
INDIVIDUAL LEVEL ASSESSMENT IN ENTREPRENEURSHIP EDUCATION: AN INVESTIGATION OF THEORIES AND TECHNIQUES.

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ABSTRACT

This paper examines a number of commonly used theories and constructs applied to the investigation of the entrepreneur (at the individual level). For each of these theories, an existing measure is selected and assessed on its applicability to the study of entrepreneurship education, reflecting on past research and an empirical investigation in the entrepreneurship education context.

Focusing on trait theory, self-efficacy, intentionality and passion, a measure for each construct was investigated by administering it on a sample of students (n=367) taking an entrepreneurship education module. Aspects of the reliability, validity, internal consistency and factor structure of each test were examined using SPSS and MPlus statistical analyses. The findings allow for a direct comparison to be made of the measures in a controlled environment.

Theoretically there is a justification for applying each assessment approach to entrepreneurship education. Based on past research it was noted that trait theory has often been criticised for inconsistent empirical findings. This was echoed in our study as empirical analysis supported the use of the entrepreneurial intentionality and entrepreneurial self-efficacy measures, yet the trait measure, the General Enterprise Tendency (GET) test displayed worrisome reliability and structural validities and would not be recommended for future research without significant revision. The measure used to examine entrepreneurial passion was stable in the context, and furthermore suggested that this construct may offer valuable insight about the mindset of students undertaking entrepreneurship education in future.

Limitations of the study include use of a mainly homogenous sample with no control group. The measures for analysis were selected as they were intended for entrepreneurship research and have since been applied to entrepreneurship education. The measures are not reflective of respective theory as a whole. Different and many theories could have been selected, as well as alternative measurement instruments. The measures could have been integrated together into a more complex analysis, however the intended purpose was to examine them in parallel.

There have been repeated calls to systematise the assessment of entrepreneurship education, to converge existing knowledge and research. It is hoped that this paper provides educators with an overview and empirical insight regarding theories and measures to adopt for future research and assessment approaches.

INTRODUCTION

'Long-term sustainable funding for entrepreneurship education and enterprise initiatives will be contingent on the perceived effectiveness of the entrepreneurship education. Evaluating the effectiveness of entrepreneurship education is not a facile exercise of measuring inputs and outputs; consequently, there is a lack of empirically rigorous research to substantiate HEI's claims that their graduates benefit significantly from entrepreneurship education' (O'Connor, Fenton, & Barry, 2012, p. 248)

In an attempt to support new venture creation and innovation at all levels of industry, entrepreneurship education has been incorporated into many levels of education and significant investment has been devoted to its development (Fayolle, Gailly, & Lassas-Clerc, 2006; Flewellen Jr., 1977; C. Jones, 2010; Donald F. Kuratko, 2005). Emerging in US business schools during the 1970's, the training for and of entrepreneurship has spread exponentially and internationally ever since (Carey & Matlay, 2011; Fiet, 2000; D F Kuratko, 2007; Solomon, Weaver, & Fernald, 1994). The link between entrepreneurship education and new venture creation has been witnessed many times (Matlay, 2006a; McMullan, Chrisman, & Vesper, 2002; Shane, 2004; Varela & Jiminez, 2001) yet in order to sustain engagement by Higher Education in its development, this needs to be proven definitively and repeatedly by accepted means (O'Conner et al., 2012). With multiple theories and perspectives on the classification of the entrepreneur, and consequently the enterprising student, assessment instruments are varied which impedes their impact and convergence (Duval-Couetil, Reed-Rhoads, & Haghghi, 2010; Souitaris, Zerbinati, & Allaham, 2007). In the field of leadership for example, the big 5 personality trait model, or five factor model, has been used extensively by researchers giving it legitimacy and widespread approval. In the entrepreneurship field, however, it is apparent that in many cases researchers tend to devise new measurement frameworks and instruments for each empirical study conducted, rather than selecting the most valid from prior work, which would help to consolidate findings (Shook, Priem, & McGee, 2003).

This paper discusses some of the key theories that are employed to assess the outcomes of entrepreneurship and entrepreneurship education from the perspective of an individual or an individual student. From this, a selection of instruments are chosen and used in parallel on a student sample to examine and compare their reliability and validity in context, the aim of which is to make inferences about their applicability for future research in entrepreneurship education.

Entrepreneurship Education at a glance

Entrepreneurship education has been defined by many scholars, yet disagreement still remains about its explicit meaning. For decades, research has tried to separate entrepreneurship education from enterprise education (Garavan & O’Cinneide, 1994; Gibb, 2002; Henry, Hill, & Leitch, 2005) and while this disentanglement may be beneficial, it lies outside the scope of this research paper. Taking a general sense, entrepreneurship education is defined by Heinonen et al. (2006, p. 81) as ‘activities aimed at developing enterprising or entrepreneurial people and increasing their understanding and knowledge about enterprise and entrepreneurship’. Though this definition establishes the main purpose of entrepreneurship education, many researchers believe that its impact is wider, affecting the skill-set and knowledge beyond that of entrepreneurship itself (Hynes, 1996; Lewis K. & Massey C., 2003). Fayolle et al. (2006, p. 702) incorporate these ideals by defining an entrepreneurship education programme, or EEP as ‘any pedagogical process that develops entrepreneurial attitudes and skills as well as personal qualities’. The combination of these specific enterprise skills and more generalised qualities is hoped to give students a more holistic educational experience, which would integrate to develop the students’ enterprising mindset.

There is a research consensus that enterprise and entrepreneurship education are valuable additions to many business courses, and indeed non-business disciplines (Bosma & Levie, 2010; Hynes, 1996; Rae, 2010). Benefits include helping to integrate various business subjects and topics; promoting cooperation and the transfer of knowledge between educational institutes and wider business, and allowing for improved decision making in students (Faoite, Henry, Johnston, & Sijde, 2003). Yet similar to the definitional ambiguity, there has been much disagreement about other aspects of entrepreneurship education, including the pedagogy (Hytti & O’Gorman, 2004) and assessment of an entrepreneurship education programme or course (Carey & Matlay, 2011; C. Jones, 2010; Matlay, 2005). As progression in any research field must be built on a cyclical process of reflection and action, these issues have slowed the development of the field. If educators cannot receive comprehensive feedback about an EEP and its effectiveness, the pedagogy cannot be improved upon, and also the benefits of a programme cannot be seen or celebrated (O’Connor et al., 2012). Despite consistent calls, there is no widely accepted measurement instrument or approach to discern entrepreneurial students or individuals from a sample group (N. E. K. Peterman, 2003; Pittaway & Edwards, 2012). Similarly, there is no definitive method of assessing an entrepreneurship education course or programme that is accepted and used by a majority (Potter, 2008). This research investigation seeks to explore a selection of assessment measures taken from different theoretical standpoints, to ascertain which methods already proposed in the area are effective in the theoretical and the practical sense.

Duvail-Couetil et al., (2010) note that there are three main assessment levels when researching entrepreneurship education; (a) course-level assessments where the course itself is under scrutiny for its effectiveness, or the effectiveness of pedagogical intervention (K. L.

Wilson, Lizzio, & Ramsden, 2012), (b) individual-level assessments whereby a specific instrument is used to measure a construct perceived to be related to entrepreneurship; and (c) top-level evaluations of programmes in which the impact in economic or knowledge terms can be analysed. This study is localised to that of the individual level assessment measures only.

Finding the Entrepreneur

In most educational contexts, the practices and theories incorporated in the teaching of a subject at third level disseminate from discoveries and research advances made in its respective field. Management, human resources, and strategy all follow this practice, and entrepreneurship is no different. The methods used to evaluate entrepreneurship and assess individual entrepreneurs have transcended into entrepreneurship education, for better or for worse. Researchers have tried to classify the entrepreneur using a wide array of theoretical perspectives including trait, cognitive, attitude, intentionality and outcome based methods (economic or performance) (Heinrichs & Walter.,; Rae, 2010; Shane & Venkataraman, 2000). Yet the findings from this body of research remain fragmented and dispersed (Gartner, 1989; Shook et al., 2003). Some of these approaches will be discussed in brief below, considering the contributions made to the field and their applicability to the assessment of entrepreneurship education. These include measures used to evaluate entrepreneurship which are outcome or performance based (assessing whether the person started a new venture) or based on behavioural, attitudinal or psychometric measures.

Performance

Performance is a construct that is as popular as it is varied. It can be distinguished into two main types; firstly as a behaviour or action (i.e. *performing*) and secondly as an output (Beal, Cohen, Burke, & McLendon, 2003). In entrepreneurship research, the focus is output, and its measurement mainly concentrates on addressing whether an individual creates a venture following an entrepreneurial intervention of some sort (Peterman & Kennedy, 2003) or if he/she improves an existing venture through innovative action. The approach is often used to evaluate entrepreneurship education programmes or courses, using individual-level performance measures such as innovative *output* i.e. the number or quality of innovative ideas produced, new ventures created, or student grades (Fayolle et al., 2006). Other performance indicators in education involve assessing knowledge (exam or assignment); evaluation of course and student satisfaction (via surveys) (Shartrand & Weilerstein, 2008). Fayolle et al., (2006) notes the possible short-sightedness of limiting the focus to new venture creation and output only, calling for researchers to be more holistic in their assessment of an entrepreneurship education programme (EEP). Highlighting this point, Kostoglou (2008) surveyed 197 graduates in Greece finding that students who attained lower performance results were more involved in entrepreneurship than those who excelled by traditional academic assessment.

Trait theory

The trait approach assumes that the entrepreneur has a unique personality with discernible psychological characteristics, and if a method of locating these characteristics were to be developed, researchers would be able to locate entrepreneurs in a sample (Driessen & Zwart, 1999; Low & McMillan, 1988; McClelland, 1961; Scherer, Adams, Carley, & Wiebe, 1989). This view takes into account the entrepreneur, the enterprising individual and the intrepeneur, considering them to have similar psychological profiles but perhaps different intentionality or environmental factors (Antoncic & Hisrich, 2003; Cromie, 2000). It is considered that while enterprising individuals are not all entrepreneurs, all entrepreneurs must display enterprising qualities (Caird, 1990a; Cromie & Callaghan, 1997). In particular, need for achievement and risk-taking are two traits commonly associated with entrepreneurs that have been tested for on many occasions. Need for achievement (nACH) was first applied to entrepreneurs by McClelland (1961) and refers to the motivation felt by an individual to accomplish a task to a certain standard of excellence. It has been suggested that successful entrepreneurs display a higher need for achievement than other occupational groups (Begley & Boyd, 1987; Hansemark, 2003; Morris & Fargher, 1974). This was shown in particular by Collins et al. (2004) in their extensive meta-analysis of 41 studies who found a link between nACH and choice of entrepreneurial career and performance. Another popular trait associated with the entrepreneur, risk taking, describes a person who works at his/her own risk to make a profit based on market demands (Landstrom & Benner, 2010; Long, 1983). It has become a well-researched trait (Galor & Michalopoulos, 2012; Praag & Versloot, 2007), displaying a positive relationship with the characteristics of the entrepreneur (Gürol & Atsan, 2006; Schwer & Yucelt, 1984; Sexton & Bowman, 1980; Venuvinod, 2005).

While the two examples described above have gained a certain amount of legitimacy from their repeated use and findings, trait theory itself has been subject to much criticism. It is commonly criticised due to claims of simplicity, rigidity and the presence of many studies displaying inconsistent findings based on weak empirical analysis (Chell, Haworth, & Brearley, 1991; C. J. H. Collins, 2004; Gartner, 1989; Pervin, 1994; Robinson, Stimpson, Huefner, & Hunt, 1991). Gartner (1989, p. 57) suggested that the entrepreneur, as a result of trait theory, is known to have so many varying characteristics, and so 'full of contradictions' that he or she is not discernible. Davidsson and Wiklund (2001) consider it 'naive' to base research conclusions on the findings of trait based research in isolation, and recommend the trait approach as part of more multi-layer approaches. More recently, however, there has been a renewed interest in the measurement of trait theory where stronger research methodologies are employed and a distinction is made between specific and general traits (Caliendo & Kritikos, 2012; Sánchez, 2013). Within entrepreneurship education itself, trait theory has been used successfully to distinguish students wishing to pursue entrepreneurship from those were less inclined (Caird, 1991a; Gürol & Atsan, 2006).

Entrepreneurial Intentions

It is thought that in some circumstances, individuals with a certain ‘entrepreneurial disposition’ who have not yet created a new venture may be lacking in intentionality to begin (Thompson, 2009). Entrepreneurial intentionality or the ‘state of mind that directs and guides the actions of the entrepreneur toward the development and implementation of the business concept’ (Boyd & Vozikis, 1994, p. 64) has been recognised as a key construct in predicting future entrepreneurial activity (Krueger, Reilly, & Carsrud, 2000). Intention-based models are seen to be strong predictors of planned behaviour and are commonly based on Azjen’s (TPB) theory of planned behaviour which dictates that attitudes predict intentions, which in turn aid in predicting subsequent behaviour (Azjen and Fishbein, 1980). Within the field of entrepreneurship, two intention based models are used commonly, one based on Azjens theory of planned behaviour and the other known as the Shapero entrepreneurial event (SEE) model, with Krueger et al (2000) finding both models to be robust in their comparison. Foyolle et al (2006) has previously recommended the use of Azjen’s model in the assessment of entrepreneurship education.

A study by Le Poutre et al. (2010) testing the entrepreneurial intention of secondary school students over 21 entrepreneurship programmes found positive results linking the student experience to entrepreneurial intentions. In other studies, Peterman and Kennedy (2003) and Souitaris et al. (2007) both found strong significant positive results between entrepreneurship education and intentions toward venture creation, while Osterbeek et al. (2010) found the contrary to be true. Like many other entrepreneurial constructs, entrepreneurial intentionality has been weakened by ambiguity in its definition and measurement (Thompson, 2009), however its use in entrepreneurship education is thought to be particularly suited to student sample groups who have not yet delved into entrepreneurship but may intend to (Krueger et al., 2000).

Entrepreneurial Self- Efficacy

Self-efficacy as defined by Bandura (1977, p. 240) as ‘a judgement of one’s ability to execute a particular behaviour pattern’. It is suggested that a person’s self-efficacy will determine their level of intended effort, persistence and engagement with a project. Embedded in social cognitive theory, all efficacy constructs are future-orientated perceptions about one’s ability to execute a specific course of action in order to produce a given achievement in a certain setting or context (Goddart, Hoy and Hoy, 2004). Bandura (1986) postulated four main sources of self-efficacy; mastery experience, vicarious experience, social persuasion, and psychological/emotional states.

Self-efficacy has been highlighted as a key construct relating to entrepreneurs and the field of entrepreneurship (Henry et al., 2005). It is considered to be particularly useful in entrepreneurship education due to its malleability as a construct, likely to be advanced through training and education (H. Zhao, Seibert, & Hills, 2005a). The fact that Bandura (2006) explains that self-efficacy must be tailored to a specific context and domain of functioning ties in with authors such as Robinson et al. (1991) who recommends that scales designed for

entrepreneurship education should have some situational specificity within them. Following this premise, the concept of entrepreneurial self-efficacy (ESE) has been used by many researchers in the field of entrepreneurship education (Maritz & Brown, 2013; H. Zhao et al., 2005a). As a contextualised version of the self-efficacy construct, entrepreneurial self-efficacy (ESE) is oriented around an individual's belief about their capability to attain success and control cognition in order to manage challenging goals during new venture creation (Drnovšek, Wincent, & Cardon, 2010; Maritz & Brown, 2013).

ESE, like self-efficacy is grounded in the socio-cognitive approach as it considers the individual and the environment; considering how the context around the individual affects his/her cognitive and affective reasoning when undertaking entrepreneurship (Drnovšek et al., 2010). It has been linked to entrepreneurial intentions on many occasions (Fayolle et al., 2006; Sánchez, 2013) and also to the likelihood of new venture creation (Rauch & Frese, 2007). Entrepreneurship education has been empirically seen to raise levels of ESE, indicating its usefulness in this field (F. Wilson, Kickul, & Marlino, 2007) and has been recommended as a key factor to consider in the creation of entrepreneurship education pedagogies and curricula (Pihie & Bagheri, 2010). Maritz and Brown (2013) recently found that students undertaking an entrepreneurship education programme increased their ESE, in particular for females aged 40+ and without business-owning relatives. It seems that by engaging in an entrepreneurship education programme these individuals access experiences such as mastery experience (through projects etc.) and social persuasion (via role models) that they did not have access to organically.

Entrepreneurial Passion

It has been pointed out in recent research that those involved in entrepreneurship have high levels of passion (M. S. Cardon, Wincent, Singh, & Drnovšek, 2009; Murnieks, Mosakowski, & Cardon, 2012). Entrepreneurial passion is 'the personal joy that a person derives from engaging in specific activities that come with the job of being an entrepreneur' (Cardon et al., 2009 p.?). While authors such as Smilor (1997) previously noted its prevalence in entrepreneurship literature was more rhetoric than explicit or empirical, it is now a construct that is growing in popularity of late especially in quantitative studies. Entrepreneurial passion is typified by an intense positive emotion associated to venture related activities which increases entrepreneurial resilience (Cardon et al., 2009). Entrepreneurial research has investigated the impact of passion on new venture growth in the past (Baum & Locke, 2004) and it has also been studied in line with many constructs associated with entrepreneurship. Recent work by Cardon and Kirk (2013) found that entrepreneurial passion mediated the relationship between entrepreneurial self-efficacy and persistence. It is not yet clear whether entrepreneurial passion will glean significant results in the entrepreneurship education field. In their study involving young students, De Clercq et al. (2012) preferred to use a more general construct for passion rather than entrepreneurial passion believing students at that age will not be sufficiently aware of entrepreneurship to be passionate about it.

METHOD

Sample

Students taking an entrepreneurship module in Dublin City University were selected for the purposes of this study. The students were from a first year undergraduate and postgraduate business programme taking a shared entrepreneurship module. The group were asked to complete an online survey in September 2012 and the results were collected in late December. The respondents numbered 366, which consisted of 245 (66.9%) first year students, and 121 (33.1%) and postgraduate students. In addition the large majority (81.6%) were Irish. The questionnaire contained demographic variables and measures relating to trait theory, self-efficacy theory and intentionality which are outlined below. In September 2013, a similar survey was released to the subsequent group taking the entrepreneurship education module. From the second study we will be examining a measure not previously included, that of entrepreneurial passion. This omission in the original study will limit the comparability of entrepreneurial passion from the other constructs but not overly so, as the two test groups are thought to be similar in terms of context. In the second study, the number of responses attained was 257. This sample was similar to the earlier version, consisting of both first year students (67.7%) and postgraduate students (31.9%) studying a shared entrepreneurship module. Over 91% of the students were aged between 17 and 25 and were evenly split gender-wise with 127 males to 130 females. Both survey results were analysed using SPSS and Mplus to determine their validity and factor structure.

Measures

The criteria for the selection of measures for the purposes of this study, was to select instruments that have been used multiple times in entrepreneurship with limited knowledge about its validity and applicability in the entrepreneurship education context.

- 1. Entrepreneurial Self Efficacy:** Most measures of ESE follow the same general format items and are designed around aspects typically associated with starting a new business such as opportunity recognition, managerial skills and tolerance, which are measured using a Likert scale (Barbosa, Gerhardt, & Kickul, 2007; Maritz & Brown, 2013). There are many forms of the ESE construct employed in empirical studies, an issue that limits its comparability and reliability (Maritz & Brown, 2013). It has been observed as a multi-dimensional and a uni-dimensional construct (Chen, Greene, & Crick, 1998; McGee, Peterson, Mueller, & Sequeira, 2009; H. Zhao et al., 2005a). Though found to have validity as both, there are concerns that treating ESE as a composite or unified measure may limit its investigative value (Drnovšek et al., 2010; Maritz & Brown, 2013; McGee et al., 2009). Despite this, the measure chosen for this study was a unified construct devised by Zhao et al. (2005a). The measure was found to display discriminant validity
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with Chen et al. 1998)'s general self-efficacy construct, yet was positively related to entrepreneurial intentions, indicating its convergent validity.

- 2. Entrepreneurial traits:** The general enterprise tendency test or GET test is a 54 item questionnaire made up of 5 dimensions of personality. The measure considers that enterprising individuals have certain discernible traits which are typified by (a) a motivation to accomplish a task to a standard of excellence (*Need for Achievement*), (b) the tendency to speak and act devoid of concern for consequence or authority (*Need for Autonomy*), (c) a perception that the individual has control over their own life (*Locus of Control*), (d) an ability to take calculated risks in the pursuit of success (*Calculated Risk Taking*) and lastly, (e) the tendency to be imaginative, innovative, curious and versatile (*Creative Tendency*) (Caird, 1990b, 1991b; Durham University Business School, 1988). Since the GET tests inception it has demonstrated criterion and predictive validity across various sample groups and countries (Caird, 1991b; Cromie & O'Donoghue, 1992; Salleh HJ. Din, 1992) and was deemed by Cromie (2000, p. 22) to be 'a comprehensive, accessible, easy to administer and score, and, though additional work is needed to verify its psychometric properties, some studies have found that the GET test has criterion and convergent validity and good internal consistency'. Despite this, concerns have been expressed about the internal consistency of the test's constructs (Stormer and Kline), a problem that is commonly noted in early trait research (C. Collins et al., 2004)

The test was selected for the purposes of this study as the traits included are discussed commonly in trait research and also its use in previous entrepreneurship education assessments. The works of Caird (1991), Kirby (2004) Cromie (2000) and Cromie and O'Donoghue (1992) suggest that students are the least enterprising group when matched with other occupational groups such as managers and teachers. Studying students exclusively, Kirby and Honeywood (2007) found students with ADHD had higher GET scores than the norm, and subsequently Kirby and Ibrahim (2010) found that Egyptian undergraduate students had higher GET results than their British peers. Salleh (1992) found that there was a positive relationship between GET scores and 'number of previous employments' for students in a large Malaysian study. From these past works, it is clear that educational researchers are interested in the GET test as a measure of entrepreneurial tendency in students

- 3. Entrepreneurial Passion:** The measure used for entrepreneurial passion was derived from a scale for harmonious passion by Vallerand et al. (2003) which was adapted for entrepreneurship by Murnieks et al. (2012). This scale is a 6 item Likert scale which includes items such as 'For me, being an entrepreneur is a passion'. One of the items was removed as it was believed to be too closely associated to entrepreneurial intentionality namely 'my intention is to become an entrepreneur'.
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4. **Entrepreneurial Intentionality:** The measure for entrepreneurial intentions was taken from the larger Entrepreneurial Intention Questionnaire (EIQ) by Linan and Chen (2009). It is a six-item scale with a 7 point Likert scale consisting of agreement questions such as 'I am determined to create a firm in the future'. Past work indicates that this measure is applicable for student samples. Using four of the six items, Iakovleva et al (2011) sampled a total of 2,225 students representing 13 countries to measure their intention to start a new venture. Interestingly, their results found that students in developing countries had greater intentionality scores than students in developed countries.

RESULTS

Reliability

1. **Entrepreneurial Self-Efficacy Test:** Alpha reliability for the ESE scale was found to be 0.800 which is considered acceptable, with a mean inter-item correlation of 0.500. Netemeyer et al. (2003) recommends item-total correlations ranging from 0.50 to 0.80. The ESE test meet these criteria as all correlations are above 0.578. The findings suggest that the items are reliable in forming the scale.
 2. **General Enterprise Tendency Test:** In terms of the internal consistency or the degree to which the scale items measure the same feature, the overall GET test had a Kuder-Richardson score of 0.774 with a mean inter-item correlation of 0.061. For a dichotomous scale such as the GET test, the Kuder-Richardson formula 20 (KR20) is more appropriate even though it provides much the same result as the usual Chronbach Alpha test (Kuder & Richardson, 1937). This is considered acceptable to many researchers but as both the Cronbach alpha and KR 20 values are calculated according to the number of items in a scale it may not be precise (Cortina, 1993). In fact, as the GET test is a 54 item scale it would need to attain a KR 20/C.A. value of 0.96 in order to attain base item-total correlations of 0.3. In its current form, it is also observed that 39 of the scale items obtained item-total correlations which are under 0.3 and would ordinarily be removed. Taking each of the sub-scales in isolation each received poor results in terms of internal consistency (See Table 1) and would not be deemed acceptable.
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Table 1. Inter-correlations and Cronbach Alpha values for the GET test

	No of items	Mean inter-item correlations	Cronbach Alpha
1. Need for Achievement	12	0.091	0.546
2. Need for Autonomy	6	0.06	0.276
3. Locus of Control	12	0.073	0.476
4. Calculated Risk Taking	12	0.107	0.577
5. Creative Tendency	12	0.085	0.509

- 3. Entrepreneurial Passion:** Using the second study results the reliability was assessed for entrepreneurial passion (5 items). Alpha reliability for the scale was found to be 0.873 which is considered acceptable, with a mean inter-item correlation of 0.582.
- 4. Entrepreneurial Intentionality:** Alpha reliability for the 6 item scale was found to be very strongly reliable at 0.955, with a mean inter-item correlation of 0.778. All inter-item correlations were above 0.719 suggesting that the items were very reliable in forming the scale. There did appear to be some minor inconsistencies in the results obtained for the first item in the measure, believed to be due in part to a formatting issue with the questionnaire which was rectified shortly after the survey was disseminated. Despite this minor issue, the intentionality scale was deemed to be strongly acceptable.

Convergent, discriminant and criterion validity

The three scales in the first study were compared using Pearson product-moment correlation coefficients in SPSS. All relationships between scales were positive and significant, indicating convergence between the constructs yet not overly so, which would indicate they are measuring the same construct. The trait based GET test indicated a mid-strength and significant relationship with the entrepreneurial self-efficacy (ESE) measure, $r=0.329$, $n= 364$, $p< .0005$, and also with the intentionality (EI) measure, $r=0.379$, $n=317$, $p< .0005$. Entrepreneurial passion was not compared in this analysis.

Table 2. Measure correlations

	General Enterprise Tendency	Entrepreneurial Intentionality	Entrepreneurship Self-Efficacy
General Enterprise Tendency	1		
Entrepreneurial Intentionality	.379**	1	
Entrepreneurial Self- Efficacy	.329**	.453**	1

** . Correlation is significant at the 0.01 level (2-tailed).

To investigate the criterion related validity of the measures an independent samples t-test was conducted to compare scores for each of the constructs against a gender variable. It has been noted in the past that males tend to score higher on entrepreneurship measures than females (Lena & Wong, 2004), and this was expected to be reflected in each of our considered scales also. The GET test produced no significant results while the other two constructs did find significant differences between males and females. Entrepreneurial self-efficacy was higher in males ($M=13.70$, $SD = 2.786$) than females ($M=12.73$, $SD = 2.586$; $t(364) = 3.383$). The magnitude of the difference in the means between males and females was small to moderate (eta squared = 0.03). Similarly, the intentionality based measure found males ($M=25.56$, $SD = 9.38$) to have higher scores than females ($M=23.07$, $SD = 9.937$), with the magnitude of the differences between the mean scores of the two group also small to moderate (eta squared = 0.016). Using the second study, the Entrepreneurial passion scale used did not show a significant difference between males ($M=18.18$, $SD = 3.918$) and females ($M= 17.88$, $SD = 3.56$; $t(243) =0.633$).

Factor Analysis

Factor analysis was carried out on the original 54 item GET test to allow the researcher understand the inter-relationships between variables. Principle component analysis revealed 22 components with eigenvalues greater than 1, accumulating to 60.28% of the total variance. A confirmatory factor analysis was undertaken using the sub-scale constructs as a five-factor model however no convergence was found. Taking each of the sub-constructs separately (Need for Achievement, Risk Taking, Need for Autonomy, Locus of Control and Creative Tendency) most showed the presence of four components despite only containing 12 items (except need for autonomy which has 6 items and indicated a two factor construct). This indicates that even within the specific dimensions of the GET test, the items were not testing for the same concept. In addition, it was found in all analysis that there was prevalent cross-loadings and items which loaded very poorly (below 0.4). Many attempts to remove these items and retest were unsuccessful in creating any form of model fit. The most successful revision attempt reduced the

scale to 26 items. Factor analysis of this revised GET test was carried out, revealing the presence of 7 components accumulating to 52.5% of the total variance, yet this was still deemed to be low and did not receive an adequate model fit using either EFA or CFA analysis in Mplus.

Using a confirmatory factor analysis, the entrepreneurial self-efficacy measure was found to be best suited to a one-factor model as was expected from previous studies (CFI = 1.000, TLI = 1.016, RMSEA = 0.000, RMSR = 0.000). The entrepreneurial intentionality measure was similarly predicted to be a one-factor model. Due to a negative cross-loading of the first item due to a minor survey issue previously outlined, it was removed for the final CFA analysis. The results indicated that indeed a one-factor model was the best fit, displaying parsimony in the thresholds investigated (CFI = 0.991, TLI = 0.982, RMSEA = 0.095, RMSR = 0.015).

As the measure of entrepreneurial passion has had limited use on student samples, it was decided to conduct an exploratory factor analysis at the outset. Results indicated that a two factor model displayed the best fit on a range of goodness-of-fit measures (CFI = 1.00, TLI= 1.026, RMSEA = 0.00, RMSR = 0.002). These results divided the scale items into two clear loadings; the first which was concerned with the attractiveness of entrepreneurship as a concept with items such as ‘the new things I discover with entrepreneurship allow me to appreciate it even more’. The other factor loading contained items such as ‘I am completely taken with being an entrepreneur’ could be considered more career orientated. It could be speculated that a young student sample who are further from considering careers may answer these items differently, thus altering the factor structure. This two factor structure was confirmed using a CFA (CFI = 0.993, TLI = 0.984, RMSEA = 0.049, RMSR = 0.026).

Table 3. Summary of Factor Analyses^a

Measure	Model	χ^2 (df)	CFI	TLI	RMSEA	RMSR
Entrepreneurial Passion	Null	358.702(10)**				
	One factor	43.164(5)**	0.891	0.781	0.178	0.062
	Two factor	6.288(4)	0.993	0.984	0.049	0.026
Entrepreneurial Intention	Null	1647.372(10)**				
	One factor	19.397(5)	0.991	0.982	0.095	0.015
Entrepreneurial Self-efficacy	Null	291.990(6)**				
	One factor	0.447(2)	1.000	1.016	0.000	0.007
General Enterprise Tendencies	Null	90900.048(1431)**				
	One factor	88210.600(1377)**	0.029	-0.009	0.415	0.131

^aThe chi-square test is a measure of overall fit; an acceptable result occurs when the analysis fails to reject the null hypothesis i.e. when there is a non-significant result. The chi-square test is often affected by sample size and should only be used as one of many indicators of goodness of fit. The comparative fit index (CFI) investigates the amount of total variance accounted by the model tested where a figure of >0.95 is considered acceptable. The normal fit index (NFI) compares the model fit to the baseline model, seeking a result of >0.95. A root-mean-square error of approximation (RMSEA) figure of below 0.08 is also sought as well as a root-mean-square-residual (RMSR) figure of below 0.06 to indicate a close fit of the data to the model.

DISCUSSION

The findings of this research measured the reliability and internal consistency of four measures commonly used to investigate the entrepreneur, which were applied to the context of entrepreneurship education/enterprise education. The measures emanated from differing theoretical perspectives, and have been used previously by scholars in entrepreneurship. This study investigated students of an entrepreneurship education module in an Irish university, focusing on respondents' entrepreneurial tendencies, entrepreneurial intentions, entrepreneurial passion and entrepreneurial self-efficacy.

In terms of the reliability of the measures chosen, it was observed that while all measures met the current standards for internal consistency, or the degree to which the scale items measure the same feature, the results of the General Enterprise Tendency trait measure caused some concern. In assessing a scales reliability, using the Chronbach Alpha (CA) coefficient (or Kuder Richardson KR-20), the number of items in the scale must be taken into account. The GET tests results indicated that it does not meet the criteria for internal consistency, and in addition a significant number of items did not correlate well with the total, indicating that they did not relate well to a common construct. Entrepreneurial intentionality, entrepreneurial passion and entrepreneurial self-efficacy all displayed strong reliability in the study.

Three of the scales were tested together to assess convergence; entrepreneurial tendencies, entrepreneurial intentions and entrepreneurial self-efficacy. All relationships between scales were positive and significant, indicating that for each measure of entrepreneurial qualities, the others were consistent. This was expected as students displaying enterprising tendencies would have a higher efficacy for entrepreneurship and so on. Also important to note was the low to mid-strength of each of these relationships, indicating that though they are related, they are measuring differing constructs thus displaying discriminant validity of sorts. Lastly, independent t-tests were carried out with each of the measures against gender to explore whether they would discern males from females. Research has seen that males usually have higher scores in entrepreneurial tests than females (e.g. Lena and Wong, 2004; Wilson, 2007) and this was investigated in the tests. Significant differences were noted using the self-efficacy and intentionality measures as expected. The enterprise tendency measure, the GET test did not provide significant results between the genders. While the measure for entrepreneurial passion did not provide significant results between males and females, there has been little research on whether males display higher passions for entrepreneurship, thus this result may be an early indication that the rule cannot be extrapolated from other constructs to that of entrepreneurial passion.

A number of factor analyses were conducted using principle component analysis on each of the measures to investigate the inter-relationships between the variables, and to determine how many latent variables underlie each set of items. An exploratory factor analysis of the GET test revealed that as a whole, 22 factors with eigenvalues greater than one was produced which was significantly higher than anticipated. When the dimensions were examined separately, multiple latent variables were observed and the data was filled with cross-loadings and negative loadings,

indicating that the items do not coherently examine the latent variables. Entrepreneurial self-efficacy and entrepreneurial intentionality both displayed parsimony in their confirmatory factor analyses for a one-factor model. The entrepreneurial passion measure was seen to be best suited to a two-factor model, separating the items into a latent variable concerned with the attractiveness of the entrepreneurial as a concept and a more career-orientated factor. A summary of the findings of the empirical analyses are presented in Table 4 below.

Table 4. Summary findings of empirical analyses

	(a) General Enterprise Tendency test	(b) Entrepreneurial Self Efficacy	(c) Entrepreneurial Intentionality	(d) Entrepreneurial Passion
Type	Trait	Self-Efficacy	Intentionality	Passion
Source of measure used	Caird, (1991), DUBS, (1988)	Zhao et al., (2005)	Linan and Chen, (2009)	Murnieks et al., (2012)
No of items	54	5	6	7
Type	Dichotomous	Likert	Likert	Likert
Reliability	KR20 = 0.774	CA = 0.800	CA = 0.955	CA = 0.905
Convergent validity	Positive significant relationship between (b) & (c)	Positive significant relationship between (a) & (c)	Positive significant relationship between (a) & (b)	Not tested
Criterion related validity		Differentiated between males and females	Differentiated between males and females	
Factor analysis	No convergence for multiple CFA models	1 factor model	1 factor model	2 factor model

The findings of this study indicate that the measures used to test the students entrepreneurial self-efficacy and entrepreneurial intentions were successful in meeting all empirical analyses of reliability and internal structure, and are viable options for entrepreneurship education research of this nature. The measure used to examine entrepreneurial passion was also successful using these criteria, and moreover gave us an interesting insight about the passions of the students surveyed. These particular findings indicated that both males and females had similar results in terms of their passions to start a new venture, so much so that it was not a criterion that differentiated them. The measure chosen to examine enterprising tendencies, the General Enterprise Tendency test displayed worrisome results in terms of its validity and its factor structure in the context to which it was used. Though convergent with the other scales, the test did not meet the required criteria in terms of reliability, internal consistency or factor structure and would not be recommended for similar studies without significant revision. Though the constructs analysed herein are contextually based and therefore should be inspected for suitability before any large scale empirical examination, it would seem that a sample of students taking entrepreneurship education are an appropriate fit for three of the four constructs used.

CONCLUSION

As the number of graduate level jobs is reduced during the economic downturn, the onus is on entrepreneurs, government bodies and educators to contribute toward reenergizing economic

activity (Rae, 2010). Institutes of higher education are asked to support the development and supply of entrepreneurial talent to the economy (Carey & Matlay, 2011; O'Connor et al., 2012). The belief is that entrepreneurship education can be used to support this aim in a cost-efficient manner (Matlay, 2006b). However, the challenge is to prove that entrepreneurship education programmes work in tangible terms. If the benefit of these programmes cannot be seen definitively, then what is the point of further investment by HEI's? The running of an EEP can be time and cost-intensive for educators and institutions, in attaining industry guest speakers and novel pedagogical interventions. In order for these types of courses to be sustained, stakeholders need to be certain of the advantage, necessitating that the assessment of such courses is measurable, comparable and valid (O'Connor et al 2012). Empirical research in entrepreneurship itself has been criticised in the past due to measurement tools being limited in structure, impact and convergence (Duval-Couetil et al., 2010; Souitaris et al., 2007). This problem has also been seen in the entrepreneurship education literature (B. Jones & Iredale, 2010). Scholars have noted the need to consolidate findings with regard to the teaching and assessment of the subject in order to secure its maturation, and this has been seen through the work of Fayolle, Matlay and other notable authors.

In an attempt to explore some individual level assessments of entrepreneurship education, this research paper sought to review a number of existing and emergent theories in the field and compare some of their respective measures. It is hoped that through the research findings, academics and practitioners can select the theories that best suit their research agenda, and use existing research instruments or measures if justified.

LIMITATIONS

Selection of theories

It is acknowledged that there are many more theories and instruments deployed in this area that can help the field of entrepreneurship education. In particular, behavioural theory was not emphasised, yet it is acknowledged that much knowledge can be sought by examining entrepreneurial learning behaviour and other related constructs. Much work has been spent on the behaviours common to entrepreneurs and instruments such as the *entrepreneurial behaviour inventory (EBT)* which may have useful applications in entrepreneurship education and should be investigated in the future. In addition there are many more elements of learning theory that can be investigated with instruments as the perceived learning scale by Rovai et al. (2009).

Selection of measures

The measures for analysis were selected as they were intended for entrepreneurship research and have been applied to entrepreneurship education. The measures are not reflective of their respective theory as a whole and should not be viewed as such. In particular, the selection of the GET test to examine the personal characteristics of the enterprising student was due to its use in the entrepreneurship education literature, and the problems highlighted with the research

instrument itself should not and does not discredit trait theory. This research accepts that there are other similar trait or personality measures that could have been selected such as the E-scan test (Driessen & Zwart, 1999) which could have had differing results.

Recent studies have used measures which integrate theories together in very promising ways. For example Wilson et al. (2007) examines the relationships between ESE, EI and gender in their investigation and while a notable contribution was made, the authors constructed their own measures. The point being made in this paper is that if researchers constantly devise new measurement instruments, rather than selecting the most valid from prior work, there will never be an astute research consensus (Shook et al., 2003).

Mixing of constructs

Many studies have incorporated more than one type of measurement during the study of entrepreneurship finding interesting results that deepen our understanding. Linked theoretically by Boyd and Vozikis (1994) in the past, entrepreneurial self-efficacy has been found to have a strong link with intentionality (Chen et al., 1998; Krueger & Brazeal, 1994; F. Wilson et al., 2007; H. Zhao, Seibert, & Hills, 2005b). In addition, recent work has begun to integrate that of trait theory to both of these constructs, empirically and theoretically (Sanchez 2013). It has been suggested that wider, multi-level studies bringing trait theory together with cognitive and environmental factors may be the way forward, rather than keeping all theories fragmented (Zhao, 2005, Low and MacMillan 2001). Von Graevenitz et al. (2010) investigated self-efficacy, intentionality and performance in their study of entrepreneurship education students in Munich. Their investigations found that the sample group's intentionality was actually reduced. The authors were able to explain their rather interesting results by integrating their array of measurement data, and postulated that while the course had a significant positive effect on student self-efficacy and skills; it allowed them to make more informed decisions about a future career, in which many decided that entrepreneurship was not preferable for them. In this study, it was the integration of various tools and theoretical constructs that gave the researcher a clearer picture of the efficacy of entrepreneurship education. This study does not dispute the merits of intertwining various constructs to form a clearer picture, however this lies outside the research agenda presented here which was to present parallel findings from the various measures associated with entrepreneurship education for comparison.

Empirical limitations

The sample group were largely homogenous as the majority were Irish students and all were taking a common entrepreneurship education module. The study also acknowledges the possible presence of self-reporting bias (Azjen 1988). While efforts were made to use the measures in parallel, entrepreneurial passion was surveyed separately which makes its comparability less linear.

FURTHER WORK

Both self-efficacy theory and intentionality are now considered to be strong predictors of entrepreneurial behaviour and this is supported in the study outlined within. In particular, the results of the study strengthen the usefulness of emphasising entrepreneurial self-efficacy in entrepreneurship education. The construct relates to the self-belief an individual has about their capacity to succeed in creating a new venture (Drnovšek et al., 2010; F. Wilson et al., 2007). In the delivery of entrepreneurship education therefore, prominence must be given to developing student mastery experiences, social persuasion and vicarious experiences in relation to new venture creation so they increase their perceived capabilities (Goddard, Hoy, & Hoy, 2004; Stumpf, Dunbar, & Mullen, 1991). Such experiences can be acquired from guest speakers who act as role models, teamwork and feedback measures (Maritz & Brown, 2013; F. Wilson et al., 2007).

Examining entrepreneurship education literature of late, it would seem that each of the theories described in this paper are making significant advances which will affect the knowledge and practice of the subject. While there is a growing consensus that ESE, entrepreneurial passion and entrepreneurial intentionality are linked, it appears that personality factors and traits seem to be less emphasised, and there are few attempts to connect them with other constructs. A notable exception by Sanchez (2013) combines observations using ESE, intentionality, traits and competencies such as proactiveness on a student sample. Work like this adds depth to our knowledge of the enterprising mind-set and subsequent intentions, and should be considered more specifically the field of entrepreneurship education. It is hoped that strengthening the instruments in use, and orienting them to be context-specific; the field will gain more legitimacy in terms of its empirical data for these new studies.

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