

Musek, J. 1993. The universe of human values: A structural and developmental hierarchy. *Studia Psychologica* 35: 321–326.

Rokeach, M. 1972. *Beliefs, attitudes and values: A theory of organization and change*. San Francisco, CA: Jossey-Bass.

Rokeach, M. 1967. *Value survey*. Palo Alto, CA: Consulting Psychologists Press.

Ryan, R. M., and E. L. Deci. 2001. To be happy or to be self-fulfilled: A review of research on hedonic and eudaimonic well-being. In S. Fiske, ed., *Annual Review of Psychology* 52: 141–166. Palo Alto, CA: Annual Reviews, Inc.

Schumpeter, J. A. 1950. *Capitalism, socialism, and democracy*. New York: Harper and Row.

Schwartz, S. H. 1992. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology* 25:1–62.

Shapero, A., and L. Sokol. 1982. The social dimensions of entrepreneurship. In C. A. Kent, D. L. Sexton, and K. H. Vesper, eds., *Encyclopedia of Entrepreneurship*. Englewood Cliffs, NJ: Prentice-Hall, 72–88).

Watson, J. G., and L. R. Simpson. 1978. A comparative study of owner-manager personal values in black and white small businesses. *Academy of Management Journal* 21, 2: 72–79.

Weber, M. 1930. *The Protestant ethic and spirit of capitalism*. New York: Scribner's.



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Using Social Cognitive Career Theory to Predict Self-Employment Goals

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Social Cognitive Career Theory (SCCT; Lent, Brown, and Hackett 1994, 1996) proposes that career interests, goals, and choices are related to self-efficacy beliefs and outcome expectations. It suggests that people's self-efficacy beliefs and outcome expectations with regard to self-employment would predict their goals to become self-employed. This study explores the ability of SCCT to predict goals for self-employment in a sample of 115 undergraduate business students. Results indicated that students with higher entrepreneurial self-efficacy and higher self-employment outcome expectations had higher intentions to become self-employed. These findings imply that educators and policy-makers may boost student entrepreneurial intentions by (1) enhancing students' confidence to succeed in an entrepreneurial career and (2) enhancing students' expectations of strong positive outcomes resulting from an entrepreneurial career.

Being an entrepreneur, one who is self-employed and who starts, organizes, manages, and assumes responsibility for a business, offers a personal challenge that many individuals prefer over being an employee working for someone else. Entrepreneurs accept the personal financial risks that go with owning a business but also benefit directly from the success of the business. As career choices go, becoming an entrepreneur is one of the most risky and unstructured choices an individual can make (Campbell 1992). Being an entrepreneur is often viewed as an aversive career choice where one is faced with everyday life and work situations that are fraught with increased uncertainty, impediments, failures, and frustrations associated with the process of new firm creation. It seems, therefore, unlikely that an individual would make a goal for an entrepreneurial career if he or she did not feel confident to perform the necessary tasks associated with forming and developing his or her own business. What is it about certain people that drives them to take on the risk, uncertainty and independent structure of business ownership?

Stevenson and Jarillo (1990) suggested that research exploring entrepreneurial behavior could be divided into three categories: (1) how entrepreneurs act (i.e., what do they do), (2) what happens when entrepreneurs act (i.e., what are the outcomes of their actions), and (3) why people choose to act as entrepreneurs (i.e., what motivates them). The research presented in this article focuses on the third category, and explores the use of a well-accepted

model from the careers literature, Social Cognitive Career Theory (SCCT), to shed light on the motivation to become an entrepreneur.

Although many studies of entrepreneurial motivation have examined personality traits of entrepreneurs, the results of these studies are mixed and inconclusive (Herron and Sapienza 1992; Shaver and Scott 1991; Kreiser, Marino, and Weaver 2002). Recent research (Roy and Elango 2000) has begun to focus on other characteristics of entrepreneurs, such as cognitive make-up as a potential indicator of success. Entrepreneurship research has also attempted to identify the situational and environmental factors that predict entrepreneurial activity, such as job displacement, previous work experience, availability of various resources, and governmental influences. However, these empirical studies of contextual factors have also found low explanatory power and predictive ability (Krueger, Reilly, and Carsrud 2000).

Most of the entrepreneurship motivation models advanced in recent years are process-oriented models, based on either economic or social psychological theory. Several researchers (Campbell 1992; Levesque, Shepherd, and Douglas 2002; Praag and Cramer 2001) have proposed models using economic perspectives to predict self-employment. These economic models suggest that the decision to become self-employed is based on maximizing the net usefulness, utility, or desirability of an entrepreneurial career.

In a theoretical discussion of the psychology of new venture creation, Shaver and Scott (1991) emphasized that new ventures emerge because of deliberate choices made by individuals. They then examined the immediate antecedents of choice: (1) Can I make a difference? (i.e., feasibility) and (2) Do I want to? (i.e., desirability). Research (Krueger and Carsrud 1993; Krueger et al. 2000) has continued on models using perceived feasibility and perceived desirability to predict entrepreneurship. This research found support for models developed by Ajzen (1991, 1985) and Shapero (1982), which used perceived feasibility and desirability to predict entrepreneurial intentions. While these process-oriented models of motivation to become an entrepreneur have some promise, one area of potential beneficial research that is ripe to be applied to the field of entrepreneurship is the careers literature and models of career choice.

SCCT (Lent, Brown, and Hackett 1994) is one of the most accepted and validated models discussed in the careers literature to understand career interests and goals

(Gore and Leuwerke 2000; Smith and Fouad 1999; Swanson and Gore 2000). However, the application of the SCCT model to entrepreneurial career decision-making has not been explored. Yet, use of an established model of career interests and goals such as SCCT may facilitate the ability to predict interest and goals for an entrepreneurship as a career choice.

The entrepreneurship literature has explored a wide variety of theories and models to answer: "What motivates an individual to become an entrepreneur?" To date, SCCT has not been discussed in the entrepreneurship literature. Yet, the careers literature includes a large number of studies examining its theoretical underpinnings and establishing the value of social cognitive theory to career selection (Beltz and Hackett 1981; Krumboltz, Mitchell, and Jones 1976; Lent and Hackett 1987; Smith 2002). Because the decision to become self-employed is essentially a career decision, this important theory deserves the attention of entrepreneurship practitioners and researchers.

Entrepreneurship researchers (Jelinek and Litterer 1994; MacMillan and Kartz 1992) have called for frameworks grounded in well-established theory. Zahra and Dess (2001) emphasized the benefits of drawing from many social science disciplines and the need to improve entrepreneurship theory building.

The purpose of the current study is to: (1) bring the well-established SCCT (Lent, Brown, and Hackett 1994, 1996) model to a forum of entrepreneurship researchers and practitioners, (2) explain why it should yield strong prediction power to explain entrepreneurial interests and goals, and (3) perform an exploratory test of the model, using a sample of business students.

The SCCT Model of Career Choice

The career development process is affected by a variety of personal, environmental, and situational factors that interrelate and change over the course of time. A number of theoretical works exist on the career development and selection process; however, the empirical evidence remains sketchy. Hackett and Lent (1992) suggested that the field would profit from theory-building efforts that "(a) bring together conceptually related constructs (e.g., self-concept, self-efficacy), (b) more fully explain outcomes that are common to a number of career theories (e.g., satisfaction, stability), and (c) account for the relations among seemingly diverse constructs (e.g., self-efficacy, interests, abilities, needs)." They presented a theoretical framework that attempted to explain central, dynamic processes and mechanisms through which career and academic interests develop, career-relevant choices are forged and enacted, and performance outcomes are achieved. The model is anchored in social cognitive theory and highlights the importance of self-beliefs and self-thought in fostering an individual's motivation and subsequently guiding their behavior.

Figure 1 illustrates the specific interrelatedness of the three main variables of the SCCT model, which affects the

choice of career. These core variables are *self-efficacy*, which affects an individual's expectations for outcomes as well as their intentions toward performance; *outcome expectations*, which affects their future performance or goals; and, ultimately, their *goals* toward self-employment. In accordance with SCCT, the concept of goals is broadly defined in this article to include plans, aspirations, or intentions.

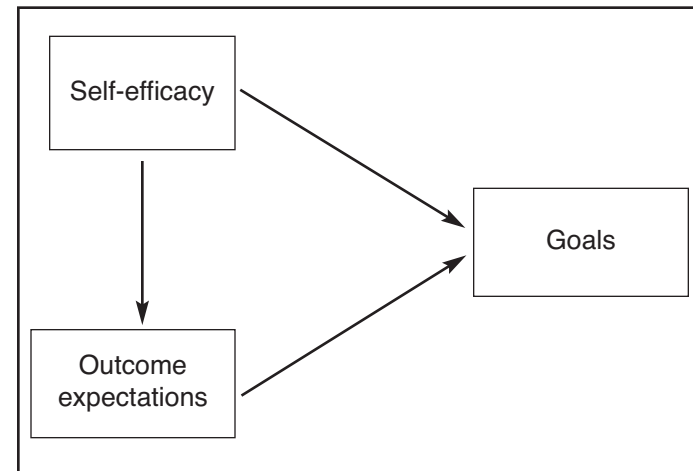


Figure 1. SCCT model

Career selection literature looks at different motivating factors and influences involved in the basic career selection and development process. Much of the research on social cognitive career selection is based on the earlier works of social cognitive theory (Bandura 1986). Bandura advocated a model of triadic reciprocity, which illustrates the interacting influences between people and their behavior and environments. Bandura posited that a person's behavior results from the interaction of that person and their environment, $[B = f(P \circ E)]$. Lent et al. (1994) extrapolated a segment of social cognitive theory and proposed a framework that emphasized three social cognitive mechanisms that seem particularly relevant to career development: (1) self-efficacy beliefs, (2) outcome expectations, and (3) goal. This career development theory may be particularly relevant for entrepreneurs. Krueger et al. (2000) compared models of entrepreneurial intentions to the ultimate choice of becoming an entrepreneur. They suggested that intentions have proven to be the best predictor of planned behavior, particularly when that behavior is rare, hard to observe, or involves unpredictable time lags. Thus, social cognitive theory as utilized in the SCCT model may be ideally suited to the study of entrepreneurs and new businesses.

This article presents a more detailed examination of the roles that self-efficacy, outcome expectations, and goals play in the role of self-selection as an entrepreneur. The core SCCT model from the research of Lent, Brown, and Hackett (1994), which has been the basis for a growing

and now established body of research in the career field (Fouad and Smith 1997; Hackett and Lent 1992; Lapan, Shaughnessy, and Boggs 1996; Lent et al. 1994; Lent et al. 1996; Lopez, et al. 1997; Smith 2002; Smith and Fouad 1999), is presented to better identify and explain the significant factors that encourage a person to choose entrepreneurship over a traditional employee role.

Self-Efficacy

Self-efficacy theory involves individuals interacting with their environment and having a desire to acquire the cognitive, social, and behavioral skills necessary to develop strategies that can aid in goal accomplishment. As defined by Bandura (1986), perceived self-efficacy is "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances."

In the social cognitive view, self-efficacy is not a unitary, fixed, or decontextualized trait but rather involves a dynamic set of self-beliefs that are specific to particular performance domains and that interact complexly with other persons, behavior, and environmental factors (Lent and Brown 1996). Self-efficacy is concerned with an individual's thoughts of whether he or she is capable of succeeding at a particular endeavor. Unrelated to measurable, objective indices of ability or skills, self-efficacy relates to a series of self-beliefs about the capabilities one holds for a particular task.

Self-efficacy beliefs are viewed as the most vital and all-encompassing explanation of personal agency (Bandura 1989). The probability of initiating an activity may be partially explained by the extent to which an individual believes he or she can effectively perform the behavior (Bandura 1977, 1986). Hackett and Betz (1981) wrote the seminal work in the career development literature focusing on the role of self-efficacy beliefs on the career selection process. Since that time, their work has been well supported by research. Meta-analysis (Lent et al. 1994) found that self-efficacy beliefs strongly ($R^2 = 0.52$) predicted career interests.

Self-efficacy not only contributes to interests and goals directly, but also through its effect on outcome expectations. This effect may be explained by the fact that people tend to expect more desirable outcomes in activities in which they see themselves to be efficacious (Bandura 1986).

Outcomes Expectations

Outcome beliefs form as a result of an individual's expectations about the consequences of his or her behavior. Whereas self-efficacy is concerned with, "Will I be able to do this?" outcomes are concerned with, "If I do this, then what will be the outcome?" Outcome expectations were originally defined by Vroom (1964) in his efforts at introducing expectancy theory to organizational settings. According to Vroom, an individual will choose among

alternative behaviors by considering which behavior will lead to the most desirable outcome. Outcome expectations play an important role in motivating individuals toward goals. Outcome expectations include several types of beliefs about response outcomes, such as beliefs about extrinsic reinforcement (e.g., receiving tangible rewards for successful performance), self-directed consequences (e.g., pride in oneself for mastering a challenging task), and outcomes derived from the process of performing a given activity (e.g., absorption in the task itself) (Lent et al. 1994). Bandura (1986) suggested several different classes of outcome expectations, such as the anticipation of physical (e.g., financial gains), social (e.g., status), and self-evaluative (e.g., pride) outcomes, that may affect career behavior. These outcomes are also influenced by the effects of self-efficacy to have an impact on the individual as to whether they are able to do it and if they value the perceived outcomes resulting from their actions.

SCCT suggests that outcome expectations are important determinants of career interests and goals (Gore and Leuwerke 2000). People will have stronger interests in activities and careers and will develop goals to enter careers in which they anticipate desirable outcomes. The decision between a career of self-employment or working for others may be viewed as a cognitive process in which individuals compare the relative desirability of each career option. As noted by Bandura (1989), this cognitive process also encapsulates important affective reflections when making an employment decision. If an individual believes self-employment is more likely than working for others to lead to valued outcomes, then he or she is more likely to be drawn to self-employment.

Goals

Bagozzi, Baumgartner, and Yi (1989) found that goals are the single best predictor of planned behavior. While environmental factors and personal experiences help to shape one's behavior, the setting of specific goals helps the individual to organize and direct their behavior in a sustained manner and increase the likelihood that desired intentions will be achieved (Lent et al. 1994). Goals are an important element of many career choice and decision-making theories although many terms have been utilized including career plans, career decisions, and career aspirations. Lent, Brown, and Hackett (1994) point out that the differences among the various terms for goals are generally minor and relate principally to their degree of specificity and proximity to actual choice implementation. For purposes of this article, goals will be defined broadly and follow Bandura's (1986) definition as being the determination to engage in a particular activity or to effect a particular future outcome.

Being an entrepreneur requires a great deal of planned behavior, from formulating the idea, securing financing, and setting up and running the business. Prior research using situational and personality measures have failed to significantly predict entrepreneurial activity. Krueger et al.

(2000) compared the predictive ability of two entrepreneurial intention models to predict entrepreneurial activity. They report that entrepreneurship is planned; therefore, it is intentional behavior. Planned behavior may be best predicted by observing goals toward that behavior, not by observing and measuring attitudes, beliefs, personality characteristics, or demographic variables.

Based on the preceding discussion, the following hypotheses are drawn:

Hypothesis 1:There is a positive relationship between an individual’s entrepreneurial *self-efficacy* and his or her *outcome expectations* for entrepreneurial activity.

Hypothesis 2: There is a positive relationship between an individual’s entrepreneurial *self-efficacy* and his or her *goals* to become entrepreneurs.

Hypothesis 3: There is a positive relationship between an individual’s *outcome expectations* for entrepreneurial activity and his or her *goals* to become entrepreneurs.

Methodology

This section examines the sample data and variables employed in this study.

Sample Data

The study surveyed 115 junior and senior undergraduate business students at an AACSB (American Assembly of Collegiate Schools of Business) accredited south-eastern university in January 2001. Surveys were completed anonymously during regular class time, with a response rate of 100 percent.

Dependent Variables

(A detailed listing of the questions and potential responses used to develop the variables for this study can be found in Figure 2). As previously discussed, the primary dependent variable in the SCCT model is entrepreneurial goals or intentions (used here as interchangeable terms). The survey instrument defined entrepreneurship as “being self-employed in your own business” and asked, “How likely are you to become an entrepreneur?” to measure the dependent variable “entrepreneurial goals.”

A second variable in the model that functions both as a dependent and an independent variable is the “outcome expectations” index. A review of the entrepreneurship literature disclosed several desired outcomes explaining the

decision to become self-employed. Five outcomes frequently mentioned in the literature included (1) monetary rewards, (2) financial security, (3) independence, (4) sense of achievement, and (5) escape from corporate bureaucracy. The researchers multiplied the importance of each outcome by the self-reported confidence that the respondent could achieve the outcome through self-employment. The product of the responses to these two questions for each outcome resulted in five outcome expectations variables: money, financial security, independence, achievement, and bureaucracy. The researchers’ initial intention was to sum the responses to these five variables into an outcomes expectations index. They used Cronbach Alpha to determine internal consistency among the outcome variables. Crano and Brewer (1986) suggest that the degree of internal consistency is considered acceptable if the Alpha coefficient is 0.75 or better. The analysis of internal consistency (see Table 1) indicated that the bureaucracy outcome variable was not internally consistent with the other outcome variables. As a result, the bureaucracy outcome variable was not included in the computation of the outcome expectations index. Removing this item increased Alpha to an acceptable value of .7755.

Independent Variables

The SCCT model includes two independent variables. The first independent variable is entrepreneurial self-efficacy, which was measured by one question designed to assess an individual’s self-confidence in his or her ability to perform the tasks and activities necessary to become an entrepreneur. The second independent variable was the outcome expectations index, which as mentioned above, also functions as a dependent variable.

Research Design. After identifying and computing variables necessary for evaluating the efficacy of the SCCT model, the researchers tested the model, as previously described in Figure 1.

They used regression analysis to assess the ability of the SCCT model to explain self-employment goals, the

Table 1 Impact on Reliability (Alpha) of Removing Outcome Measures for Inclusion in Constructing the Outcome Expectations Index					
Importance of Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
Money	63.2174	230.434	.4699	.3907	.6699
Security	61.6696	200.644	.6522	.4987	.5937
Independence	59.4435	205.582	.6105	.3983	.6116
Achievement	58.5826	223.298	.4756	.2826	.6669
Bureaucracy	63.9391	243.619	.2280	.1130	.7755

Goals: “How likely are you to become an entrepreneur?”				
1 0—20%	2 21—40%	3 41-60%	4 61-80%	5 81-100%
Entrepreneuria/ Self-Efficacy: “How confident are you that you have all the necessary knowledge, skills, and abilities to perform the tasks and activities necessary to become an entrepreneur?”				
1 Not at All Confident	2 Very Little Confident	3 Somewhat Confident	4 Very Confident	5 Completely Confident
Global Outcomes Expectations: Sum the products of the following two questions in each of the four areas.				
1. Earning Lots of Money “How important is it for you to make a lot of money?”				
1 Not at All Important	2 Very Little Importance	3 Somewhat Important	4 Important	5 Extremely Important
“What do you think is the probability of making money by being self-employed?”				
1 0-20%	2 21-40%	3 41-60%	4 61-80%	5 81-100%
2. Financial Security “How important is it for you to have financial security?”				
1 Not at All Important	2 Very Little Importance	3 Somewhat Important	4 Important	5 Extremely Important
“What do you think is the probability of having financial security by being self-employed?”				
1 O—20%	2 21-40%	3 41-60%	4 61-80%	5 81-100%
3. Independence “How important is it for you to be independent?”				
1 Not at All Important	2 Very Little Importance	3 Somewhat Important	4 Important	5 Extremely Important
“What do you think is the probability of being independent if you are self-employed?”				
1 0-20%	2 21-40%	3 41-60%	4 61-80%	5 81-100%
4. Need for Achievement “How important is your need for achievement?”				
1 Not at All Important	2 Very Little Importance	3 Somewhat Important	4 Important	5 Extremely Important
“What do you think is the probability of satisfying your need for achievement if you are self-employed?”				
1 0-20%	2 21-40%	3 41-60%	4 61-80%	5 81-100%

Figure 2. Survey instrument measures

dependent variable. The model predicts that outcome expectations are related to goals. Furthermore, the model predicts that self-efficacy affects goals both directly and also indirectly through their effect on outcome expectations.

Model Results

The SCCT model results are presented in Figure 3 and Table 2. Figure 3 shows significant and complete support for the SCCT model. The Adjusted R² for the regression was .509 (p < .001). A discussion of the findings of each of the three model hypotheses follows.

Hypothesis 1: There is a positive relationship between an individual's entrepreneurial self-efficacy and his or her outcome expectations for entrepreneurial activity.

It is apparent from Table 2 that the dependent variable outcome expectations was significantly positively correlated with the independent variable self-efficacy with a significant (.001) Pearson correlation coefficient of 0.392. Higher entrepreneurial self-efficacy was associated with higher expected outcomes resulting from entrepreneurship. In addition, the model's link between self-efficacy and outcome expectations possessed significant explanatory power, with a t-statistic of 4.533 (p < .001), demonstrating that higher self-efficacy led to higher outcome expectations.

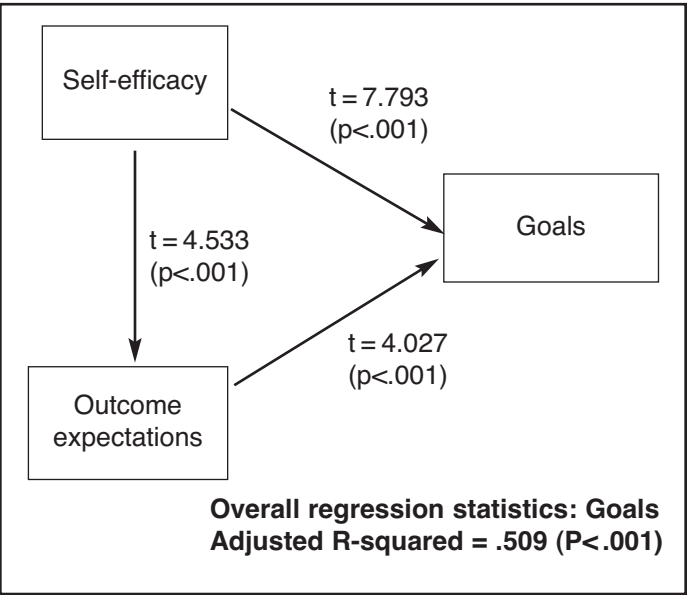


Figure 3. Results for the SCCT model

Hypothesis 2: There is a positive relationship between an individual's entrepreneurial self-efficacy and his or her goals to become an entrepreneur.

An individual's goals to become an entrepreneur were significantly positively correlated with the independent

Table 2 Model Results Pearson Correlation Coefficients		
	Self-efficacy	Outcome Expectations
Goals	.669 ^a	.506 ^a
Self-efficacy		.392 ^a

a. p < 0.001.

variable self-efficacy. Higher entrepreneurial self-efficacy was associated with a higher likelihood to become an entrepreneur with a significant Pearson correlation coefficient of 0.669 (p < .001). Higher entrepreneurial self-efficacy was associated with a higher likelihood that an individual would choose to become an entrepreneur. In addition, the model's link between self-efficacy and goals possessed significant explanatory power, with a t-statistic of 7.793 (p < .001), demonstrating that higher self-efficacy led to higher aspirations toward entrepreneurial activity.

Hypothesis 3: There is a positive relationship between an individual's outcome expectations for entrepreneurial activity and his or her goals to become an entrepreneur.

An individual's goals to become an entrepreneur were significantly positively correlated with the independent variable outcome expectations. Higher expected outcomes from engaging in entrepreneurship was associated with a higher likelihood to become an entrepreneur with a significant Pearson correlation coefficient of 0.506 (p < .001). In addition, the model's link between outcome expectations and goals possessed significant explanatory power, with a t-statistic of 4.027 (p < .001), demonstrating that higher outcomes expectations led to higher aspirations toward entrepreneurial activity.

Discussion

The four positive outcomes pulling people toward entrepreneurship formed an outcome expectations construct: (1) monetary rewards, (2) financial security, (3) independence, and (4) sense of achievement. On the other hand, the negative outcome, escape from corporate bureaucracy, did not correlate with the others. Perhaps this is an indication that people become entrepreneurs because they are attracted by the positive outcomes of entrepreneurship, rather than because they are repelled by the negative outcomes of working for others. Another possibility is that these students have not yet had enough direct experience dealing with corporate bureaucracy to perceive that it is something they wish to avoid.

As hypothesized, respondents in this study formed entrepreneurial goals if they considered themselves to be efficacious and they anticipated positive outcomes from entrepreneurship. As posited, outcome expectations were partly explained by self-efficacy. As Bandura (1986) suggested, respondents expected to attain desired outcomes in activities in which they saw themselves to be efficacious.

The R² for this model was .509; such strong explanatory power is rare in the literature explaining entrepreneurial behavior. Krueger et al. (2000) found R²s of .350 for the Ajzen Theory of Planned Behavior and R² of .408 for the Shapiro–Krueger model. In comparison, trait or attitude typically measure 10 percent of variance in behavior (Ajzen 1987).

Limitations

The sample consisted entirely of undergraduate business students. However, other research (Audet 2000; Krueger et al. 2000) has also relied on student surveys to measure entrepreneurial intentions. The primary goal of the current research was to better understand these students' decisions to become self-employed or work for others. This study was not a simulation using students to predict the behavior of managers or other nonstudent populations. Rather, it was a study of people actually beginning to face career decisions. However, there are students whose intentions are not durable and clear. Also, the findings may not be generalizable to nonstudent populations.

Although cross-sectional research designs are frequently used and considered acceptable in this type of research (Ajzen 1987), the cross-sectional rather than longitudinal design of the study raises the usual caveats regarding lack of causal evidence.

Finally, the use of single-item measures of intentions and self-efficacy raises issues of measurement accuracy. Future research will use multiple-item measures of key constructs to increase validity.

Implications

This research addressed only a portion of the SCCT model. SCCT goes on to predict that intentions/goals will lead to career-related behaviors, such as activity selections and performance attainments.

According to Timmons (1999), America has created more than 34 million new jobs since 1980, while the Fortune 500 lost more than 5 million jobs. Timmons further reported that, since 1980, entrepreneurs have created over 95 percent of the wealth that exists in America today. The success of entrepreneurial activities has resulted in many large firms placing greater emphasis on establishing structures and systems that foster entrepreneurial orientation among managers as a response to declining competitiveness (Lewis, Goodman, and Fandt 2001; Vale and Addison 2002). For these reasons, understanding why people make goals to become entrepreneurs is becoming increasingly important for educators and policy-makers.

Educators, policy-makers, and others wishing to enhance entrepreneurial activity should focus on enhancement of entrepreneurial self-efficacy and outcome expectations. According to Bandura (1986), self-efficacy in an activity such as entrepreneurship develops through four processes: (1) enactive mastery or repeated performance accomplishments, (2) vicarious experience or modeling, (3) verbal persuasion, and (4) autonomic or physiological arousal. Educators may also enhance student's entrepreneurship outcome expectations. A common misconception is that the vast majority of small businesses fail within their first few years. This has a chilling effect on perceptions of outcome expectations. Yet, a large-scale study of the eight-year destiny of small firms (Kirchhoff 1994) found that only 18 percent of all new venture initiations resulted in business failures with losses to creditors. In contrast, 28 percent survived under their original ownership and another 26 percent continued under ownership changes. To stimulate entrepreneurship, perhaps educators should remind students of the high earnings potential an entrepreneurial career makes possible. The best-selling book *The Millionaire Next Door* (Stanley 1999) reported that two-thirds of America's 3.5 million millionaires were self-employed.

Many educational practices may be modified to increase entrepreneurial self-efficacy, outcome expectations, and goals. Further research is planned to recommend specific pedagogical methods and interventions, based on SCCT, that entrepreneurship educators may use to stimulate entrepreneurial goals.

One topic of interest to researchers has been the participation of women (Gundry, Ben-Yoseph, and Posig 2002) and minorities (Masurel, Nijkmamp, and Vindigni 2002) in entrepreneurial activities. This research implies that levels of entrepreneurial intentions of such groups are related to their levels of perceived entrepreneurial self-efficacy and outcome expectations. Enhancing their perceptions of entrepreneurial self-efficacy and outcome expectations may strengthen the entrepreneurial intentions of women and minorities.

If an individual does not wish to become an entrepreneur, it is likely that he or she (1) does not feel efficacious or (2) does not see the outcomes resulting from entrepreneurship as desirable or obtainable. If an individual has low self-efficacy but views entrepreneurship as desirable, he or she might apply some of Bandura's interventions listed above to enhance his or her self-efficacy. Enactive mastery, one of Bandura's four interventions, may be obtained through successful accomplishment of small-scale entrepreneurial activities involving low levels of risk and challenge. If an individual decides not to become an entrepreneur due to low outcome expectations, then it would not be appropriate for him or her to pursue an entrepreneurial career. Even in this instance, it would be wise for that person to determine the accuracy of his or her perceptions. For example, perhaps the failure rate for the proposed new business is not as high as he or she imagine.

References

Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50: 179–211.

Ajzen, I., ed. 1985. *From intentions to actions: A theory of planned behavior*. Heidelberg: Springer.

Ajzen, I., ed. 1987. *Attitudes, traits, and actions: Dispositional prediction of behavior in personality and social psychology* (Vol. 20). NY: Academic Press.

Audet, J. 2000. Evaluation of two approaches to entrepreneurial education using an intention-based model of venture creation. *Academy of Entrepreneurship Journal* 6, 1: 58–63.

Bagozzi, R., H. Baumgartner, and Y. Yi. 1989. An investigation into the role of intentions as mediators of the attitude-behavior relationship. *Journal of Economic Psychology* 10: 35–62.

Bandura, A. 1977. *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. 1986. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. 1989. Human agency in social-cognitive theory. *American Psychologist* 44: 1175–1184.

Beltz, N. E., and G. Hackett. 1981. The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *Journal of Counseling Psychology* 28: 399-410.

Campbell, C. A. 1992. A decision theory model for entrepreneurial acts. *Entrepreneurship Theory and Practice* 17, 1: 21–27.

Crano, W. D., and M. B. Brewer. 1986. *Principals and methods of social research*. Newton, MA: Allyn and Bacon, Inc.

Fouad, N. A., and P. L. Smith. 1997. Reliability and validity evidence for the middle-school self-efficacy scale. *Measurement and Evaluation in Counseling and Development* 30: 17–31.

Gore, P. A., and W. C. Leuwerke. 2000. Predicting occupational considerations: A comparison of self-efficacy beliefs, outcome expectations, and person-environment congruence. *Journal of Career Assessment* 8, 3: 237–250.

Gundry, L. K., M. Ben-Yoseph, and M. Posig. 2002. The status of women’s entrepreneurship: Pathways to future entrepreneurship development and education. *New England Journal of Entrepreneurship* 5, 1: 39–50.

Hackett, G., N. E. Betz. 1981. A self-efficacy approach to the career development of women. *Journal of Vocational Behavior* 18: 326–336.

Hackett, G., and R. W. Lent, eds. 1992. *Theoretical advances and current inquiry in career psychology*. New York: Wiley.

Herron, L., and H. J. Sapienza. 1992. The entrepreneur and the initiation of new venture launch activities. *Entrepreneurship Theory and Practice* 17, 1: 49–55.

Jelinek, M., and J. Litterer, eds. 1994. *A cognitive theory of organizations* (Vol. 5). Greenwich, CT: JAI Press: 3–42.

Kreiser, P. M., L. Marino, and M. Weaver. 2002. Assessing the psychometric properties of the entrepreneurial orientation scale: A multi-country analysis. *Entrepreneurship Theory and Practice* 26, 4: 71–94.

Kirchhoff, B. A. 1994. *Entrepreneurship and dynamic capitalism*. Westport, CT: Greenwood Publishing Group, Inc.

Krueger, N. F., Jr., and A. L. Carsrud. 1993. Entrepreneurial intentions: Applying the theory of planned behavior. *Entrepreneurship & Regional Development* 5: 315–330.

Krueger, N. F., Jr., M. D. Reilly, and A. L. Carsrud. 2000. Competing models of entrepreneurial intentions. *Journal of Business Venturing* 15: 411–432.

Krumboltz, J. D., A. M. Mitchell, and G. B. Jones. 1976. A social learning theory of career selection. *The Counseling Psychologist* 6: 71–81.

Lapan, R. T., P. Shaughnessy, and K. Boggs. 1996. Efficacy expectations and vocational interests as mediators between sex and choice of math/science college majors: A longitudinal study. *Journal of Vocational Behavior* 49: 277–291.

Lent, R. W., and S. D. Brown. 1996. Social cognitive approach to career development: An overview. *The Career Development Quarterly* 44, 310-321.

Lent, R. W., S. D. Brown, and G. Hackett. 1994. Toward a unifying social cognitive theory career and academic interest, choice, and performance. *Journal of Vocational Behavior* 45: 79–124.

Lent, R. W., S. D. Brown, and G. Hackett, eds. 1996. *Career development from a social cognitive perspective* (3rd. ed.). San Francisco: Jossey-Bass Publishers.

Lent, R. W., and G. Hackett. 1987. Career self-efficacy: Empirical status and future directions. *Journal of Vocational Behavior* 30: 347–382.

Levesque, M., D. A. Shepherd, and E. J. Douglas. 2002. Employment or self-employment: A dynamic utility-maximizing model. *Journal of Business Venturing* 17: 189–210.

Lewis, P. S., S. H. Goodman, and P. M. Fandt. 2001. *Management: Challenges in the 21st century*. Ohio: South-Western Publishing.

Lopez, F. G., R. W. Lent, S. D. Brown, and P. A. Gore. 1997. Role of social-cognitive expectations in high school student’s mathematics-related interest and performance. *Journal of Counseling Psychology* 44: 44–52.

MacMillan, I., and J. Kartz. 1992. Idiosyncratic milieus of entrepreneurial research. *Journal of Business Strategy* 13: 25–31.

Masurel, E., P. Nijkamp, and G. Vindigni. 2002. Motivations and performance conditions for ethnic entrepreneurship. *Growth and Change* 33, 2: 238–260.

Praag, C. M. V., and J. S. Cramer. 2001. The roots of entrepreneurship and labor demand: Individual ability and low risk. *Economica* 68, 269: 45–62.

Roy, M. H., B. Elango. 2000. The influence of cognitive make-up on new venture success. *Academy of Entrepreneurship Journal* 6: 64–83.

Shapero, A., ed. 1982. *Social dimensions of entrepreneurship*. Englewood Cliffs: Prentice-Hall.

Shaver, K. G., L. R. Scott. 1991. Person, process, choice: The psychology of new venture creation. *Entrepreneurship Theory and Practice* 16, 2: 23–45.

Smith, S. M. 2002. Using the social cognitive model to explain vocational interest in information technology. *Information Technology, Learning, and Performance Journal* 20, 1:1–10.

Smith, P. L., and N. A. Fouad. 1999. Subject-matter specificity of self-efficacy, outcome expectancies, interests, and goals: Implications for the social-cognitive model. *Journal of Counseling Psychology* 46: 461–471.

Stanley, T. J., and W. D. Danko. 1999. *The millionaire next door*. NY: Simon & Schuster.

Stevenson, H. H., and J. C. Jarillo. 1990. A paradigm of entrepreneurshhip: Entrepreneurial management. *Strategic Management Review* 11, 17–27.

Swanson, J. L., and P. A. Gore, eds. 2000. *Advances in vocational psychology theory and research* (3rd ed.). New York: Wiley.

Timmons, J. A. 1999. *New venture creation* (5th. ed.). Burr Ridge, IL: Irwin McGraw-Hill.

Vale, P. A., and M. Addison. 2002. Promoting entrepreneurship and innovation in a large company: Creating a virtual portfolio. *Journal of Change Management* 2, 4: 334–349.

Vroom, V. H. 1964. *Work and motivation*. New York: Wiley.

Zahra, S., and G. G. Dess. 2001. *Entrepreneurship as a field of research: Encouraging dialogue and debate*. Academy of Management Review 26, 1: 8–10.



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Encouraging Technology-Based Ventures: Entrepreneurship Education and Engineering Graduates

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This article examines entrepreneurship courses offered by engineering faculties in Canada. The venturing rate of engineering students, whether the venturing rate increases if students have taken a course in entrepreneurship, and the type of ventures created are also explored. A recent census and an empirical study of two groups of engineering graduates from a Canadian university were utilized. Findings have implications for educators and administrators and for policy-makers interested in encouraging economic growth.

Graduates from university faculties of engineering are perhaps the most promising cohort from which we would expect high-technology start-ups. Apart from their exceptional academic skills, these graduates have an in-depth knowledge of technology in a specific area and have worked on practical projects throughout their degree studies. They may also, on graduation, work for a technology-related company and thus be accumulating the skills, knowledge, and personal readiness (e.g., financial, networking) for launching their own business. In addition, some of these engineering graduates may have taken courses in entrepreneurship during their engineering degree studies. Entrepreneurship education has been touted as valuable in encouraging venturing and with increasing the success of ventures (Gillin and Powe 1994; Gorman and Hanlon 1997; Hood and Young 1993; McMullan and Vesper 1987; Timmons 1999; Wyckham and Wedley 1990; Young 1997). Specifically, in relation to engineers, Blais (1997) cites multiple advantages for providing engineering students with courses in entrepreneurship. These include nurturing a sociological perspective within engineering students including teamwork and joint initiatives, creativity, innovation, and practical applications as well as teaching them the specifics of new venture creation. Entrepreneurship education is also valuable for graduates who pursue a position within a larger corporation (Hood and Young 1993).

Because technology-based start-ups and ventures have considerable payoff at the personal, regional, and national level, it is appropriate to study how they are nurtured. This article looks at what faculties of engineering are doing to encourage students to pursue a career as an entrepreneur. It also explores the venturing rate and type of ventures started by graduates of one faculty of engineering. The research questions posed in this article are:

1. Do faculties of engineering provide entrepreneurship education? What is the breadth and depth of these offerings?
2. Do engineering graduates venture at a rate above the population in general?
3. Is there a difference in venturing rates according to whether graduates have taken an entrepreneurship course during their undergraduate degree?
4. Do engineering graduates start technology-related ventures?

Previous Literature

Surveys of the incidence and type of entrepreneurship courses have been conducted (Blais 1997; Duke 1996; Gartner and Vesper 1994; McMullan and Vesper 1987; Menzies and Gasse 1999; Vesper 1985, 1993; Vesper and Gartner 1997, 1999; Vesper and McMullan, 1988). Vesper and Gartner are the most well known for their surveys of entrepreneurship education worldwide. As would be expected, their surveys show a tremendous growth over the last 20 years in entrepreneurship education at universities. Looking at Canada in particular, a Canadian Academy of Engineering 1996 survey showed 33 (79%) engineering schools in Canada that either offered, or were intending to offer, undergraduate courses on entrepreneurship and closely related subjects (Blais 1997). In their census of entrepreneurship education offered by universities in Canada, Menzies and Gasse (1999) found that 52 (98%) universities offer entrepreneurship education, mostly within their faculties of business, and that undergraduate entrepreneurship courses were offered in only 16 (48%) faculties of engineering (see Table 1). In some universities, engineering students can take entrepreneurship courses offered by the faculty of business, however, unless there is a formalized program, this may not be easy for students to schedule into their course load. Very few entrepreneurship courses are offered to engineering students at the graduate level.

Range of Entrepreneurship Courses

Table 2 shows the types of courses offered in the engineering schools. The norm is to offer one or two courses. These courses are most commonly an introduction to the field of entrepreneurship, with some orientation toward technology start-ups. The second most common type of course deals with business planning and start-up activities. Additional courses are offered on management of a