

Risk tolerance: A perspective on entrepreneurship education

A.J. Antonites & R. Wordsworth

ABSTRACT

The field of entrepreneurship in South Africa has certain unique although limiting characteristics, including an unconvincing enabling environment, a weak entrepreneurial culture and an emergent, and therefore limited, body of knowledge surrounding the topic of entrepreneurship. Consequently, entrepreneurship in South Africa does not hold a strong position in terms of entrepreneurial activity and, in fact, is generally approached with a degree of scepticism. At the same time, Maas & Herrington in the *Global Entrepreneurship Monitor* (GEM) (Maas & Herrington 2006: 12) indicate categorically that an increase in entrepreneurial activity is highly dependent on effective entrepreneurship education. This study confirmed the fact that education *per se* may increase the current Total Entrepreneurial Activity rate of 5.29% in South Africa, as compared with 14.8% in other developing countries.

An aspect of entrepreneurship that is currently not adequately addressed in entrepreneurship education and training literature is that of risk tolerance and risk-taking of the entrepreneur. Debate on whether entrepreneurs exhibit higher risk tolerance than other managers and full-time employed individuals is ongoing and raises the question of whether risk tolerance should be included in entrepreneurship curricula. This study seeks to elaborate on this debate.

Key words: entrepreneurship, entrepreneurial skills, entrepreneurship curricula, risk propensity, risk tolerance

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Introduction

This study finds its roots in the work of Antonites & Van Vuuren (2000, 2002), who concluded that the concepts of risk assessment/taking/management are represented in only 40% of entrepreneurship training programmes, as derived from an internationally representative sample. At the same time, a study by Nieuwenhuizen & Kroon (2002) found a strong relationship between willingness to take risks (risk tolerance) and the success of entrepreneurial businesses, further emphasising the importance of including risk in entrepreneurship training programmes.

The current failure rate of entrepreneurs in South Africa is approximately 70–80% (Olivier 2006). This alarming figure depicts, among others, a basic need for risk assessment and management interventions on an array of education and training levels.

Stumpf (in Leitch & Harrison 1999: 105) reviews the state of entrepreneurship education as follows:

Rigorous research is clearly needed to understand the target audiences for entrepreneurship education, their unique educational objectives and learning styles, and the types of content to be covered for each audience, and which specific pedagogical methods will most effectively meet their educational goals. Such research must look at both the proximal criteria of student interest and immediate feedback as well as the more distal criteria of actual behaviour over ten or more years ... the most difficult and costly research on entrepreneurship education will involve the examination of different program content and pedagogical methods used to accomplish educational objectives.

The content of entrepreneurship curricula pertaining to the inclusion of risk tolerance, assessment, decision-making and management variables seems to evade general and specific research in the field. The reason for this absence can possibly be explained by the fact that a convincing body of evidence has not yet been established to suggest that entrepreneurs exhibit a higher risk tolerance than other managers or even members of the public in general (Stewart & Roth 2001).

With regard to this ongoing debate, it would appear that there are two distinct positions. The first position is offered by researchers such as Stewart & Roth (2001), whose research suggests that entrepreneurs do indeed exhibit a higher risk tolerance than other managers. The second position is offered by researchers such as Miner and Raju (2004) and Xu and Reuf (2004), who suggest that entrepreneurs are not more risk tolerant, and in some instances even more risk avoidant, than other managers and full-time employed persons. Both of these positions are based on comprehensive meta-analyses of results from many smaller studies, and both sides defend their positions fervently.

Hisrich and Peters (2002) go even further to suggest that “no conclusive causal relationships” have empirically been determined regarding risk and the entrepreneur. These authors argue that the risk-taking propensity trait does not form an integral part of research on entrepreneurial characteristics.

Contrary to the latter, however, it is evident that contemporary entrepreneurship literature does indeed include risk-taking/tolerance as an entrepreneurial trait, although not based on any empirical foundation. This literature includes Baron and Shane (2004); Bolton and Thompson (2003); Deakins and Freel (2003); Kuratko and Hodgetts (2001); Megginson, Byrd and Megginson (2003); Wickham (2001) and various others who support the notion that risk-taking is an entrepreneurial trait, even if it has yet to be demonstrated as such through empirical study.

The divergent arguments of Miner and Raju (2004), Hisrich and Peters (2002), Stewart and Roth (2001) and Deamer and Earle (2004) highlight the need for clarity and empirical evidence regarding entrepreneurial risk tolerance. Miner and Raju eloquently state that in terms of this particular debate, “in the absence of a convincing body of evidence, the ‘I don’t know’ response becomes not only an acceptable answer but also a valued one”. They further state that the risk tolerance displayed by entrepreneurs remains, in their opinion an “open issue”.

Based on the findings of our research, this article seeks not to end the debate on this issue, but rather to add to the body of evidence that supports the position of Stewart and Roth (2001) that entrepreneurs do indeed exhibit high risk tolerance.

Entrepreneurial risk

Xu and Reuf (2004) state that in its simplest form, risk is a function of the variation in the distribution of possible outcomes, the associated outcome likelihoods and their subjective values. Casson (1990: 11) more specifically describes entrepreneurial risk as the result of insecurity that exists due to the fact that the success of market penetration can never really be determined beforehand. The correct prediction of the question by the entrepreneur would therefore be an indication of success in the form of a decrease in risk. Hence, risk can be described as the possibility of innovation having an unwanted result.

Zimmerer and Scarborough (1996: 48) regard risk as the conflict situation wherein the entrepreneur will find him/herself. All risk variables must therefore be studied in depth with regard to the potential resultant reward. The authors refer to the successful entrepreneur as one who capitalises on the constructive effect of the conflict situation that originates when a certain risk is taken. This includes a decrease

in the negative reaction that could develop from the accompanying exhaustion and frustration that results from continuous failure.

In their opportunity evaluation model, Zimmerer and Scarborough (1996: 51) describe the following risks that an entrepreneur may encounter:

- **Time risk:** This risk entails the time implication of taking a new idea through the product development phase until it could be considered right for the market.
- **Investment risk:** This includes the cost of the establishment of a new venture, in other words, does the entrepreneur have access to enough capital to enable the venture to survive to the point of being an entrepreneurial institute? Other costs are those related to the total product development process, as well as those concerned with the physical manufacturing of the total product that will, for instance, satisfy the qualitative description.
- **Technical risk:** All the technical aspects associated with the product development process are considered, and the final product has to satisfy the set technical quality standards.
- **Competitive risk:** The possibility exists that competitors could be offering the same or comparable products in the market, while the success rate of competitors in comparable markets is also an indication of risk. The financial strength and depth of a competitor should not be omitted, as a 'follower' strategy by the competitor could pose further risk. The existing market advantage of a competitor as well as its existing distribution system, selling power and established relationships within the market place must be researched.

The opportunity identification model of the authors categorised the different forms of risk within an entrepreneurial context. Venter, Urban and Rwigema (2008: 68) contribute to the categories of entrepreneurial risk by adding career risk, family and social risk, as well as psychological risks. Brockman, Becherer and Finch (2006: 113) empirically modulate the categories of perceived risk as a result of a direct relationship between likelihood, the degree/magnitude of the potential loss and the magnitude of the relative level of investment on perceived risk.

Risk tolerance (assumed risk)

It would appear from the literature that the terms 'risk tolerance' and 'risk-taking propensity' are used interchangeably in the entrepreneurial context, and hence can be viewed as one and the same in the context of this study. The concept of risk tolerance is described by Van de Venter (2006) as the amount of risk (financial or other) that an individual is willing to accept and thus take. This author goes on to

differentiate between subjective and objective measures of risk tolerance. As such, subjective risk tolerance is often expressed as an attitude towards risk and is simpler to measure than objective risk tolerance, which assesses the actual quantifiable risks taken. This study adopts the position of subjective risk tolerance as a measure of risk tolerance.

The measurement of risk tolerance in itself has enjoyed significant attention from academics and practitioners in recent times. The focus of much of this research has been directed at establishing valid risk-tolerance assessment methodologies and instruments (Cordell 2001; Grable & Lytton 1999, 2001, 2003; Roszkowski & Grable 2001; Van de Venter 2006; and others). While much of this research has taken place in the domain of finance and investment management, the findings and instruments developed can also be applied to other disciplines.

Janney and Dess (2006) challenge the conventional “calculated risk taking propensity and tolerance” of entrepreneurs by reconsidering the risk-taking construct. The authors argue that high risk-taking decisions are more evident in the new venture-creation process in particular and give an account of an investigation into the perceived differences in this regard. A suggestion for alternative measures that confine this concern is moreover explored, and a conclusion is reached with respect to three dimensions of the risk construct, namely: Risk as a variance; Risk as a downside loss and bankruptcy; and Risk as an opportunity. The authors furthermore describe the body of knowledge pertaining to the operationalisation of the concepts of risk drawn from the economics, finance, strategy and entrepreneurship literature in order support the constructs in an entrepreneurial context. Table 1 summarises their findings based on a secondary assessment.

In another empirical study, Simon, Houghton and Aquino (2000: 113) found that risk perceptions differ due to certain cognitive biases that drive entrepreneurs to perceive less risk. Three cognitive biases emerged as being significant: overconfidence (“failure to know the limits of one’s knowledge”), illusion of control (“overemphasizing the extent to which their skill can increase performance in situations where chance plays a large part and skill is not necessarily the deciding factor”) and the belief in the law of small numbers (“a limited number of informational inputs is used”). Palich and Bagby (1995: 426) researched the cognitive categorisation process of entrepreneurs pertaining to risk-taking. This study also challenges conventional wisdom by finding on a multivariate and univariate level that entrepreneurs do perceive risk differently from non-entrepreneurs and have the propensity to take significantly higher risks. Mullins and Forlani (2005: 48) criticise the general lack of empirical research on entrepreneurial risk-taking, risk propensity and risk tolerance, especially within the context of high risk-taking evidence. The

Table 1: A summary of the risk construct, and how it can be applied in entrepreneurs

Dimensions of the risk construct and areas of study for each	Operationalisation (representative studies), drawn from the economics, finance, strategy, and entrepreneurship literature
Risk as a variance	Variability of results (Bowman 1984)
Returns to new product/firm launches	Variance of ROE [return on equity] (Miller & Bromily 1990)
Returns to venture capital	Standard deviation of ROE around the mean ROE (Miller & Bromily 1990)
Returns to corporate venturing	R&D [research and development] intensity (Miller & Bromily 1990)
Private equity placements	Stock analysts' earnings forecasts (Wiseman & Bromily 1991)
Funds raised at IPO [initial public offering]	Funds raised at IPO (Deeds, DeCarolis & Coombs 1997)
Risk as downside loss and bankruptcy	Entry and exit rates from industry (Gimeno, Folta, Cooper & Woo 1997)
Loss of employment	TMT [top management team] heterogeneity (McNamara & Bromily 1999)
Survival analysis of new firms	Age of the firm (Gimeno, Folta, Cooper & Woo 1997)
Liability of newness	ROA [return on assets] relative to a target level (Reuer & Leiblein 2000)
Entrepreneurial perceptions of risks from launching a new firm or product	Use of the term 'new' in the president's section of annual reports (Bowman 1984)
Decision to launch multiple products at once	Burn rate/survival index (Janney & Folta 2003) Managerial perceptions of risk/survey (Busenitz & Barney 1997; Simon, Houghton & Aquino 2000)
Risk as opportunity	Entrepreneurial wealth, education, experience and income levels (Gimeno, Folta, Cooper & Woo 1997)
Opportunity costs	Dilution of control/investor concentration (Wruck 1989)
Evaluation of the decision to launch new ventures	Geographic location (Deeds, DeCarolis, & Coombs 1997)
Rate of new product launches	Network affiliation (Powell, Koput & Smith-Doerr 1996)
Number of new product launches	Number of products under development (Janney & Folta 2003)

Source: Adapted from Janney & Dess (2006: 390)

latter is supported by this paper and therefore provides further insight into the risk-taking behaviour of entrepreneurs and specifically the implications for education and training interventions within the entrepreneurship domain.

Research methodology

Research problem and objectives

The overall research problem can be summarised in the following three points:

- Risk tolerance of the entrepreneur remains an ‘open issue’, without a conclusive theoretical position based on empirical research. The result is that theory development is impeded, and the risk-taking trait does not form an integral part of research on the entrepreneurial characteristics, as we believe it should (Stewart & Roth 2001; Miner & Raju 2004; Xu & Reuf 2004; Hisrich & Peters 2002)
- Contrary to the above, it is evident that entrepreneurship literature includes risk-taking as an entrepreneurial skill (Megginson et al. 2003; Bolton & Thompson 2003; Deakins & Freel 2003; Baron & Shane 2004; Kuratko & Hodgetts 2001; Wickham 2001; and various others).
- The inertia with regard to a theoretical position on entrepreneurial risk-taking has particular implications for the design of entrepreneurial education programmes, which are of fundamental importance if South Africa is to deliver on the goals of the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) and other development goals.

With this in mind, the study sought to achieve the following objectives:

- To demonstrate that entrepreneurs exhibit a higher risk tolerance than other full-time employed persons and members of the public
- To make suggestions on how risk tolerance can be addressed and included in entrepreneurship education and training programmes.

The research instrument

A questionnaire was designed for the purposes of the study. The items relating to risk-tolerance assessment, as the dependent variable in the study, were adapted from those cited in the studies of Van de Venter (2006), Grable, Lytton and O’Neill (2004) and the Survey of Consumer Finance (Lindamood, Hanna & Bi 2007). These items have been demonstrated to be valid and reliable.

The independent variable of the study is not dichotomous, differentiating only between entrepreneurs and other managers, as is the case with other similar studies. For the purposes of this study, the independent variable instead distinguishes between entrepreneurs, full-time employed persons, part-time employed persons and unemployed persons, thus differentiating this study from many similar studies.

The selection and suitability of the control variables were directly derived from the application of Van de Venter (2006), Grable et al. (2004) and the Survey of Consumer Finance (Lindamood et al. 2007). The control variables for the assessment of risk tolerance included in the questionnaire were the following:

- Prior entrepreneurial experience of parents while growing up
- Prior entrepreneurial experience while at school
- Gender
- Age
- Ethnic group
- Marital status
- Number of financial dependents
- Home ownership status
- Total household income
- Highest level of education
- Objective measure of financial knowledge.

Sample

The questionnaire was mailed to 16 860 first-year business management students at a South African university. These students were distance education students, and the majority were involved in employment. A total of 1 054 usable responses (representing a 6.25% response rate) were received. The descriptive statistics for the sample are provided in Table 2.

Data analysis and results

Data were obtained from the 1 054 usable questionnaires returned by respondents and captured and analysed using SPSS 15 for Windows. One-way ANOVA and independent sample t-tests were used to compare the risk tolerance of entrepreneurs with that of non-entrepreneurs. Risk tolerance is calculated as the sum of the scores of the six items used to assess subjective risk tolerance and is indicated as a mean score in Tables 3–8. Reliability analysis shows a relatively low, although acceptable

Table 2: Descriptive statistics for the research sample

Item	Response	Percentage
Exposure to prior entrepreneurial experience through parents owning a business	Yes	27.9
	No	71.5
Exposure to prior entrepreneurial experience by being involved in business while growing up	Yes	32.6
	No	66.8
Gender	Male	63.8
	Female	36.2
Age	Mean age: 26.95 yrs	
Ethnic group	Black	52.2
	White	31.7
	Coloured	5.6
	Indian	9.7
	Other	0.8
Marital status	Single	68.1
	Married	25.8
	Living together	5.9
Number of financial dependents	Mean	1.18
Home ownership status	Own	43.0
	Rent	29.1
	Other	27.1
Household income	R50 000 or less	37.2
	R50 001–R100 000	21.0
	R100 001–R150 000	13.6
	R150 001–R200 000	7.7
	R200 001–R300 000	7.6
	R300 001 +	9.2
Highest level of education	High school	50.0
	Undergraduate	45.7
	Postgraduate	3.8
Objective measure of financial knowledge	Mean test score out of a possible 100%	71.31

Note: Percentages may not add up to 100% due to missing responses for some items.

(Hair, Anderson, Tatham & Black 1998), alpha coefficient of 0.628 across these six items. While the main comparison of risk tolerance is between entrepreneurs and non-entrepreneurs, further analyses were also conducted to assess whether other variables impacted on risk tolerance.

Risk tolerance and employment status

The results presented in Table 3 show a clear distinction between the risk tolerance of entrepreneurs and non-entrepreneurs; with entrepreneurs demonstrating significantly higher levels of risk tolerance (a higher mean indicates a higher risk tolerance). The risk tolerance is considerably higher for entrepreneurs when compared with full-time employed persons as well as unemployed persons. In fact, further analysis using Tukey's test shows that the entrepreneurial group had a higher risk tolerance than all other employment categories, as seen in Table 4. These findings are in line with the position of Stewart and Roth (2001) (who found that entrepreneurs do indeed exhibit a higher risk tolerance than other managers) but contradict the findings of Xu and Reuf (2004) (who suggest that entrepreneurs are not more risk tolerant, and in some instances even more risk avoidant, than other managers and full-time employed persons).

Table 3: Risk tolerance and employment status

		Sum of squares	df	Mean square	F	Sig.
Employment status	Between groups (combined)	379.289	4	94.82	6.351	.000
	Within groups	9 209.285	14 960.826	1 002	14.931	
	Total	9 317.566	15 340.115	1 006		

In taking the analysis further, we analysed the effect of one's parents being involved in entrepreneurial activity while one was growing up, as well as being involved in business activities while growing up. Interesting results were found in this regard and are presented in Tables 5 and 6.

Interestingly, ownership of a business by one's parents while growing up seemed to have very little impact on the risk tolerance of the respondents. While the risk tolerance is indeed higher among this group, it is not indicated as a significant difference at the 95% confidence level. However, involvement in business activities while growing up did have a significant impact on the risk tolerance of respondents, as indicated in Table 6.

Table 4: Risk tolerance and employment status: post hoc Tukey test

Employment status	Risk tolerance		
	n	Subset for alpha = .05	
		Mean	Mean
Unemployed	121	16.69	
Full-time employed	580	17.21	
Full-time student	194	17.73	
Part-time employed	113	18.09	
Self employed	40		19.81
Did not respond to this question	6		
Total (N)	1 054		

Note: The full-time students were grouped with the unemployed in the data analysis.

Table 5: Ownership of a business by parents when growing up

Did your parents own a business while you were growing up?	Risk tolerance		
	n	Mean	Std. deviation
Yes	281	17.76	3.77
No	723	17.31	3.95
Total that responded to this question	1 004	17.43	3.90
Did not respond to this question	50		
Total (N)	1 054		

Table 6: Involvement in business activity while growing up

Were you involved in any kind of business while growing up?	Risk tolerance		
	n	Mean	Std. deviation
Yes	326	18.31	4.07
No	678	17.01	3.75
Total that responded to this question	1 004	17.43	3.90
Did not respond to this question	50		
Total (N)	1 054		

The risk tolerance of those individuals involved in business activity while growing up was found to be significantly higher at the 95% confidence level than those who had not been involved in any form of business while growing up. The t-test table for this finding is presented in Table 7.

Table 7: T-test for involvement in business activity while growing up

Tolerance	T-test for equality of means						
	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
						Upper	Lower
Equal variances assumed	4.980	1 002	.000	1.296	.260	.785	1.807
Equal variances not assumed	4.838	596.344	.000	1.29666	.26804	.770	1.823

Risk tolerance and other demographic variables

Various analyses in the form of t-tests and ANOVA were conducted to determine whether demographic variables other than employment status (as identified in Table 1) had a significant influence on the risk tolerance of respondents. The results of the analyses are very interesting and are summarised in Table 8.

It is very interesting to note from Table 8 that of the eight control variables correlated with risk tolerance, only two resulted in significant differences in risk tolerance scores, namely gender and the respondent’s own (subjective) perception of their level of knowledge regarding financial matters. The mean scores between male and female respondents differed considerably, with male respondents reporting a much higher risk tolerance. The mean risk tolerance score for all male respondents is indicated as 18.66, while for female respondents this drops to 16.70. Further analysis in this regard highlights an interesting finding. When employment status is added as an additional control variable to the analysis, the above relationship remains true for all employment categories; however, in respect of the entrepreneurial group, the distance between males and females shrinks to an almost insignificant number. In this regard, female entrepreneurs reported almost the same risk tolerance (19.56) as their male counterparts (20.14). Furthermore, the risk tolerance score for female entrepreneurs is higher than the male scores in any of the other categories.

Risk tolerance differed considerably based on respondents’ assumptions of their own level of financial knowledge. These results link well with the findings regarding cognitive biases of entrepreneurs as reported by Simon et al. (2000) in that the

Table 8: Risk tolerance and demographic variables

ANOVA							
			Sum of Squares	df	Mean Square	F	Sig.
Age	Between groups	(Combined)	26.737	5	5.347	.348	.883
	Within groups		9 139.646	15 163	988	15.347	
	Total		9 189.846	15 189	993		
Ethnic group	Between groups	(Combined)	79.231	4	19.808	1.300	.268
	Within groups		9 222.068	15 257	1 001	15.242	
	Total		9 278.936	15 336	1 005		
Marital status	Between groups	(Combined)	34.181	2	17.091	1.121	.326
	Within groups		9 289.726	15 305	1 004	15.245	
	Total		9 294.427	15 340	1 006		
Number of dependents	Between groups	(Combined)	50.046	4	12.512	.819	.513
	Within groups		9 256.825	15 288	1 001	15.273	
	Total		9 277.771	15 338	1 005		
Home ownership status	Between groups	(Combined)	47.242	2	23.621	1.548	.213
	Within groups		9 235.818	15 232	998	15.263	
	Total		9 266.226	15 279	1 000		
Highest level of education	Between groups	(Combined)	33.779	2	16.889	1.109	.330
	Within groups		9 243.178	15 246	1 001	15.231	
	Total		9 266.473	15 280	1 003		
Current level of knowledge regarding financial matters	Between groups	(Combined)	1 047.905	3	349.302	24.503	.000
	Within groups		8 947.345	14 269	1 001	14.255	
	Total		9 314.922	15 317	1 004		

(continued)

Table 8 (continued)

T-test							
Gender	T-test for equality of means						
	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
						Upper	Lower
Equal variances assumed	7.919	1 006	.000	1.956	.247	1.471	2.441
Equal variances not assumed	8.004	811.704	.000	1.956	.244	1.476	2.436

respondents who rated their knowledge of financial matters as excellent or above average reported a higher risk tolerance than those who rated their knowledge as average or below average. These differences are even more exaggerated when one only examines the group of entrepreneurs.

Conclusion and recommendations

The primary objective of this study was met in the sense that the results showed that entrepreneurs do exhibit a higher risk tolerance than other full-time employed persons as well as part-time employed and unemployed members of the public. Our results concur with those of Stewart and Roth (2001) and add to the position that entrepreneurs present themselves as individuals with higher risk tolerance. The results further show that factors such as exposure to entrepreneurial activity, level of financial knowledge and gender impact significantly on the risk tolerance of respondents, whereas factors such as ethnicity, age, marital status and home ownership status, among others, have very little impact. Due to certain sampling limitations of the study, however, we would not be as bold as to state that the debate surrounding this matter should now be considered exhausted.

The second objective of the study sought to inform curriculum development pertaining to enhancing risk tolerance as a key entrepreneurial skill. The results of the study steer us towards making certain recommendations. The results and conclusions clearly show that exposure to and involvement in entrepreneurial activity both correlate positively with increased risk tolerance. These findings

have two comprehensible implications for curriculum development within the adult-learning context, firstly during the learning experience, students need to be actively exposed to and engage with the entrepreneurial environment. Secondly, the learning experience should involve an element of action learning, whereby students go through the entrepreneurial process, either by simulation or physical start-up.

The respondents' levels of financial knowledge also correlated positively with higher risk tolerance. This endorses the belief that financial management and practical exposure and acquisition of competencies should form a critical component of any entrepreneurship curriculum. This construct should be expanded, however, to include the constructs of risk identification, assessment and management within the entrepreneurial context.

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