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Entrepreneurial selection and success: does education matter?

Entrepreneurial
selection and
success

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Abstract

Purpose – The purpose of this paper is to explore the relationship between general education, specific forms of entrepreneurial education and a range of entrepreneurial activities.

Design/methodology/approach – The relationships were investigated through an analysis of peer-reviewed research published in a wide range of journals and proceedings between 1995 and 2006.

Findings – Findings suggest strong evidence supporting the relationship between levels of general education and several entrepreneurial success measures. The findings are less clear in regards to the link between general education and the choice to become an entrepreneur. The findings linking specific programs of entrepreneurship education to entrepreneurship, although ambiguous, suggest a positive link between such education and both the choice to become an entrepreneur and subsequent entrepreneurial success.

Research limitations/implications – The review of research suggests four implications for existing research: a need for increased research outside the USA; an understanding that inconsistencies in findings may be to a great extent temporal artifacts; a need for increased research focused on innovation; and an acknowledgement that “venture exit” as an outcome measure has received limited attention.

Practical implications – Given the significant investments by both private organizations and governments aimed at increasing rates of entrepreneurship and entrepreneurial success through education, it is important to understand that while the evidence supporting the links between education and entrepreneurial outcomes is promising it is not yet definitive.

Originality/value – In addition to providing a review of existing research this paper suggests an integrative framework for future research.

Keywords Education, Entrepreneurialism, Research, Critical success factors

Paper type General review

Introduction

The impact of entrepreneurial activity on the economy of both industrialized and developing countries has been well established (Aidis, 2005; Minniti *et al.*, 2004). A

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wide range of institutional antecedents have traditionally been associated with both the choice of individuals to found ventures and various outcomes associated with venture founding (Aidis, 2005; Casper, 2000). One institutional variable that has received significant attention is education based on the fundamental assumption that there is a positive relationship between education and the individual's choice to become an entrepreneur as well as the potential positive outcomes of such activity. In recent years several studies have called this assumption into question. The authors of two meta-analyses of past research on the topic (van der Sluis *et al.*, 2004, 2005) conclude that the relationship between general education and venture formation is unproven although they do conclude that there appears to be a positive relationship between general education and entrepreneurial income. The first of van der Sluis and colleagues' conclusions is supported by the directors of the Global Entrepreneurship Monitor (GEM) research program (Acs *et al.*, 2004; Autio, 2005; Minniti *et al.*, 2004; Neck *et al.*, 2003), one of the first multi-country studies focusing on a wide range of entrepreneurial issues, who suggest from their findings that when viewed across a wide range of countries the relationship between the average level of general education and the rate of venture formation is ambiguous. Both of these studies appear to contradict the prevailing assumptions as well as a number of studies reporting positive relationships between education and entrepreneurship.

One purpose of this study is to explore this seeming contradiction by providing a review of the current peer reviewed research linking general education and venture creation and success. Another purpose is to expand our understanding of the links between education and entrepreneurship by reviewing the current research linking specific forms of entrepreneurship education and venture creation and success. Finally, this study explores the most prominent theoretical frameworks offered in support of the education-entrepreneurship linkage and offers an analysis of both the research and policy implications that might be derived from this review.

Theoretical frameworks supporting the education-entrepreneurship linkage

A wide range of economic and strategic theories have been employed in providing a framework in which education is viewed as an important determinant of selection into entrepreneurship for the individual, entrepreneurial success for the firm and rates of firm formation in a society. These theories include those drawn from both economic and strategic foundations. One of the more prominent economic theories employed is human capital theory (Becker, 1975; Bosma *et al.*, 2004; Gimeno *et al.*, 1997). This theoretical framework examines the impact of acquired variables such as experience and education (Sørensen and Chang, 2006) on career outcomes and is built upon the assumption that education can serve both as a determinant of decision choice as well as providing benefits to specific ventures. Other theories that have variously been applied in linking education both to entrepreneurial selection and outcomes include signaling theory (van der Sluis *et al.*, 2004), outsider assistance theory (Chrisman and McMullan, 2004) and knowledge spillover theory (Audretsch and Lehmann, 2005). Institutional theory, which assumes that firms are embedded in country-specific institutional arrangements, including systems of education (Lynskey, 2004) has been applied to explain differences in both the rates of innovation and entrepreneurship at the societal or country level. When looking across the theoretical frameworks applied in this

research, education is variously assumed as enhancing managerial capabilities, generating broader options making entrepreneurial selection of lesser or greater value, impacting the quality and quantity of labor, or signaling production ability in labor markets that have incomplete information.

Regarding the linkage between education specific to entrepreneurship and entrepreneurial outcomes, Béchar and Grégoire (2002) report, based on their review of entrepreneurship education research, that just over 60 percent of all such research was principally underpinned by academic theories, just over twenty percent built upon social theories and about ten percent relied on technical theories to support proposed linkages. Two of the theories often used are Bandura's "social learning theory" (Human *et al.*, 2005) and "action learning theory" (Leitch and Harrison, 1999). Bandura's theory provides a framework involving five steps necessary for learning that includes skill and attitude assessment, skill and attitude learning, behavioral guidelines and action steps, skill and attitude analysis and skill practice. The model of action learning was first proposed by Revans (1971). The model focuses on learning by reflecting on actions that solve real organizational problems. While these are only two of many theoretical frameworks utilized, they suggest that support for hypothesizing a relationship between entrepreneurial education and various entrepreneurial outcomes is the impact of such education on attitudes, skill development and behavior.

Literature review

Study methodology

This review has a specific focus on empirical research linking either general education or specific forms of entrepreneurial education to either the creation of a new venture or some measure of entrepreneurial success. The review draws specifically on published, peer-reviewed research, published between 1995 and 2006[1]. Articles for inclusion in this review were obtained from a wide range of published sources by a thorough database search utilizing ABI/Inform Complete, the Social Sciences Research Network (SSRN) electronic library, the Journal Storage Project (JSTOR) electronic library, and the Organization for Economic Co-Operation and Development (OECD) publication archive. Additionally, the published Proceedings of three entrepreneurship-focused organizations, the United States Association for Small Business and Entrepreneurship (USASBE), the International Council of Small Business (ICSB), and the Babson-Kaufman Entrepreneurship Conference were searched. Because research relating to the economic returns for education is of great interest, studies span a wide range of academic disciplines including economics, sociology and management among others. Articles were categorized as empirical, theoretical or descriptive and based on the type of educational program studied. Only those empirical articles that reported specific findings relating to the link between general education or entrepreneurial education and some entrepreneurial outcome were included in the review. Although the studies included in the analysis may not include all studies published during the study period, it is assumed that they provide a good representation of such studies.

General education and entrepreneurial selection and success

One difficulty in aggregating research across disciplines and national settings is the wide range of definitions utilized by researchers both in defining education and entrepreneurial outcomes. The level of general education has alternately been

measured in terms of total years of education or operationalized as a dummy variable denoting a secondary school graduate or a college graduate. In some studies the obtainment of an advanced graduate degree is utilized as the key antecedent. Likewise, a wide range of measures has been applied to reflect entrepreneurial outcomes. Research founded in economic theory often refers to the individual's choice to seek self-employment or to form a new venture as "selection into entrepreneurship," a term we will use in this review. Entrepreneurial performance has been operationalized through such measures at the firm level as growth in sales, growth in profits, or some measure of innovation. At the level of the entrepreneur it has been measured primarily in terms of growth in personal income or income in comparison to wage earners. These definitional differences not only create confusion but also may be the cause of conflicting findings.

The answers to two key questions were sought in this review. First, does the probability of selection into entrepreneurship increase with the level of an individual's general education? Second, is the level of general education linked to entrepreneurial performance and if so what types of performance have been linked to education? The literature search for the review of general education and entrepreneurship yielded eighteen peer reviewed studies with the formation of a venture or selection into entrepreneurship as the outcome variable of interest. An additional sixteen studies were located in which some measure of entrepreneurial success was the outcome of interest. Tables I and II provide a brief review of these research articles.

The relationship between general education and selection into entrepreneurship and general education and entrepreneurial performance in industrialized countries was the subject of a 2004 meta-analysis (van der Sluis *et al.*, 2004). In 2005 these same authors conducted a similar study of research conducted in developing countries (van der Sluis *et al.*, 2005). The primary conclusions drawn from reviewing research dating back to the early 1980s were similar in both cases. They concluded that in both developing and industrialized countries there is evidence to support a positive and significant relationship between the level of general education and entrepreneurial performance, whether performance is measured as growth, profits or earning power of the entrepreneur. They further concluded that the evidence linking general education to selection into entrepreneurship is ambiguous and can not be classified as either positive or negative. These findings are not dissimilar to the conclusions drawn by the GEM researchers (Acs *et al.*, 2004) who concluded that their data indicated a strong relationship between the level of education and entrepreneurial performance but an ambiguous relationship between general education and selection into entrepreneurship when viewed across national boundaries.

A review of the research included in Tables I and II and conducted since 1995 leads to somewhat different conclusions than those drawn by these researchers. Consistent with their conclusions it would appear that there is a significant and positive relationship between the educational level of the entrepreneur and various venture performance measures including profitability, growth and innovation. However, the findings would also suggest that the educational attainment of the entrepreneur has not been shown to significantly impact firm survival. The findings of the studies included in Tables I and II seem to diverge in regards to the relationship between general education and selection into entrepreneurship. The findings of these studies suggest among other things that:

Study	Sample size	Country	Antecedent	Outcome measure	± or n.s.
Acs and Armington (2005)	394 ^a	USA	College degree	Rates of venture formation	+
Arenius and DeClercq (2005)	4,536	Finland, Belgium	Level of college education	Perception of entrepreneurial opportunities	+
Autio <i>et al.</i> (1997)	1,956	Various	Years of higher education	Likelihood of becoming an entrepreneur	+
Block and Wagner (2006)	1,109	Germany	Years of total education	Probability of venture formation ^b	+
Camp (2005)	394 ^a	USA	College degree	Level of entrepreneurial activity	+
Delmar and Davidsson (2000)	933	Various	Years of total education	Probability of venture formation	+
Dunn and Holtz-Eakin (2000)	371	USA	Years of total education	Probability of self employment	n.s.
Goedhuys and Sleuwaegen (2000)	141	Africa	Secondary or college level	Probability of venture formation	+
Kirchoff and Armington (2002)	3,152	USA	Secondary or college level	Rates of firm births	+
Lofstrom and Wang (2006)	19,271	USA	Years of total education	Probability of entry into either low or high barrier ventures	+
McManus (2000)	7,342	USA, Germany	Years of total education	Probability of entry into high quality venture/low quality ventures	+/n.s.
Minniti <i>et al.</i> (2004)	9,195	USA	Years of total education	Likelihood of becoming an entrepreneur ^b	+
Neck <i>et al.</i> (2003)	7,059	USA	Years of total education	Likelihood of becoming an entrepreneur	+
Reynolds <i>et al.</i> (2004)	1,261	USA	Years of total education	Rates of nascent entrepreneurship	+
Uhlauer <i>et al.</i> (2002)	14 ^a	Various	Years of total education	Rates of self employment	+
Wagner and Sternberg (2004)	7,802	Germany	Secondary or college level	Likelihood of becoming a nascent entrepreneur	+
Wagner and Sternberg (2002)	1,000	Germany	Secondary or college level	Likelihood of becoming an entrepreneur	+

Notes: ^aLevel of analysis is country or region rather than individual; ^bseparates necessity and opportunity entrepreneurs

Table I.
General education and
entrepreneurial selection

Table II.
General education and
entrepreneurial success

Study	Sample size	Country	Antecedent	Outcome measure	± or n.s.
Aidis and Mickiewicz (2004)	399	Lithuania	College degree	Growth expectations	+
Almus and Nerlinger (1999)	20,602	Germany	Technical degree	Venture growth rates	+
Basu and Goswami (1999)	118	Asia	College degree	Venture growth	
Bosma <i>et al.</i> (2004)	896	USA	Level of college education	Venture profitability/venture survival	+ /n.s.
Goedhuys and Sleuwaegen (2000)	141	Africa	Secondary/college degree	Growth in performance	+
Jo and Lee (1996)	48	Korea	Years of total education	Venture profits	+
Maes <i>et al.</i> (2005)	294	Belgium	Years of total education	Innovation within venture	+
Morris and Pitt (1995)	30	Africa	Years of total education	Operational sophistication	+
Nicholas (1999)	283	Britain	High status versus low status education	Wealth accumulation	-
Peña (2002)	114	Spain	College degree	Growth in sales	+
Chrisman and McMullan (2004)	159	USA	Years of total education	Venture survival	n.s.
Fairlie (1999)	6,417	USA	College degree	Probability of exit	-
Gimeno <i>et al.</i> (1997)	1,547	USA	Years of total education	Venture survival/performance	n.s./+
Taylor (1999)	10,000	Britain	Years of total education	Exit rates	n.s.
van der Stuis <i>et al.</i> , 2004	94 ^a	Various industrialized	Years of total education	Entrepreneurial income/selection into entrepreneurship	+ /n.s.
van der Stuis <i>et al.</i> , 2005	60 ^a	Various developing	Years of total education	Entrepreneurial income/selection into entrepreneurship	+ /n.s.

Note: ^aMeta-analytic review of prior studies

- the higher the average education level in a country the higher the rates of selection into entrepreneurship;
- in studies including a broad range of socio-economic and institutional variables as predictors of selection, education is generally the strongest predictor;
- education beyond a baccalaureate degree has generally not been found to be positively linked to selection; and
- significant differences in the impact of education on selection are seen based on ethnicity but not on gender.

Three additional conclusions drawn from the research presented in Tables I and II may help in providing an explanation. First, the findings of those studies utilizing data drawn from multiple countries (Arenius and DeClercq, 2005; Delmar and Davidsson, 2000; McManus, 2000; Uhlaner *et al.*, 2002) suggest important differences across countries in the impact of education on selection into entrepreneurship. Second, when venture type, in terms of necessity entrepreneurship or opportunity entrepreneurship is considered, significant differences exist (Block and Wagner, 2006; Lofstrom and Wang, 2006; McManus, 2000). Opportunity entrepreneurship has been operationally defined as selection into entrepreneurship as the result of a pursuit of a specific entrepreneurial opportunity while necessity entrepreneurship is the choice of self employment as a result of the limited availability of employment opportunities in existing organizations (Block and Wagner, 2006; Neck *et al.*, 2003). Finally, a number of studies seem to suggest that the relationship between education and selection into entrepreneurship is not linear in nature (Minniti *et al.*, 2004; Neck *et al.*, 2003) with both the lowest and highest levels of education have little impact on selection into entrepreneurship.

All three conclusions would appear to be linked. In those countries in which necessity entrepreneurship is most prevalent educational attainment would have little impact on selection into entrepreneurship. van der Sluis *et al.* (2004) offer an economic explanation as to why higher levels of education might in fact have an inverse relationship to selection into entrepreneurship in countries with strong economic opportunities. They cite Le's (1999) argument that higher levels of education might offer greater opportunities for high paid wage employment making selection into entrepreneurship a more difficult choice. The meta analysis by van der Sluis *et al.* (2004; 2005) while controlling for country of origin are unable to control for differences in the types of entrepreneurship, necessity or opportunity, since few of their included studies do so.

It would appear that there is sufficient evidence to suggest that the level of educational attainment by entrepreneurs is significantly and positively associated with entrepreneurial performance. The evidence linking education to selection into entrepreneurship is more ambiguous and differs in important ways across countries. When individual countries are considered, particularly developed economies, there does appear to be a positive relationship between the level of education of an individual and the probability of selection into entrepreneurship but this relationship is not linear in nature. Individuals with at least some college education appear to be the more likely to select into entrepreneurship than more highly educated individuals.

Entrepreneurial education and entrepreneurial selection, success, and other indicators
Definitional issues, in addition to those already mentioned, create difficulty when reviewing research linking specific types of entrepreneurial education and entrepreneurial outcomes (Matlay, 2005a, b). Entrepreneurship education is often delineated based on the educational source – higher education, vocational training programs, continuing education, or secondary school programs (Gartner and Vesper, 1994; Raffo *et al.*, 2000; Sexton and Bowman, 1984) or the structure of the education – didactic, skill-building or inductive (Garavan and O’Cinneide, 1994). Unfortunately many entrepreneurship education studies do not provide the underlying theories or strategies employed in the educational intervention. Since most do provide the source of the educational program we have chosen to use the organizational framework based on the categorization scheme employed by Raffo *et al.* (2000). They categorize the source of the entrepreneurial training and education as “higher education,” “further education,” and other “vocational education training.”

Following the suggestion of De Faoite *et al.* (2003; 2004), we will focus our attention on research specific to either the founding of an entrepreneurial venture or the “raising of awareness” associated with the act of entrepreneurship. In specific as it relates to entrepreneurial awareness, a review of recent research suggests five antecedents for venture creation. These include “entrepreneurial intentions” (Autio *et al.*, 1997; Krueger and Carsrud, 1993), “opportunity recognition” (DeTienne and Chandler, 2004; Dimov, 2003), “entrepreneurial self-efficacy” (Alvarez and Jung, 2003), certain psychological characteristics (Hansemark, 1998), and “entrepreneurial knowledge” (Kourilsky and Esfandiari, 1997).

In reviewing the literature the answers to two key questions were sought. First, does education specific to entrepreneurship, in contrast to non-entrepreneurship specific education, lead to higher rates of selection into entrepreneurship? Second, is entrepreneurship-specific education linked to entrepreneurial performance and if so what types of performance are impacted? The literature search yielded six peer reviewed articles published since 1995 that focused on the relationship between some form of specific entrepreneurship education and the founding of a venture (or selection into entrepreneurship). The search yielded fifteen articles published since 1995 that focused on the relationship between some form of specific entrepreneurship education and some outcome that serves as a precursor of selection into entrepreneurship. Tables III and IV provide a brief summary of these research articles.

Utilizing a relatively broad focus that included both theoretical and empirical research, Gorman *et al.* (1997) conducted a survey of entrepreneurship education research published between 1985 and 1994. Their review located 63 articles divided between those focusing on venture creation and those focusing on the management of small- to medium-sized firms. They suggested that the central theme in the research they reviewed is the extent to which formal education can contribute to entrepreneurship. The authors noted that most of the research they reviewed consisted of specific program descriptions and evaluations of those programs. They argued that the existing empirical research published during the time period of their review seems to suggest a consensus among researchers that entrepreneurship can be taught and that entrepreneurial attributes can be positively influenced by educational programs. The authors conclude that research on education for entrepreneurship, as of 1994, was still in the exploratory stages with most studies utilizing cross-section

Study	Sample size	Country	Antecedent	Outcome measure	± or n.s.
Charney and Libecap (2000)	511	USA	Graduate entrepreneurship program completion versus other degree completion	Venture founding	+
Dumas (2001)	34	USA	Completion of entrepreneurship vocational training ^a	Venture founding	19 ventures founded
Kolvereid and Moen (1997)	374	Norway	Graduate degree in entrepreneurial studies versus other degree	Venture founding	+
McLarty (2005)	39 ^b	USA	Business degree with entrepreneurial training ^a	Venture founding within two years of graduation	35
Monroe <i>et al.</i> (1995)	126	USA	Completion of entrepreneurship vocational training ^a	Venture founding	39 ventures founded
Osborne <i>et al.</i> (2000)	51	USA	Completion of entrepreneurship vocational training ^a	Venture founding	34 ventures founded

Notes: ^aQualitative study or no test group; ^bstudy only looked at graduates who had founded companies; the outcome measure was time to founding

Table III.
Entrepreneurial
education and venture
creation

Table IV.
Entrepreneurial
education and other
entrepreneurship
indicators

Study	Sample size	Country	Antecedent	Outcome measure	± or n.s.
Alvarez and Jung (2003)	400	Mexico	University level entrepreneurship course completion	Perceived entrepreneurial self-efficacy and intentions to start venture	+
Brännback <i>et al.</i> (2005)	263	Finland	University level entrepreneurship course completion	Perception of entrepreneurship as personally desirable, feasible	+
Chrisman and McMullan (2004)	159	USA	Completion of guided entrepreneurial training	Venture performance based on sales and employment	+
DeTienne and Chandler (2004)	130	USA	University level entrepreneurship course completion	Ability to generate venture ideas	+
Dimov (2003)	22	USA	Graduate education and prior knowledge of entrepreneurship	Entrepreneurial intentions	+
Ehrlich <i>et al.</i> (2000)	24	USA	University level entrepreneurship course completion ^a	Perception of ability to develop new venture	+
Frank <i>et al.</i> (2005)	875	Austria	Type of secondary education/entrepreneurship activities	Orientation towards becoming an entrepreneur	+
Galloway <i>et al.</i> (2005)	519	Scotland	University level entrepreneurship course completion ^a	Perception of entrepreneurial skill sets	Varies based on skill
Galloway and Brown (2002)	1,954	Scotland	University level entrepreneurship course completion ^a	Intention to start venture	78 percent intend to start
Hansemark (1998)	70	Sweden	Completion of a vocational entrepreneurship program	Need for achievement and internal locus of control	+
Klapper (2004)	142	France	Completion of university entrepreneurship program	Intention to start venture	+
Kourilsky and Estandiari (1997)	95	USA	Completion of a high school entrepreneurship education intervention	Entrepreneurial knowledge	+
Lütjhe and Franke (2002)	455	USA/Germany	US based program with entrepreneurship versus Germany program without	Entrepreneurial spirit	+
Noel (2000)	84	US	Completion of degree in entrepreneurship versus other degree programs	Intention to start venture	+
Peterman and Kennedy (2003)	236	Australia	Completion of an enterprise training program	Perceptions of desirability to venture	+

Note: ^aQualitative study or no test group study

survey designed and self-reports with few basic experimental controls employed. In an earlier study, Dainow (1986) reviewed entrepreneurship education literature for a ten-year period prior to 1984. Dainow noted a limited number of empirical studies focusing on entrepreneurship education. He concluded that there was a significant need for a more systematic collection of data and a more varied methodological frameworks in order to move research in the area forward.

The studies published since 1995 and included in Tables III and IV primarily focus on the outcomes of specific educational programs. The majority of the studies were located at the university level but two reported the results of vocational education programs and one reported the results of a continuing education program. In general, the study authors concluded that there was a significant and positive correlation between participation in the educational programs and selection into entrepreneurship. In those that compared program participants and non-program participants, higher rates of venture creation were reported for program participants.

Entrepreneurial intentions or the expressed intention to start a venture at some point in the future is the most often studied antecedent of venture creation. This research draws on a well established body of literature linking intentions to subsequent actions (Ajzen, 1987; Ajzen and Fishbein, 1980) and has been proposed for some time as the best predictor of entrepreneurial behavior (Honig, 2004; Krueger and Carsrud, 1993; Shaper, 1975; 1982). Six studies testing the relationship between entrepreneurial education and entrepreneurial intentions were located and are provided in Table IV. Five of the studies were conducted at the university level and one was a vocational training program at the secondary school level. In general the studies found a positive correlation between entrepreneurial education and the expressed "intent" to form a venture at some point in time. Interestingly, one study noted that a majority of those students expressing an intention to found a venture indicated that they planned to start the venture only after an extended, ten years or more, period of time. Additionally, studies noted that prior work experience impacted both participation in the training programs and subsequent intentions to start a venture.

A second antecedent of venture creation measured as an outcome of entrepreneurial education is that of "opportunity recognition." The implicit assumption of these studies is that the ability to recognize venture opportunities will be positively linked to the subsequent creation of ventures although there is limited evidence of this linkage. Two studies were located that measured the impact of education on opportunity recognition. In one study a link was shown between entrepreneurial education, recognition of entrepreneurship as personally desirable and the level of opportunity recognition. A second study linked specific skill training with opportunity recognition and a third found a negative correlation between prior industry-specific knowledge and opportunity recognition.

Entrepreneurial self-efficacy or the belief of an individual that they are capable of entrepreneurial behavior and the link to entrepreneurial education was tested as well. Three of the studies were conducted at the university level and one at the secondary school level. In general the studies conclude that entrepreneurial training positively impacts and individual's perception of their ability to start a new venture.

In addition to these three proposed antecedents to venture creation, one study sought to measure the relationship between an entrepreneurial vocational training program and the participants "need for achievement" and "locus of control." The

implied assumption was that those individuals scoring higher on these traits might be more likely to engage in entrepreneurial behavior. A positive relationship between training and changes in these to psychological traits was noted. Also, an entrepreneurial vocational training program at the secondary school level sought to measure the relationship between entrepreneurial education and specific entrepreneurial knowledge proposed as necessary for venture creation. The results of the study indicated that the program did increase the levels of specific entrepreneurial knowledge in participants.

Discussion

We believe the following conclusions can be drawn from a review of this literature. First, although the volume of empirical research has increased since Dainow's review in 1986 and has stayed relatively constant with that reviewed by Gorman *et al.* (1997), many of the limitations noted by both still seem to persist. Most studies focus on the outcomes of specific educational programs, are exploratory in nature and employ cross-section surveys with few experimental controls. Second, there has been a noted increase in the number of studies focusing on entrepreneurial intentions as a precursor of entrepreneurial behavior following on the broad foundation of research suggesting intentions as the best predictor of subsequent behavior. Third, while the most direct measure of venture creation is the act itself, researchers have come to understand that there may be long time periods between the educational experience and subsequent behavior. Therefore, the focus on proposed antecedents to entrepreneurial behavior has in general gained momentum. Finally, even though the vast majority of research still focuses on specific and often unique educational programs, the general consensus, although not yet definitively proven, seems to be that there is a positive correlation between entrepreneurial education and entrepreneurial activity.

Research implications and future research opportunities

The review of existing literature points out numerous limitations in existing research as well as numerous opportunities for future research exploring the linkages between both general education and entrepreneurial activity and entrepreneurial education and entrepreneurial outcomes. For both streams of research the lack of consensus in the definition of terms as well as the lack of clarity in outcome measures makes it difficult to draw definitive conclusions. The failure to consider potential cross-country differences as well as to clearly separate situations of opportunity entrepreneurship from necessity entrepreneurship by most existing studies seems to be a significant determinant of inconsistencies in past research. As it relates specifically to studies of specific entrepreneurial education programs the over reliance on post hoc methodologies, the primary focus on specific, unique and sometimes non-transferable education programs, and the probability that only the results of successful programs will end up being published are all critical limitations. Additionally, one of the fundamental difficulties in linking entrepreneurship education to entrepreneurial behavior in general through post hoc analysis or even through experimental analysis of existing education programs is the concern that there is a selection bias at the outset for students choosing to engage in entrepreneurial education.

In spite of these numerous limitations there are also important opportunities for future research. A review of Tables I-IV in this analysis suggests several holes in existing research leading to future opportunities, five of which include the following. First, although there is a growing body of research emerging from Europe, Asia and Africa the preponderance of the research is U.S.-based. Additionally, of all the studies reviewed only four provide cross-country analyses. Given the findings of the GEM studies (Acs *et al.*, 2004; Neck *et al.*, 2003) suggesting important cross-country differences in the impact of education, studies comparing differences across countries may provide particularly rich information. Second, a detailed analysis of the studies in this review indicates for the most part a very limited time horizon for most studies. It may be that the inconsistencies in findings are to a great extent a temporal artifact. The opportunity for longitudinal studies providing a better understanding of the impact of education over extended periods of time is great. Third, given the importance accorded to innovation in entrepreneurship there is clearly a limited body of research focusing on innovation. This is either an outcome or a moderator in the education-entrepreneurial activity relationship. Fourth, it is clear from this review that successful “venture exit” as an outcome measure has received limited analysis. Finally, as noted in the limitation discussions the failure of existing research to clearly delineate between necessity and opportunity entrepreneurship opens the door for important future research.

Taken collectively, the existing research linking education and entrepreneurial selection and success would seem to suggest an integrative framework for future research that would consider general education and/or unique institutional programs, such as entrepreneurial education and training programs as antecedents for an array of entrepreneurial outcomes while also considering a range of critical intervening variables that include unique characteristics of individuals. Table V provides an example of such a framework.

Policy implications

The findings of existing research, suggesting positive links between general education and both selection into entrepreneurship and entrepreneurial success, however measured, has important implications from a public policy and support perspective. The consistent evidence that education is linked to higher entrepreneurial performance and productivity is supported by the economic evidence provided by the OECD suggesting significant productivity increases for each year of added education. At the national level, expansion of tax savings plans and other tax-based schemes for supporting individual education seem appropriate. Universities may need to focus on providing scholarship and financial aid to underserved populations to help increase the general education levels of specific regions and countries. Commerce and trade associations that use their contacts and resources to offer educational opportunities to both members and non-members could be a significant private sector force. Finally, foundations also have a role to play in finding ways to support education efforts and to help keep students in school longer. Computer training, minority and ethnic based support systems, training for people transitioning from maturing industries and other similar efforts could ultimately provide a national good through entrepreneurial selection and success.

Educational antecedents for entrepreneurial selection/success				
General education	Entrepreneurial education/training and support programs	Individual moderating or intervening variables	Entrepreneurial outcomes	
Level of general education attained	Unique entrepreneurial education programs completed Existence of government/university based management/technical assistance programs Growth and availability of multiple knowledge portals (web based, classroom, online education, etc.)	Behavioral intentions Opportunity recognition Entrepreneurial self-efficacy Various psychological characteristics Knowledge	<i>Country level outcomes</i> New venture starts Venture survival rates Net new job creation <i>Firm level outcomes</i> Growth in sales Growth in profitability Innovation Operational sophistication Successful venture exit <i>Individual level outcomes</i> Selection into entrepreneurship Wealth accumulation	

Table V.
An integrative framework for education and entrepreneurial selection and success

Although the links between entrepreneurial education and entrepreneurial activity are not at this time definitive there is research suggesting such a linkage. Based on the assumption that the linkages must exist there has been a dramatic increase in entrepreneurship education (Solomon, 2002; Solomon *et al.*, 2002). For example in the U.S. endowed positions in entrepreneurship and related fields grew seventy-one percent between 1999 and 2003 and worldwide such positions grew from 271 in 1999 to 563 by 2003 (Katz, 2004). Additionally, as Hannon (2005) notes, governments have made significant investments in entrepreneurship education programs. He gives an example of the dramatic increase in entrepreneurship course offerings at UK universities and the government's financial support for Centres of Excellence in Teaching and Learning with a specific focus on entrepreneurship education. The investments by both private organizations and governments strongly suggest that future challenges for these organizations will be to encourage entrepreneurship education providers to clearly delineate the theoretical foundations of their course and program offerings and to both track and adequately measure the impact of the programs they provide over time across a wide range of outcomes related to both entrepreneurial selection and success. Second, support organizations should encourage the frequent consolidation of research findings in order to assess the cumulative evidence provided by these findings regarding the linkages between education and

both entrepreneurial selection and success. Ultimately, based on what is learned through this research, support organizations should encourage entrepreneurial educators to adopt, when merited, new innovations and processes known to provide positive outcomes.

Conclusions

The primary purpose of this study has been to provide a review of relevant research regarding the relationship between general and entrepreneurial education and entrepreneurial selection and success and to provide a discussion of both the research and policy implications provided by this research. The findings of this review highlight the general consensus across research from multiple countries, which indicates a significant and positive relationship between education and entrepreneurial performance. The review also notes the ambiguous findings regarding the links between general education and selection into entrepreneurship and suggests several potential theoretical and methodological reasons for these ambiguous findings.

This review highlights the lack of consensus in both our definitions of entrepreneurial education and what should be the appropriate and measurable outcomes for entrepreneurial education. The findings of existing research provide indications, albeit still preliminary, of the relationship between entrepreneurial education and subsequent entrepreneurial selection and success. Given these promising results this report also highlights the future opportunities afforded researchers in this important area of research.

Note

1. For reviews of research in this area prior to 1995, see Dainow (1986) or Gorman *et al.* (1997).

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Further reading

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