revealed that the relationship between commitment to entrepreneurship and nascent entrepreneurship is stronger in men than in women, implying that gender is a moderator of the intention-entrepreneurial behavior link. Research data show that women face increased barriers to entrepreneurship compared to men mainly due to gender stereotypes and gendered social roles and, as a result, tend to display lower levels of perceived behavioral control (Maes et al., 2014; Shirokova et al., 2016; Sitaridis & Kitsios, 2019). Thus, along with the significant gender difference favoring men in perceived controllability and the significant direct effect of perceived controllability on nascent entrepreneurship obtained in our study, the aforementioned moderating effect of gender suggests that in order to foster the entrepreneurial intention-action translation, educators and policy-makers should create and support an environment that facilitates female entrepreneurship

by eliminating or at least minimizing gender stereotypes which perceive entrepreneurship to be a masculine field and entrepreneurs to have predominantly masculine characteristics (Gupta, Turban, Wasti, & Sikdar, 2005).

### **Limitations and research suggestions**

This study makes some important contributions to the literature examining entrepreneurial intentions by using the framework of the TPB, but it is not without limitations, the major of which is its cross-sectional design.

Cognition and affect have been argued to have reciprocal relationships in attitude formation, such that cognition influences emotions and, inversely, emotions influence subsequent thoughts (Delgado-García et al., 2015; Eysenck, Fajkowska, & Maruszewski, 2012; Fernandes & Proença, 2013). Such a bidirectional relationship appears also to exist to the association over time between self-efficacy beliefs and controllability beliefs which, according to Bandura (1986), sustain one another through reciprocal causation. Wood and Bandura (1989) argue that those who perceive their environment as controllable in important matters to them are motivated to apply their self-efficacy effectively, increasing their likelihood of success. In turn, the experience of success enhances their self-efficacy and provides behavioral validation of environmental controllability. To address the dynamics of the aforementioned reciprocal relationships across stages in the entrepreneurial process, future research could employ a longitudinal analysis. Longitudinal data will also allow investigation of the long-term impact of moderators, such as gender, on the entrepreneurial intention-action translation.

Another study limitation is its sample which, though it meets the requirements of structural equations modeling, i.e., minimum sample size of 200 or a 5:1 ratio of respondents to number of estimated parameters (Kline, 2010), is not representative as it includes students from only one university and only one field of study (information technology). Therefore, the findings of this work should be interpreted with caution and be validated and replicated by a larger study using sample of students from various disciplines and different Greek higher education institutions.

Future research may also include salient key behavioral, normative, and control beliefs to “gain insight into the factors that produce favorable or unfavorable attitudes toward a behavior, that generate perceived social pressure about whether to engage in the behavior, and that lead to a sense of high or low control over performance of the behavior” (Ajzen, 2012, p. 21).

### **Conclusions**

This study examined the network of relations among gender, attitude, PBC, and intention within the TPB. The hypothesized model was tested using multi-group structural equations analysis in which the dimensions of the TPB constructs were disentangled and treated as latent variables that were indirectly inferred from multiple indicators. The study highlighted the role of affect in the entrepreneurial process by showing that affective attitude and perceived self-efficacy are by far the strongest predictors of intention, in that order. Moreover, the study provided evidence that women are less likely than men to convert their entrepreneurial intentions into start-up activities, indicating that the particularly marked gender difference in entrepreneurship rates seems to emerge at the action stages of the entrepreneurial process rather than at the intention formation stage.

## Appendix

**Table 10** Items of the questionnaire along with their sources and their theoretically designated factors

Items	Sources
Attitude	
Instrumental attitude	
1. Being an entrepreneur implies more advantages than disadvantages to me.	Liñán and Chen (2009)
2. Entrepreneurship would present more up than downsides.	Maes et al. (2014)
Affective attitude	
3. A career as entrepreneur is (totally) attractive for me.	Liñán and Chen (2009)
4. If I had the opportunity and resources, I would love to start a firm (business).	
5. Being an entrepreneur would entail great satisfactions for me.	
Perceived behavioral control	
Perceived difficulty	
1. Starting a firm and keeping it viable would be easy for me.	Guerrero et al. (2009)
2. If I wanted to, I could easily pursue a career as entrepreneur.	Kolvereid (1996b)
Perceived confidence	
3. If I tried to start a business, I would have a high chance of being successful.	Guerrero et al. (2009)
4. I have skills and capabilities to succeed as an entrepreneur.	Grundstén (2004); Autio et al. (2001)
5. I am confident that I would succeed if I started my own firm.	
6. I am certain that I can start a firm and keeping it viable.	Self-constructed
Perceived controllability	
7. I can control the creation process of a new firm.	Liñán and Chen (2009)
8. The number of events outside my control which could prevent me from being an entrepreneur are very few.	Kolvereid (1996b)
9. As entrepreneur, I would have complete control over the situation.	
Intention	
Choice intention	
1. I would rather own my own business than earn a higher salary employed by someone else.	Kolvereid and Isaksen (2006)
2. I would rather own my own business than pursue another promising career.	
3. I am willing to make significant personal sacrifices in order to stay in business.	
4. I would work somewhere else only long enough to make another attempt to establish my business.	
Commitment to an entrepreneurial career	
5. My professional goal is to become an entrepreneur.	Liñán and Chen (2009)
6. I will make every effort to start and run my own firm (business).	
7. I am determined to create a firm (business venture) in the future.	
8. I have very seriously thought of starting a firm.	
9. I consider it to be very likely that in the future I will be running my own firm.	van Gelderen et al. (2008)
10. I plan to launch my own business someday.	Thompson (2009)
Nascent entrepreneurship	
11. I read books on how to set up a firm.	Thompson (2009)
12. I spend time learning about starting a firm.	
13. I attend seminars and conferences that focus on a "start your own business planning."	McGee et al. (2009)
14. I participate in seminars that focus on writing a business plan.	

### Abbreviations

AIC: Akaike information criterion; AVE: Average variances extracted; CFA: Confirmatory factor analysis; CFI: Comparative fit index; ECVI: Expected cross-validation index; PBC: Perceived behavioral control; RMSEA: Root mean square error of approximation; SEM: Structural equations modeling; TLI: Tucker-Lewis index; TPB: Theory of planned behavior

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### Authors' contributions

All authors contributed to all the steps of conceiving, writing, and finalizing this manuscript. Each author's degree of contribution to this study is indicated by the order in which the names appear under the title of the manuscript. All authors read and approved the final manuscript.

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The authors declare that they have no competing interests.

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