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Predicting Entrepreneurial Intention across the University

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Abstract

Purpose

This research is designed to quantify the relative importance of four key entrepreneurial characteristics identified in the literature (proactiveness, attitude to risk, innovativeness, and self-efficacy) in predicting students' entrepreneurial intention (EI) across a range of faculties offering different subjects at a UK higher education institution (HEI). This approach will help to identify whether there are variations across the faculties in the predictors of EI. This enables recommendations to be made with regard to the development of educational delivery and support to encourage and develop the specific predictors of EI within the different subject areas.

Design/methodology/approach

This research uses a 40 item questionnaire to obtain information on students' demographics, entrepreneurial characteristics and EI, based on 5 point likert type scales. Principle component analysis, correlation analysis and multiple hierarchical regression analysis are used to analyse the data from 1185 students to develop models which predict EI for each of the six faculties.

Findings

Individual models which predict EI are developed for each of the six faculties showing variations in the makeup of the predictors across faculties in the HEI. Attitude to risk was the strongest predictor in five of the six faculties and the second strongest predictor in the sixth. The differences, together with the implications, for educational approaches and pedagogy are considered.

Originality/value

This research breaks down the level of analysis of EI to the individual faculty level in order to investigate whether different entrepreneurial characteristics predict EI in different academic disciplines across a UK HEI. This enables entrepreneurship educational approaches to be considered at a faculty level rather than a one size fits all approach.

Keywords

Entrepreneurial intention; Entrepreneurship education; Enterprise education; Entrepreneurial characteristics; Entrepreneurial orientation.

Introduction

The importance of the role of entrepreneurship in helping to achieve economic development, competitiveness, job creation and national prosperity has led to a marked global interest into the development of both business and entrepreneurship education, in the hope that that this will lead to an increase in social, economic and organizational development (Martinez et al., 2010; Singer et al., 2015). The creation of new enterprises is regarded as essential for the development of national economies (Fayolle et al., 2016). It is now generally accepted that entrepreneurship, or at least certain facets of it, can be taught and learned and that it is not restricted to those who are born with certain skills, attributes or characteristics (Harris and Gibson, 2008; Kuratko, 2005). Education can thus play a critical role in the development of enterprising graduates by identifying and generating aptitudes or by helping to promote entrepreneurial behaviours and intent (Ferreira and Trusko, 2018). This has led to an exponential increase in both the number and status of entrepreneurship education programs in HEIs worldwide (Fayolle, 2013; Neck and Greene, 2011). In the past, entrepreneurship courses have primarily been found in business schools within HEIs (Collins et al., 2006), often taught alongside traditional business disciplines. The scope of entrepreneurship education has widened more recently, from traditionally a business school topic, to include other departments and faculties (Karlsson and Moberg, 2013).

The study of entrepreneurial intention (EI) is a rapidly evolving field of research (Linan and Fayolle, 2015). It has become a consolidated area of research within the entrepreneurship discipline dating back to the 1990's which, despite much research, still requires further research to advance understanding (Fayolle and Linan, 2014).

However, research into EI has often been conducted in business schools using business students or undefined populations (Maresch et al., 2016) in one or multiple settings, in one academic discipline (e.g. González-Serrano et al., 2018) or by aggregating students from several academic disciplines into one sample (e.g. Koe, 2016). The widening focus of entrepreneurship education from traditionally a business school topic to other fields of education (Kuratko, 2005; Karlsson and Moberg, 2013) necessitates an understanding of what characteristics drive EI in the different faculties. The aim of this research is to break down the

level of analysis to individual faculties in order to investigate whether different entrepreneurial characteristics predict EI in different academic disciplines across a UK HEI.

The concept of entrepreneurial orientation (EO) (Covin and Slevin, 1989) based on risk propensity, innovation, and proactiveness has been extensively researched and has often been associated with superior firm performance (Rauch et al., 2009). Other researchers have included other variables such as competitive aggressiveness and autonomy (Lumpkin and Dess, 1996), although these variables have exhibited less promise. More recently, the EO firm level constructs have been extended to use at an individual level as a measure of individual entrepreneurial orientation or tendencies (Bolton and Lane, 2012). Research has confirmed the relationship or correlation between individual EO and EI (Bolton and Lane, 2012), opening up new fields of research including the study of the impact of entrepreneurship education on student EO and the impact that it has on EI (Robinson and Stubberud, 2014). This research will adopt these three EO variables, together with the self-efficacy construct (a key cognitive antecedent of EI and entrepreneurial behaviour), to investigate the role of these four variables in the development in EI. Self-efficacy has been highlighted widely as an important factor in the shaping of EI (Solesvik, 2017; Tsai et al., 2016; Piperopoulos and Dimov, 2015) and will provide further insights in this research.

This HEI wide research thus seeks to contribute to the literature by addressing the issue of a lack of research in less researched faculties across the HEI and is designed to investigate the impact of four key entrepreneurial characteristics on EI across a range of faculties at a HEI, in order to establish if those predictors vary between faculties. Such information can help to inform educational delivery and support to make it more effective and in line with the needs and requirements of individual students in developing their entrepreneurial potential and individual goals.

This research does not seek to compare the relative entrepreneurial or EI levels of the different faculties; previous research has sought to explore this (e.g. Passoni and Glavam, 2018; Taatila and Down, 2012) but instead seeks to compare the relative abilities of the four well established and researched variables to predict EI in the individual faculties across the HEI.

This paper is organised as follows. The next section is the literature review which first considers the concept of entrepreneurial intent and its measurement and this is followed by a consideration of the entrepreneurial characteristics and the variables that are used in this research. Next, the development of the questionnaire measurement instrument scales and the data collection is discussed. The results and data analysis are then presented. This is followed by the discussion and then the conclusions of the research.

Literature Review

Entrepreneurial Intent and its Measurement

Entrepreneurship is a complex multi-stage process, one of which is the development of EI (Hisrich et al., 2013). The stronger an individual's intention to perform a given behaviour then the more likely it will be executed effectively (Maresch et al., 2016). EI can be considered as a reflection of the state of mind of an individual which prompts them towards taking up self-employment rather than being employed (Karimi et al., 2016).

Intention is the key in explaining human behaviour (Sheeran, 2002) and research suggests that EI is an important precursor, or critical step, to becoming an entrepreneur (Zhao et al., 2010), so developing those behaviours that predict an increase in EI should encourage students to take that step. The intention of carrying out a specific behaviour will depend on the individual's attitudes towards that behaviour (Ajzen, 1991). Ajzen's Theory of Planned Behaviour (1991) proposes three motivational factors that influence behaviour; behavioural control (perception of difficulty in the realisation of the behaviour); the attitude in relation to the behaviour (a positive or negative evaluation or attitude towards the behaviour); and the perception of societal norms (social pressures towards the behaviour). This can be considered in EI terms as perceived entrepreneurial effectiveness: personal preference or attractiveness of the idea: and perceived social norms (Linan, 2004). Thus having a favourable attitude, in terms of these factors, towards an act will eventually make the intention appear more feasible. Self-efficacy is related to an individual's optimistic perception of their competences to start and run a business (Solesvik, 2017). Since these attitudes can change over time, then EI can change as perceptions change or are modified through, for example, education and experience. Research suggests that education should include active learning by doing, experiential pedagogies to develop competences and confidence (Henry and Treanor, 2012).

EI has often been studied against the entrepreneurial nature or characteristics of individuals on the basis that those with certain entrepreneurial characteristics will be more likely to start their own entrepreneurial ventures. The results of student cohort research into the correlation of entrepreneurial characteristics with EI are mixed (Bolton and Lane, 2012). This, in part, may be due to factors such as the different propensities of different international participants to become entrepreneurs (Levenburg and Schwarz, 2008; Gürol and Atsan, 2006) and factors such as previous experiences with entrepreneurial firms (Harris and Gibson, 2008). However, Bolton and Lane (2012) found correlations between the entrepreneurial intent of students and their individual entrepreneurial orientations (IEOs) based on proactiveness, innovativeness and attitude to risk, which have previously been positively correlated with entrepreneurial performance at firm level in the past (Covin and Slevin, 1989; Lumpkin and Dess, 1996).

EI is often measured by the use of one or more questions relating to the future intent, plans, aspirations, desire, or perceived likelihood that individuals will work independently or start a new venture (e.g. Levenburg and Schwarz, 2008; Packham et al., 2010) and are usually measured through the use of Likert style measurement scales.

Entrepreneurial Characteristics

Research into entrepreneurship has often focused on the differences in personality characteristics between successful entrepreneurs and non-entrepreneurs (Armstrong and Hird, 2009). These include characteristics such as attitude to risk, innovativeness, proactiveness, a need for achievement, an internal locus of control, and self- efficacy. As a result many different approaches and models have been adopted to measure the relative entrepreneurial nature of individuals and/or organizations. These have included, for example, approaches such as Entrepreneurial Attitude Orientation (EAO) (Robinson et al., 1991), Entrepreneurial Orientation (EO) (Covin and Slevin, 1989; Lumpkin and Dess, 1996), and Individual Entrepreneurial Orientation (IEO) (Bolton and Lane, 2012).

The so-called EO of an organization has emerged as a major construct within the strategic management and entrepreneurship literature over the last 20 years (Tang et al., 2008). Based on Miller's (1983) conceptualization, Covin and Slevin (1989) adopted an approach based on three dimensions, namely, the proactiveness, innovativeness, and attitude to risk of an

enterprise to measure the EO of the enterprise. More recently this approach has been adopted to measure the EO of individuals, on the basis that the EO of an enterprise is in fact based on the behaviours of entrepreneurial individuals (Lumpkin and Dess, 1996; Miller, 1983). The development of EO as an individual level construct, based on the measurement of combinations of individual characteristic dimensions, to investigate the entrepreneurial behaviour/tendencies/characteristics of individuals (Bolton and Lane, 2012; Koe, 2016; Taatila and Down, 2012) has gained support in recent years (Robinson and Stubberud, 2014) and has led to the opening up of new areas of research.

This research will focus on four characteristics, namely, innovativeness, proactiveness, attitude to risk, and self-efficacy, in order to quantify the relationship between these four identified entrepreneurial characteristics of individual students and their EI, across a range of academic faculties. In short, this approach will enable this research to investigate the relative importance of the four entrepreneurial characteristics in predicting students' EI across a range of different faculties at a UK HEI.

The four dimensions are briefly described below.

Preference for Innovation

Innovation is a constant theme within entrepreneurship literature (Lumpkin and Dess, 1996) and innovation often involves creation or creative destruction (Schumpeter, 1942). It is reflected in the tendency to engage in and support new ideas, new approaches, experimentation, and new processes that may result in new products, services or technical processes. It has been proposed that entrepreneurs need a preference for innovation to explore new venture opportunities (Nasip et al., 2017).

Attitude to Risk

The attitude to risk has been extensively researched in an attempt to discover why successful entrepreneurs are able to perceive and act upon opportunities that others either do not see or do not act upon (Palich and Bagby, 1995). It has long been associated with entrepreneurship (Covin and Slevin, 1989; Miller, 1983), although evidence has been mixed and does not always provide conclusive evidence for the claim (Macko and Tyszka, 2009). Some researchers believe that risk is inherent in the definition of entrepreneurship since the process of starting a new venture always carries a risk (Aldrich and Martinez, 2007). However,

entrepreneurship does not involve reckless risks but a reasonable awareness of associated risks and an attempt to manage those risks (Davis et al., 1991).

Proactiveness

Proactiveness can be considered to be the opposite of reactivity and can be reflected in implementation and on making things happen, by using whatever means necessary. In contrast to passive behaviour, proactiveness is deliberate, active, change, and future orientated (Belschak et al., 2010). It implies a 'hands on' management style or approach in order to overcome any barriers or obstacles (Davis et al., 1991). It is reflected in the ability to engage in opportunistic expansion by seizing opportunities in the process of new market entry (Lumpkin and Dess, 1996). It has been linked with career success (Seibert et al., 2001) and as an employability asset (Bell, 2016; Tymon and Batistic, 2016)

Self-efficacy

Self-efficacy is a belief in one's ability to successfully complete a task or attain a desired goal and as such is a useful construct with which to predict an entrepreneur's behavioural choice, persistence and effectiveness (Chen et al., 1998). Self-efficacy is thus a key cognitive antecedent of EI and entrepreneurial behaviour (Laviolette et al., 2012). Entrepreneurial self-efficacy has been widely researched as one of the personality behaviours that motivates entrepreneurial behaviour (Chen et al., 1998; De Pillis and Reardon, 2007), and enables entrepreneurs to successfully undertake the entrepreneurship process including the recognition of opportunities, the management of resources and the challenges of the management of the entrepreneurship process itself (Kumar, 2007). Research suggests that entrepreneurial self-efficacy is a prerequisite for the start-up of new ventures (Karlsson and Moberg, 2013) and since research suggests that the intent to become an entrepreneur is correlated with becoming an entrepreneur (Zhao et al., 2010), self-efficacy has provided a focus for research into the EO of students and the role of HEI education.

Questionnaire Development & Data Collection

This research uses a 40 item questionnaire to obtain information on students' demographics, entrepreneurial characteristics and EI, based on 5 point likert type scales. In order to assess

the students' entrepreneurial characteristics this research adopted the previously validated ten item measurement instrument developed by Bolton and Lane (2012) based on the three individual entrepreneurial orientation (IEO) variables (innovation, proactiveness and attitude to risk). In addition to these three entrepreneurial characteristics, this research also considered self-efficacy as an entrepreneurial dimension, as self-efficacy has also previously been found to be an important predictor of EI (Pruett et al., 2009). The questions used to measure self-efficacy were based on those validated by Florin et al. (2007) and were chosen as they were specifically developed to measure self-efficacy in university level students. In order to further strengthen this research, equivalent reverse worded questions were mixed into the questionnaire in order to minimise answering inertia, reduce boredom and to control for acquiescent response sets (Schriesheim and Hill, 1981). Although this increased the number of questions in the instrument, this further ensures the robustness of the measurement. EI was measured by two questions based on those used by Levenburg and Schwartz (2008) and adopted by Bolton and Lane (2012). The respondent's gender, current level of study, and whether they had previous work experience was collected so that this data could be controlled for in the regression analysis. These variables have been identified within the literature as having an impact on EI (Tsai et al., 2016).

As the research is interested in exploring the link between the individual's entrepreneurial characteristics and their EI, both sets of measures needed to be collected from the same source, the individual. This meant that it was not possible to obtain the measures from different sources, as they are personal measures. This can potentially lead to common method variance (CMV) where systematic variance is shared amongst the variables collected, which is variation introduced by the measurement method rather than the constructs the measures represent (Jakobsen & Jensen, 2015). In order to reduce the potential for CMV three procedural remedies were included within the questionnaire. These included proximal separation between the questions relating to each variable, a clear statement explaining there were no right or wrong answers to reduce social desirability, and the inclusion of negative questions to provide balanced positive and negative questions (Podsakoff et al., 2012). In addition to the procedural remedies put in place to reduce CMV, the presence of CMV within the dataset was tested for within the data analysis stage.

A link inviting students to complete an online survey was emailed to students studying within six different faculties (Business, Creative Arts, Health and Society, Sport and Exercise, Education, and the Science and Environment faculties) at a UK HEI. The invitation was completed by 1185 respondents, giving a response rate of 13.9%. A breakdown of the respondents' demographics are presented in table 1.

Table 1 Demographics

Faculty	Male Respondents	Female Respondents	Total Respondents
Faculty of Education	10	171	181
Faculty of Health and Society	46	193	239
Faculty of Creative Arts	78	183	261
Faculty of Science and the Environment	60	88	148
Faculty of Sports and Exercise Science	89	41	130
Faculty of Business	101	125	226
Total	384	801	1185

Data Analysis & Results

Data Screening

Prior to subjecting the data to principle component analysis (PCA), the Kaiser-Meyer-Olkin (KMO) test was conducted to determine whether the data was suitable for PCA. The KMO value was 0.79, which is above the recommended minimum value of 0.6 (Kaiser, 1974) and Bartlett's test of sphericity reached statistical significance (Bartlett, 1954). To check if a problematic level of common method variance existed within the data Harman's One-Factor Test was conducted. This test indicated that one factor accounted for 18.9% of the variance, this is below the 50% level which has been suggested to indicate a potentially problematic level of CMV (Podsakoff and Organ, 1986).

Principle Component Analysis

The data collected from the 26 entrepreneurial characteristics scale questions was then subjected to principle component analysis and scale purification, and item reduction was

undertaken based on the removal of items demonstrating factor loadings below .4, producing four distinct factors (shown in table 2 and table 3). Two of the questions did not exhibit factor loadings of a minimum of .4 so were removed to support a clean factor structure. These items were 'I often like to try new and unusual activities that are not typical' and 'I believe that the respect that others have for me is due to my knowledge and success'. The total variance explained by the 4 factors was 43.75% (see table 2). The Cronbach Alpha scores contained in Table 3 indicate that the internal consistency for all five factors is acceptable. The results from the principle component analysis helped to demonstrate construct validity and validate the use of reverse worded questions to minimize answering inertia and ensure control for acquiescent response sets (Schriesheim and Hill, 1981). Anderson-Rubin factor scores were computed for each of the four factors; this method was chosen as it has the advantage of producing uncorrelated factor scores (Tabachnick and Fidell, 2007). This ensured that the variance inflation factor (VIF) was 1, the mean score was 0 and the standard deviation 1 for each factor (DiStefano et al., 2009).

Table 2 Total Variance Explained in Principle Component Analysis of Scale Items

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.554	18.976	18.976	4.554	18.976	18.976
2	2.512	10.467	29.443	2.512	10.467	29.443
3	1.814	7.559	37.002	1.814	7.559	37.002
4	1.620	6.749	43.751	1.620	6.749	43.751

Extraction method: Principle component

Table 3 Rotated Factor Matrix

Dimensions	Item Description	Factor			
		1	2	3	4
Preference for Innovation $\alpha=.740$	I prefer focusing on well-known techniques and routines when learning new things*	.758			
	I like to engage in established practices and approaches when trying to solve problems*	.714			
	I prefer to engage in tried and trusted activities and practices rather than new and untested activities and practices*	.599			
	I favour experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems	.586			
	I prefer to try my own unique way when learning new things rather than doing it like everyone else does	.581			
	In general, I prefer a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before	.485			
	I know what activities I enjoy doing and I prefer to stick with them rather than trying new activities*	.424			
Attitude to Risk $\alpha=.742$	I like to take bold action by venturing into the unknown		.712		
	I tend to act “boldly” in situations where risk is involved		.684		
	I prefer to engage in low risk activities rather than risky ones*		.658		
	I prefer to tread cautiously in risky situations*		.644		
	I am willing to invest a lot of time and/or money on something that might yield a high return		.567		
	I prefer to adopt a cautious approach towards the investment of time and money*		.512		
Self-Efficacy $\alpha=.723$	I feel very self-conscious when making presentations*			.816	
	I am confident and comfortable when making presentations			.722	
	I feel self-conscious when I am with very successful people*			.625	
	I often struggle to perform to the same level of other team members*			.616	
	I usually perform very well on my part of any project I am involved with			.517	

Proactiveness	I prefer to “step-up” and get things going on projects rather than sit and wait for someone else to do it	.700
$\alpha=.675$	I tend to plan ahead on projects	.696
	I usually act in anticipation of future problems, needs or changes	.663
	I wait to see how a situation develops and prefer to wait and see before making changes*	.542
	I prefer to sit back and listen to other people’s views before decisions are made about starting a new project*	.494
	I prefer to make decisions immediately before they are required*	.419

Extraction method: Principle component analysis. Rotation method: Varimax with Kaiser normalization

* Items in these sections are reversed score

Correlation Analysis

In order to further validate and confirm the usability of the refined entrepreneurial attitude measurement instrument and its component sub-dimensions, the sub-dimensions were correlated with the EI measurement. Based on previous research such as Bolton and Lane (2012) it would be expected that a correlation would exist between the entrepreneurial characteristics adopted and EI. A partial correlation was undertaken, whilst controlling for the effect of whether the students were within the Business Faculty or a non-business faculty. The results from the correlation analysis are presented in table 4. The correlation analysis demonstrates the existence of statistically significant correlations between all of the entrepreneurial characteristic variables and EI. This demonstrates concurrent validity in line with the findings of other research and supports the external validity of the measures.

Table 4 Correlations between the Entrepreneurial Behaviours and Entrepreneurial Intent

	Preference for Innovation	Attitude to Risk	Proactiveness	Self-Efficacy
Entrepreneurial Intent	.195*	.350*	.199*	.107*

* Correlation is significant at the .01 level (2 tailed)

Regression Analysis

The final stage of the analysis involved conducting a multiple hierarchal regression for students studying in each faculty, using the entrepreneurial characteristics as the independent variables and the EI variable as the dependent variable, to create a model predicting EI for each faculty. The respondent's gender, year of study and work experience were controlled to reduce the possibility of alternative explanations, through developing a baseline model for each faculty (model 1). Only 2 of the baseline models were statistically significantly able to predict an increase in EI. However, in both cases the models were only able to explain a relatively small percentage of the variance in EI, 4.3% in the Business Faculty and 3.3% in the Creative Arts Faculty. Building on this baseline model, the entrepreneurial characteristics were added within model 2 for each faculty. A statistically significant model was developed for each faculty by adding the entrepreneurial characteristic variables; however, the models contained a range of different combinations of the entrepreneurial characteristic variables which statistically significantly predicted EI. The ability of the models

developed from the entrepreneurial characteristic variables to explain the variance in the EI of students ranged from 26.2% in the Business Faculty to 17.9% in the Science and Environment Faculty. The ability of the four entrepreneurial characteristic variables to explain the variance in the EI of students is relatively high given that a wide range of demographic and economic factors have also been found to impact on EI (Arenius and Minniti, 2005). The hierarchal regression models for each faculty are presented in tables 5.

Table 5 Multiple Hierarchical Regression Models for Departments

Dependent Variable:	Business Faculty	Business Faculty	Creative Arts Faculty	Creative Arts Faculty	Health & Society Faculty	Health & Society Faculty
Entrepreneurial Intent	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Control Variables						
Gender	-.175**	-.090	-.078	-.036	-.127	-.090
Year of Study	-.099	-.131*	-.113	-.081	-.093	-.117*
Work Experience	-.097	.033	-.141*	-.042	-.086	-.033
Independent Variables						
Preference for Innovation		.192**		.316**		.168**
Attitude to Risk		.342**		.348**		.294**
Proactiveness		.172**		.157**		.324**
Self-Efficacy		.318**		.121*		.054
R ²	.043	.305	.033	.271	.030	.253
Adjusted R ²	.030	.282	.022	.251	.018	.231
R ² Change		.262		.238		.223
F Value	3.328*	13.651**	2.908*	13.426**	2.448	11.193**
F Value Change		20.516**		20.648**		17.245**

Notes: Standardised regression coefficients (β) are displayed in the table for the control and independent variables. * $p < 0.05$, ** $p < 0.01$

Dependent Variable: Entrepreneurial Intent	Sport & Exercise Faculty	Sport & Exercise Faculty	Education Faculty	Education Faculty	Science & Environment Faculty	Science & Environment Faculty
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Control Variables						
Gender	-.112	-.181*	.106	.141*	-.005	-.064
Year of Study	-.061	-.062	.036	.024	-.053	-.022
Work Experience	-.117	-.053	.066	.073	-.057	.040
Independent Variables						
Preference for Innovation		-.070		.185**		.238**
Attitude to Risk		.365**		.339**		.246**
Proactiveness		.252**		.105		.183*
Self-Efficacy		-.128		.198**		.080
R ²	.029	.259	.018	.207	.004	.183
Adjusted R ²	.006	.216	.002	.175	-.016	.143
R ² Change		.230		.189		.179
F Value	1.242	6.081**	1.098	6.454**	.212	4.491**
F Value Change		9.459**		10.298**		7.671**

Notes: Standardised regression coefficients (β) are displayed in the table for the control and independent variables. * $p < 0.05$, ** $p < 0.01$

For the Business Faculty the second model (containing the entrepreneurial characteristics) explained an additional 26.2% of the variance of EI, beyond the control variables (R² change between model 1 & 2). An increase in all four of the entrepreneurial characteristic variables were able to statistically predict an increase in EI. Attitude to risk followed by self-efficacy was found to have the biggest impact on EI.

The second model developed for the Creative Arts Faculty was able to explain an additional 23.8% of the variance in students' EI. In common with the Business Faculty an increase in all four of the entrepreneurial characteristics statistically predicted an increase in EI and again the attitude to risk was found to have the biggest impact on EI. However, the preference for innovation had the second biggest impact on students' EI, whilst self-efficacy had the smallest impact.

The second model developed for the Health and Society Faculty was able to explain an additional 22.3% of the variance in students' EI, beyond the baseline control variable model.

Within the model developed, an increase in three of the entrepreneurial characteristics statistically predicted an increase in EI. Proactiveness had the biggest impact on students' EI, followed by attitude to risk and preference for innovation.

The second model developed for the Sport and Exercise Faculty was able to explain an additional 23.0% of the variance in students' EI. Within the model developed, an increase in two of the entrepreneurial characteristics statistically predicted an increase in EI. Attitude to risk had the biggest impact on students' EI, followed by proactiveness.

The second model developed for the Education Faculty was able to explain an additional 18.9% of the variance in student's EI. Within the model developed, an increase in three of the entrepreneurial characteristics statistically predicted an increase in EI. Attitude to risk had the biggest impact on students' EI, followed by self-efficacy and then preference for innovation.

The second model developed for the Science and the Environment Faculty was able to explain the lowest of the additional variance in students' EI (17.9%). The model developed contained three entrepreneurial characteristics, which in order were attitude to risk, preference for innovation and proactiveness.

Discussion

This research was designed to quantify the relative importance of four entrepreneurial characteristics identified in the literature (proactiveness, attitude to risk, innovativeness, and self-efficacy), in predicting students' EI across a range of faculties offering different subjects at a UK HEI. A summary of the results is shown in table 6.

Table 6 Summary of Significant Entrepreneurial Characteristic Predictors of Entrepreneurial Intention by Department

Entrepreneurial Characteristics	Beta (β)	t	Sig
Business Faculty			
Attitude to Risk	.342	5.948	.000
Self-Efficacy	.318	5.086	.000
Preference for Innovation	.192	3.298	.001
Proactiveness	.172	3.025	.003
Creative Arts Faculty			
Attitude to Risk	.348	6.249	.000
Preference for Innovation	.316	5.839	.000
Proactiveness	.157	2.834	.005
Self-Efficacy	.121	2.184	.030
Health & Society Faculty			
Proactiveness	.324	5.584	.000
Attitude to Risk	.294	4.930	.000
Preference for Innovation	.168	2.934	.004
Sport & Exercise Faculty			
Attitude to Risk	.365	4.644	.000
Proactiveness	.252	3.097	.002
Education Faculty			
Attitude to Risk	.339	4.884	.000
Self-Efficacy	.198	2.778	.006
Preference for Innovation	.185	2.677	.008
Science & Environment Faculty			
Attitude to Risk	.246	3.051	.003
Preference for Innovation	.238	2.963	.004
Proactiveness	.183	2.205	.029

The ability of the four entrepreneurial characteristics to explain up to 26.2% of EI (Business Faculty) provided strong evidence of the role that these entrepreneurial characteristics have in supporting EI. However, the difference in the makeup and success of the individual models for each faculty in predicting EI, highlights the differences that exist between students in different faculties.

The attitude to risk was the only entrepreneurial characteristic which appeared in all of the models predicting EI. Furthermore, it was the greatest contributor to EI in five of the six faculties and the second largest in the sixth (Health and Society Faculty). This highlights the importance that developing a positive attitude to risk plays in supporting the development of EI. The attitude to risk has often been associated with entrepreneurs (Levenburg and Schwarz,

2008) and has been regarded by some as inherent in the definition of entrepreneurship since starting a venture is inherently risky (Aldrich and Martinez, 2007).

Attitude to risk has been widely studied, both at the business level (Rauch et al., 2009), and at the individual level (Taatila and Down, 2012; Koe, 2016). Zhao et al. (2005) concluded that risk propensity was positively associated with students' EI and was a particularly significant influence early on at the early prelaunch stage of entrepreneurship, which might reflect why attitude to risk is such a major predictor across the faculties in this research.

Attitude to risk is the biggest predictor of the variables tested in the Business, Science and the Environment, Creative Arts, Sport and Exercise, and Education faculties and the second biggest predictor in the Health and Society Faculty. This result does, however, suggest that more risk-averse students across all the six faculties may potentially be put off from entrepreneurship by a negative attitude to risk. However, since the attitude to risk can change over time, then EI can change as perceptions change or are modified through education and experience. Importantly, entrepreneurship does not necessarily have to involve reckless risks but a reasonable awareness of associated risks and an attempt to manage those risks (Davis et al., 1991). Recent research suggests, for example, that the practical experience of attempting to make a profit in a non-threatening and scaffolded competitive situation as part of an experiential learning project can have a positive impact on students' perception of risk and their ability to calculate it (Bell and Bell, 2018). This however, requires such experiential learning approaches to be available to all students across all faculties. Following a systematic review of the impact of entrepreneurship education, Nabi et al. (2017) highlight a range of entrepreneurship pedagogical approaches (e.g. supply, supply-demand, demand, and demand competence) and specific outcomes.

Preference for innovation was a predictor of EI in five of the six models and was the second largest predictor in the Creative Arts Faculty and the Science and Environment Faculty. It was the third predictor in the Business, Health and Society, and Education Faculties. It was not a statistically significant predictor for EI in the Sport and Exercise Science Faculty. "Entrepreneurship is a dynamic process of vision, change and creation" (Kuratko and Hodgetts, 2004 p. 30) and innovation is reflected in the tendency to engage in new ideas, experimentation and new processes that may result in new approaches, new products or new services. It is perhaps not surprising that this particular entrepreneurial characteristic is more important as a predictor in EI in faculties that perhaps have a more creative license. As a

result, innovation may play a greater role in the EI of students in these faculties and development of this characteristic will help to stimulate this. Competitive experiential learning formats can encourage students to devise innovative approaches to problems and new ways of thinking when faced with new challenges and limited resources (Bell, 2015).

Self-efficacy was only a statistically significant predictor in three of the models. It was, however, the second biggest predictor in the business school and education faculties, both after the attitude to risk variable. The self-efficacy predictor played a more subsidiary role in the Creative Arts (fourth predictor), where again the attitude to risk was the most dominant factor followed by innovativeness and proactiveness. The impact of self-efficacy on EI in this research is consistent with previous research that has found it to be a significant predictor (Zhao et al., 2010; Sesen, 2013). Zhao et al. (2005) opined that strengthening students' confidence by increasing their self-efficacious beliefs could positively impact their EI.

EI can be considered in terms of three motivational factors that influence attitude: Perceived entrepreneurial effectiveness; personal preference or attractiveness of the idea; and perceived social norms (Linan, 2004). Thus having a favourable or positive attitude towards one's entrepreneurial effectiveness will eventually make the intention appear more feasible. This can be achieved in numerous ways through experiential "hands on" learning which is becoming increasingly popular within business schools to supplement traditional teaching formats (Piercy, 2013). Such approaches can include interviewing entrepreneurs, composing business plans (Sherman et al., 2008), mentoring experiences, involvement in consulting in business initiatives and case studies (Chang et al., 2013). These can all help to develop individual self-efficacy which can help to encourage individual EI at an early stage.

Proactiveness was a predictor in five of the six models and was the most important predictor in the Health and Society Faculty, the second predictor in the Sport and Exercise Faculty, the third in the Creative Arts and Science and Environment Faculties, and the fourth in the Business Faculty. Different entrepreneurial characteristics are more important at different stages of an entrepreneurial venture (Styles and Genua, 2008) and this may suggest that this is an attitude that is less important as a driver of EI at the student stage but may perhaps be of more importance later in the early stages of launching a venture.

Conclusion

This research focused on four well researched characteristics, which could be developed, to determine their relative abilities to predict EI across six different faculties at a UK HEI. In short, this research sought to breakdown the level of analysis to individual faculties in order to investigate whether different entrepreneurial characteristics predict EI in different academic disciplines.

The first conclusion was that all of the four variables had some ability to predict EI in various combinations across some of the faculties. However, the results highlighted that there were different predictors of EI between the faculties. In two faculties all four variables played a part, in three faculties three variables, and in one faculty two variables. This is a significant finding and can help to advise future training and workshops to encourage EI and future entrepreneurship. Whilst training in entrepreneurship should be widely available across all faculties, this research suggests that some targeted experiential learning focused on specific characteristics might be particularly efficacious in increasing EI in particular faculties.

In the Business Faculty four variables were predictors of EI (26.2% variance), as was the case in the Creative Arts Faculty (23.8% variance). Similarly, three of the variables in this study (risk, proactiveness and innovation) were predictors of EI in the Health and Society Faculty (22.3% variance), the Education Faculty (risk, self-efficacy, and innovation) (18.9% variance), and in the Science and Environment Faculty (risk, innovation and proactiveness) (17.9% variance), and two variables were predictors in the Sport and Exercise Science Faculty (risk and proactiveness) (23% variance). This would suggest that entrepreneurship courses across faculties that focus on these four areas will help to develop these characteristics and also potentially increase EI in so doing.

In particular, attitude to risk was the biggest individual predictor across five of the six faculties and the second predictor in the sixth. The former included the Business, Creative Arts, Sport and Exercise, Education and the Science and Environment faculties. This research suggests that a positive attitude to risk is an important facet in the early development of EI.

Self-efficacy was the second biggest predictor in predicting EI in the Business and Education Faculties and fourth in the Creative Arts Faculty. Self-efficacy can be developed particularly through active experiential approaches which can help to bridge the gap between the education and the real business world (Nabi et al., 2017). Whilst entrepreneurship education

has traditionally been found in business schools, many researchers have called for it to be more widely available (Karlsson and Moberg, 2013; Kuratko, 2005). More recently, it has been available in other fields of education and in cross faculty/departmental events and training which can result in the cross fertilisation of ideas (Bell and Bell, 2016). Universities can provide entrepreneurship learning environments tailored to the needs of the students. This may involve widening the availability of courses tailored at developing specific entrepreneurial needs. Westhead and Solesvik (2016) suggested that gender specific entrepreneurship courses may be advantageous in some cases.

A well-developed university wide entrepreneurial ecosystem can lead to the development of students with an entrepreneurial mindset and the creation of graduates with EI (Isenberg, 2010). Researchers have called for the need to create conducive entrepreneurial ecosystems to complement entrepreneurship education (Olutuase et al., 2018). Miller and Acs (2017) describe a strong ecosystem as involving alumni, partners in industry and commerce, joint research projects and incubators, all of which can offer opportunities to provide encouragement, the practice of ideas, and the development of an entrepreneurial mindset and increased EI. Entrepreneurial ecosystems can help to provide business social support, which has been found to positively influence EI (Farooq et al., 2018).

In common with all research, this research has a number of limitations. Firstly, this research was carried out across six faculties in one UK HEI. Further research can be undertaken across a wider range of locations to test the generalisability of these findings. This is particularly appropriate as students from different cultural backgrounds and studying in different economic and business climates may perceive entrepreneurial opportunities differently. In addition, this research focused on four key variables highlighted in the literature and which had the potential to be encouraged and developed. Other variables which may be important could be tested in the future.

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