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The validation of the Educational Outcome Expectancy Scale

by

Brian Patrick Tilley

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE

Major: Psychology

Program of Study Committee:
Lisa Larson, Major Professor
Fred Borgen
Frederick Lorenz

Iowa State University

Ames, Iowa

2003

Graduate College
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This is to certify that the master's thesis of

Brian Patrick Tilley

has met the requirements of Iowa State University

Signatures have been redacted for privacy

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The researcher owes a great deal to others in his life for the work completed on this thesis. First and foremost, the researcher would not be where he is today, nor even close to here, were it not for the seemingly endless sacrifice and selflessness of his parents. Patrick Lyman Tilley and Ellen Marie Tilley are two of the greatest people in the world and it is only on their shoulders (to borrow a phrase) that he was able to see the far-off horizon of his dreams. This thesis would have never even gotten off the ground had it not been for the vision (and prodding) of Dr. Lisa Larson and Dr. Fred Borgen. Lisa has been a steady influence during a storm of tables, figures, and SPSS outputs. Her vision helped the researcher put the thesis in perspective. But above all, she has been a friendly, helpful, supportive face for the researcher since his arrival at Iowa State University. Fred, a man with a true passion for Vocational Psychology, has been very giving to the researcher. Dr. Fred Lorenz also deserves credit for helping to shape this thesis as well. All in all, the researcher is grateful for the hard work and dedication of these people, without whom not even an initial draft of this thesis would have been possible. I only hope I can live up to the example you have set for me.

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ABSTRACT

This study presents convergent, discriminant, and predictive validity estimates for the Educational Outcome Expectancy Scale (EOE; Larson, Springer, Tilley, & Gasser, 2001). The EOE is a measure of educational outcome expectancies that is anchored in the social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994). SCCT proposes that the main three processing mechanisms that underlie social cognitive theory (SCT; Bandura, 1986) as it relates to career are self-efficacy (SE), outcome expectancies (OEs), and goal representations. The author examined the workings of SE and OEs within the framework of SCT and SCCT and how they are measured within career and educational domains. A sample of 846 participants completed the EOE and two self-efficacy measures. A subset of 195 also reported GPAs and ACT scores. Hypotheses were that educational OE would correlate moderately positively with academic self-efficacy, persistence, aptitude, and achievement. The results provided some psychometric support for the EOE. Specifically, the EOE was shown to have convergent validity in that it moderately correlated with academic SE as expected. Some discriminant validity was also shown in that students currently enrolled had higher EOEs but not higher academic SE compared to those students that had dropped out. Conversely, academic SE moderately correlated with achievement and aptitude while EOE did not. Finally, some predictive validity was also established. The EOE seems to play a small role in academic persistence six months later.

INTRODUCTION

Lent, Brown, & Hackett's (1994) social cognitive career theory (SCCT) proposes that the main three processing mechanisms that underlie social cognitive theory (Bandura, 1986) as it relates to career are self-efficacy (SE), outcome expectancies (OEs), and goal representations. For the purposes of this thesis, SE and OEs will be discussed prominently.

Self-efficacy (SE) is defined in Lent et al. (1994) as the beliefs about one's ability to perform in a given domain in the near future. The nature of this construct is dynamic; it can develop over time. According to SCT, people's abilities in an area are best realized and manifested when they are high in efficacy in that area. In other words, they are more likely to perform at a level most closely matching their abilities when they have high efficacy beliefs about those abilities. Self-efficacy is an area that has drawn a great deal of attention in the literature.

Outcome expectancies (OEs) are personal beliefs about probable outcomes. According to SCT, people act partially on the beliefs they have about the possible consequences of their actions. The areas in which these consequences can be manifested include, but are not limited to, physical, social, self-evaluative, and educational outcome expectancies. Like SEs within a given domain, OEs can be domain-specific as well. The relationship between SE and OE is important because it provides the link between OE and interest through the Skills Confidence Inventory (Betz, Borgen, & Harmon, 1996), a vocationally-based measure of SE.

In order to understand the relationship between SE and OE, the two will be examined as they are commonly studied in the literature, beginning with SE and then moving to OE. The author will examine the workings of SE and OE within the framework of SCT and

SCCT and how they are measured within those frameworks. In other words, whereas SCT has served as the theoretical underpinnings of SCCT, SCCT has served as the basis for several SE and OE scales.

Research has shown SE and OEs to have numerous impacts. For example, SE and OEs have been shown to play a role in the choice of career (e.g., Wheeler, 1983; Lent, Brown, & Hackett, 2000). Conceptual articles have attempted to define the role of SE and OE in career development (e.g., Morrow, Gore, & Campbell, 1996; Hackett & Byars, 1996; Chartrand & Rose, 1996). These articles advocate the positive influence of SE and OE on career development. In addition, SE and OEs have also been shown to play a role in educational achievement (Brown, Lent, & Larkin, 1989; Lent, Brown, & Gore, 1997). In fact, numerous studies on the specific category of academic SE—personal beliefs about one's ability to perform in an academic setting—(e.g., Shell, Colvin, & Bruning, 1995; Lent et al., 1997; Hackett & Betz, 1989) and academic (or educational) OE—personal beliefs about the outcomes of his or her education—(e.g., Lent, Lopez, & Bieschke, 1991; Brown, Eisenberg, & Sawislowski, 1997) exist in the literature as well. The research presented in this section showed SE and OEs to be positively correlated in a variety of career- and education-related areas. This provides support to the SCCT position that SE and OE are related.

A multitude of career and educational SE measures exist, such as the Occupational Self-Efficacy Scale (OSES; Betz & Hackett, 1981), the Career Decision-Making Self-Efficacy Scale (CDSME; Taylor & Betz, 1983), the Math Self-Efficacy Scale (MSES; Betz & Hackett, 1983), the Task-Specific Occupational Self Efficacy Scale (TSOSS; Osipow & Rooney, 1989), the Academic Self-Efficacy Scale (ASE; Larson, Toulouse, Fitzpatrick, & Heppner, 1994), and the Skills Confidence Inventory (SCI; Betz, Borgen, & Harmon, 1996).

However, only a relative few broad-based career or educational OE measures exist, most of which are subject-specific (e.g., Hackett, Betz, Casas, & Rocah-Singh, 1992; Shell et al., 1995; Fouad & Smith, 1996; Fouad, Smith, & Enochs, 1997).

Even within this category, the research is limited. This thesis used the requirements that the scale must tell the researcher something across items (in other words, there must be some form of summing procedure that yields results informative of an overall educational OE of the subject) and it must be applicable to a wide range of people. The Educational Outcome Expectancy Scale (EOE; Springer, Larson, Tilley, & Gasser, 2001) fits these criteria. The EOE measures college students' expectancies regarding the consequences of pursuing their chosen educational goal (e.g., 2-year college, 4-year college, graduate school, professional degree/doctoral degree). Larson et al. presented initial reliability and construct validity estimates for the EOE. Through an exploratory and confirmatory factor analysis across two samples, the EOE was shown to be a unified construct. It also appeared to be internally consistent and have appropriate 3-week test-retest reliability. However, no convergent or predictive validity data has been collected for the EOE as of yet. This study attempted to provide convergent and predictive validity estimates for the EOE.

Dawis (1987) states that if a scale is valid, it will produce results that are similar to those of related scales. Therefore, we used two other scales that either measure OE or SE in order to ascertain convergent validity. Scales using SE (i.e., the SCI and the ASE) were employed because SCCT purports that SE and OE should moderately correlate and studies have reported moderate correlations with other measures of SE and OE (Maddux, Sherer, & Rogers, 1982; Shell et al., 1995; Lent et al., 1991).

The research clearly links career-related SE to OE (e.g. Maddux, Sherer, & Rogers, 1982; Hackett & Betz, 1995; Lent & Brown, 1996; Lent et al., 2000). The ASE, which measures SE, will be used in conjunction with the EOE, which measures OE, to test the proposition that there will be a positive correlation between SE and OE. For the purposes of this thesis, the link the author examined was between academic SE (as measured by the ASE) and academic OE (as measured by the EOE). If such a link were found between the two, this would strengthen the existing literature that SE and OE are related by supporting SCCT's claim in the area of education, an area that is covered less in-depth in the literature than the career domain. Finding this link would also lend support to the EOE as a valuable tool because there are no existing measures of educational OE that match the specifications mentioned earlier.

As noted at numerous points, SE and OE have been shown to be related (e.g. Maddux, Sherer, & Rogers, 1982; Hackett & Betz, 1995; Lent & Brown, 1996; Lent et al., 2000). Another goal of this thesis was to provide support for the EOE by correlating it with the SCI, a measure of SE. What makes the SCI special is that it measures SE and breaks it down into specific interest areas as per Holland's (1959, 1997, 1999) RIASEC hexagon (which will be discussed in more detail in the Rationale for Hypotheses section). This study attempted to correlate the EOE with the SCI in such a fashion that the EOE broke down into six areas just as the SCI does. The EOE has seven items that will load on the RIASEC code. This was done by item content; each item should fall in a different region of the hexagon.

The SCI was specifically used to investigate the relationship of interest as explained by Holland's RIASEC (1959, 1997, 1999) model to OE. The main reason for concentrating on the RIASEC model was to address the apparent lack of extant research on this

relationship. The Holland code has been applied and supported time and time again by research within the vocational field. If a link was found between SE as operationalized in the SCI and OE as operationalized in the EOE, that would lend great support to the EOE as a measure.

The students' ACT scores were also used because of their usage by the university to assess academic aptitude. Another part of validity is predictive validity, which assesses whether the measure can be used to accurately predict outcomes or scores on other measures. Since the very nature of OE is linked to the outcomes themselves, the outcomes used were a) continued enrollment seven months after the EOE was measured and b) semester Grade Point Average (GPA) four months after the EOE was measured.

These findings should be important to counseling psychology. The EOE is a seven-item scale, whereas many of the scales used to measure SE and OE are much longer. From a practical point of view, it would behoove the researcher to use the EOE. But even more importantly, if this study shows a relationship between academic SE, educational OE, and RIASEC a new link in career psychology specifically and counseling psychology in general will be formed. This measure should be able to tell researchers about various dimensions of the participant using one scale.

LITERATURE REVIEW

SCT and SCCT: A Brief Overview

Bandura's (1986) social cognitive theory (SCT) is based on the assumption that there are three mechanisms that describe the relations between a person and her or his behavior. This model is known as the model of triadic reciprocity. This model consists first of the person factor. The person factor includes cognitions, feelings, and motivations. The second part of the model is environmental attributes such as the surroundings of the person. This is the state of the current surroundings of the person. The third part of the model is the individual's behavior. Prior to Bandura, the prevailing notion was that current behavior was a function of the interaction between people and their environments and their past behavior. The difference with social cognitive theory was this theory of triadic reciprocity: that each variable affected and was affected by the other.

Whereas the model of triadic reciprocity was the focus of the 1986 paper, it was the mechanisms that underlie the functioning of the model that had a great influence in the field of vocational psychology. Lent, Brown, & Hackett's (1994) social cognitive career theory (SCCT) elaborates on Bandura's model by discussing the main three processing mechanisms that influence the functioning of the triadic reciprocity model in making career decisions: self-efficacy, outcome expectancies, and goal representations. Self-efficacy, outcome expectancies, and goal representations are posited by SCCT to be related in numerous ways. The relationships between these three variables play a large role in determining the functioning of the triadic reciprocity model. Specifically, the research has shown self efficacy and outcome expectancies to be strongly related (as will be discussed in greater detail later) in the career domain (e.g. Maddux, Sherer, & Rogers, 1982; Hackett & Betz, 1995; Lent &

Brown, 1996; Lent et al., 2000). Thus, for the purpose of this thesis, self-efficacy and outcome expectancies will be the focus of the literature review.

Self-efficacy (SE) is defined in Lent et al. (1994) as the beliefs about one's ability to perform in a given domain in the near future. The nature of this construct is dynamic; it can develop over time. According to SCT, people's abilities in an area are best realized and manifested when they are high in efficacy in that area. In other words, they are more likely to perform at a level most closely matching their abilities when they have high efficacy beliefs about those abilities. Self-efficacy is an area that has drawn a great deal of attention in the literature.

Outcome expectancies (OEs) are personal beliefs about probable outcomes. According to SCT, people act partially on the beliefs they have about the possible consequences of their actions. The areas in which these consequences can be manifested include, but are not limited to, physical, social, self-evaluative, and educational outcome expectancies. Like SEs within a given domain, OEs can be domain-specific as well. The relationship between SE and OE is important because it provides the link between OE and interest through the Skills Confidence Inventory (Betz, Borgen, & Harmon, 1996), a vocationally-based measure of SE.

As stated earlier in the section on SCT, SE and OE both play a role in the functioning of the model of triadic reciprocity. As seen in the literature, SE and OE both affect many specific fields in similar ways. In the career domain (e.g. Maddux, Sherer, & Rogers, 1982; Wheeler, 1983; Lent et al., 2000), the research is plentiful linking the effects of SE to OE.

According to SCCT, SEs and OEs are related in that they each play an individual role in the triadic reciprocity model. The researcher now examines the studies that link the

functioning of SE and OEs. As stated above, self-efficacy is defined in Lent et al. (1994) as the beliefs about one's ability to perform in a given domain in the near future. The nature of this construct is dynamic, and as such it is a mechanism that can develop over time. As was also earlier noted, OEs are personal beliefs about probable outcomes. According to SCT, people act partially on the beliefs they have about the possible results of their actions. Like SEs within a given domain, OEs can be domain-specific as well. The umbrella under which these domains exist, for the purposes of this study, will be the career domain.

Self-Efficacy and Outcome Expectancies in the Career and Educational Domains

The relationship between SEs and OEs as seen in the literature were examined in the larger career realm, with three subdivisions: career choice, career development, and the educational domain. The goal of the paper was directly tied to the validation of an outcome expectancy measure. The researcher has already discussed OEs above in the frame of SCCT, a career psychology theory. Therefore, for the purposes of this review, only literature that pertained to career psychology was included.

SE and OE in Career Choice

The review conducted for this section yielded nine articles that matched the criteria of focus on career choice using SE and OE according to the specifications of SCCT. Four of these were conceptual in nature and five of these were empirical in nature. The researcher discusses the conceptual research first, followed by the empirical research.

SE and OE in Career Choice: Conceptual literature

Career choice is defined as the actual selection process that results in the choice of a career. Hackett and Betz (1995) have studied the impact of SE and OE on this process in that

they recognized the very important connection between educational decisions and career choices. As they noted in their introduction, in their previous papers they had already covered the impact of early self-efficacies of both men and women in later career development. This led them to conclude from the aforementioned review that self-efficacy is “predictive of a wide range of choice behaviors, as well as academic achievement and persistence in career-related pursuits.” Betz (2000) conducted a similar review that addressed the relevance of SCCT and self-efficacy specifically to multiple models of vocational psychology. However, she added a section addressing the possible applications of this theory to women and racial/ethnic minority groups. Betz noted that after suggesting that gender-role socialization moderated career development in women two decades earlier (Hackett & Betz, 1981), numerous studies have supported this position (Betz & Hackett, 1981; Layton, 1984; Post-Kammer & Smith, 1985). Furthermore, she recognized the work of several papers that have applied said position to multiple ethnic groups and achieved results similar to what she predicted: that role socialization plays a large role in career development, especially in setting up barriers.

Brown and Lent (1996) addressed the seemingly less than straightforward nature of SCCT’s implications for counseling by highlighting the facets of SCCT they saw as most helpful for practice. The first suggestion, identification of foreclosed occupational options, is rooted in an understanding of the self-efficacy of the client in several possible career arenas, most notably those which the client has (wrongly, in many cases) deemed unattainable or unsavory because of a lack of efficacy or “faulty” outcome expectancies. Similarly, Brown and Lent discussed the importance of breaking down potential career barriers that prevent many career clients from pursuing many lucrative career options. They also suggested that

counselors facilitate the modification of self-efficacy beliefs through positive performance experiences that can build efficacy. As in the previous article, Lent and Brown (1996) examined career barriers. But the Lent and Brown paper additionally concentrated on the extra-person or context variables in the implementation of SCCT. Lent and Brown's conceptual paper served as an overview for the following study.

SE and OE in Career Choice: Empirical Research

Lent, Brown, and Hackett (2000) examined career barriers using the Lent and Brown (1996) paper as a basis. As the Lent and Brown (1996) conceptual paper did, the Lent et al. (2000) paper also concentrated on the extra-person or context variables in the implementation of SCCT. Lent et al. found that these contextual variables consisted mostly of environmental factors that can influence career choice in both positive (supports) as well as negative (barriers) ways. They found proximal (immediate) and distal (background) contextual variables to be moderators of the relationships between interests and choice goals, and furthermore goals to actions. Based on these results, they ultimately proposed several possibilities for studying the environment of career choice, such as determining the relationship of the environment to expectancies or studying the reasons people may see a factor as a support or a barrier.

One of the main barriers is a perceived sex line that holds one sex (usually females) back from engaging in healthy career exploration (which could lead to increased self-efficacy and more positive and better-defined outcome expectancies) in a certain area. Wheeler (1983) also studied career choice by examining the role of expectancy models and self-efficacy models in the occupational preferences of male versus female college students. He found support for both models empirically, using a questionnaire administered to college

students. Additionally, he found that self-efficacy may play a role in the sex differences in occupational preferences, especially math-related and other “male-dominated” ones.

But this type of sex barrier, self-constructed or societal, is not the sole cause of complicated interplay between the self-efficacy of the student and his or her career development. Betz and Klein (1996) attempted to sort out the relationships among measures of career self-efficacy, generalized self-efficacy, and global self-esteem by collecting data on several measures of the above domains (the measures will be discussed later). They analyzed this data by calculating correlations between the domain-specific and the general measures (separated by sex) and evaluated these correlations using a z test. Betz and Klein statistically determined that career decision-making self-efficacy was the best predictor of generalized self-efficacy; this appears to be a rousing endorsement for the use of career decision-making self-efficacy measures as a predictive tool and a solid support for career choice-focused research as a whole.

Lent, Brown, Brenner, Chopra, Davis, Talleyrand, and Suthkaran (2001) investigated the role of math/science-related SE and OE in career choice. They found that math SE and OE were, both together and separately, predictive of math interests. Math OE was found to be linked directly to math-related career choice and it was also found to be related to math career choice through interest. The link between math SE and choice was found to be mediated by interests and math OE.

Maddux, Sherer, & Rogers (1982) discussed the influence of self-efficacy on outcome expectancies, using SE and OEs based on an interpersonal communication technique. Using the theory that self-efficacy and outcome expectancy are two independent constructs as a null hypothesis, Maddux et al. proceeded to empirically support the alternate.

After providing written materials meant to influence efficacy and expectancies from the subjects, they administered a post experiment questionnaire to ascertain the effects of the materials. They found evidence to support the idea that efficacy and outcome expectancy are not independent of each other, that high outcome expectancies for performance on a task were correlated with a rise in self-efficacies for successfully performing that task.

SE and OE in Career Choice: Summary

The empirical research has supported the value of OEs in career choice (Lent et al., 2000). Research has also supported the value of SE in career choice (Betz & Klein, 1996). The contention that SE and OE are related in the domain of career choice was also supported (Wheeler, 1983; Maddux et al., 1982; Lent et al., 2001). This provides support to SCCT in that SE and OE were shown to be influential and related in the domain of career choice.

SE and OE in Career Development

The review conducted for this section yielded five articles that matched the criteria of focus on career development using SE and OE according to the specifications of SCCT. Career development appears to be a somewhat nebulous concept. The bulk of the literature is devoted to defining this concept and its influence. Thus, all five of the studies presented here are of a conceptual nature.

Lent and Hackett (1994), while focusing on the defense of vocational theory against the erstwhile zeitgeist of cognitive theory, provided a comparison of SCCT to already-existing career theories. They cite external variables (from Bandura's 1986 model of triadic reciprocity) as the main commonality between SCCT and the "Big Four" vocational theories/theorists (Holland, Krumboltz, Super, and Theory of Work Adjustment). They noted

that self-efficacy and outcome expectancies were among the unique, although theoretically concordant, contributions of SCCT.

Lent, Hackett, and Brown (1999) based their recommendations for interventions in students' career development on the principles of SCCT. Lent et al. emphasized that the transition is more of a process than an event, which embeds it as part of the career development process. The smoothness of the transition and the strength of the foundation for the transition hinges, according to Lent et al., on well-developed self-efficacies and realistic outcome expectancies.

Sexual orientation, gender, and ethnic background are important factors in the study of career development, but they are not the only factors. Chartrand and Rose (1996) discussed the possibilities of applying SCCT to the career development of at-risk populations, specifically with adult female offenders. The two studied this population using the PROVE (Preventing Recidivism through Opportunities in Vocational Education) program which applies the concept of triadic reciprocity. They found SCCT to be particularly impactful because of its recognition of environmental factors.

Morrow, Gore, and Campbell (1996) recognized SCCT as a model that moves beyond trait-factor theories to synthesize conceptually related constructs. Morrow et al. applied the principles of SCCT, most notably self-efficacy and outcome expectancies, to the career development of lesbian women and gay men. Along the same vein of multicultural applications of SCCT, Hackett and Byars (1996) applied self-efficacy theory to the career development of African-American women. Hackett and Byars found through a conceptual analysis that the main elements captured by the use of SCCT were the weight of early influences such as SES and the role of constantly changing environmental and contextual

variables such as the barriers mentioned earlier. They also noted a phenomenon they called the attitude-achievement paradox, which is essentially an explanation for the often-low outcome expectations that have been documented in this demographic.

SE and OE in Education Domain

The review conducted for this section yielded 13 articles that matched the criteria of focus on the education domain using SE and OE according to the specifications of SCCT. Unlike the career development domain, there is a comparatively large proportion of empirical research. In fact, all of the articles presented in this section are empirically based.

SE in Education Domain

Lent, Brown, and Larkin (1984) as well as Brown, Lent, and Larkin (1989) studied the moderating effects of academic self-efficacy on the relationship between scholastic aptitude and academic achievement as measured by grade point average (GPA) and persistence as measured by remaining enrolled. Lent et al. (1984) was conducted based on technical (math-related) measures and therefore showed similar findings to Brown et al. (1989), but only in the mathematics-related domain. Brown et al. (1989) found that the influence of global self-efficacy was stronger on low-aptitude students than on higher ones while personal and specific self-efficacy demonstrated consistently powerful and additive effects on grades and persistence 1 year following collection of the data.

Hackett, Betz, O'Halloran, and Romac (1990) isolated a section of the Math Self-Efficacy Scale (MSES; Betz & Hackett, 1983) called the College Course subscale for the purposes of their study. This section consists of items designed to measure career self-efficacy as it pertains to math-related ("nontraditional") and non-math-related ("traditional") college courses. As is usually the case with these types of studies Hackett et al. reported

higher efficacies for men than women on the math-related items. Conversely, the “dummy” or irrelevant task used as a control garnered more attention to detail and performance from the females, presumably because it was verbally based. They concluded that career-related self-efficacy was strongly and significantly related to interest, especially on the math-related items.

Lent, Brown, & Gore (1997) investigated mathematics-specific self-efficacy to determine whether it was (a) a completely separate form of self-efficacy, (b) a part of academic self-efficacy or perhaps academic self-concept, or (c) a dimension that is neither completely distinct nor completely engulfed by the more global formulations of self-efficacy. Lent et al. used independent measures of self-efficacy and self-concept and used dependent measures of mathematic achievement and overall achievement. They determined that each domain was separate but related and that self-efficacies and self-concepts predicted mathematic-specific performance better than overall performance. Hackett and Betz (1989) also investigated the empirical relationship between mathematic self-efficacy and mathematic performance. They found that mathematic self-efficacy predicted the choice of a mathematics-related major better than any of the other constructs.

Lent, Lopez, Brown, and Gore (1996) conducted two studies to determine the nature of the underlying structure of SE information sources using factor analysis. They found a good fit for a five-factor model that supports the theoretical assumptions of SCT regarding the structure of the primary sources of mathematics SE. This five-factor model is headlined by personal performance and evidence for a higher order factor structure.

Both SE and OE in Education Domain

Bores-Rangel, Church, Szendre, and Reeves (1990) provided strong support for SCCT views of career and academic SE. Bores-Rangel et al. (1990) found moderate relationships between academic SE and OE and academic achievement (although academic achievement was not measured using GPA). This lends further support to the link between academic SE and academic performance discussed in Brown et al. (1989) and Lent et al. (1984).

Specific self-efficacies take on many forms, one of which is an educationally domain-specific form, such as reading and writing self-efficacy. Shell, Colvin, & Bruning (1995) examined self-efficacies and outcome expectancies for reading and writing concurrently at several grade levels using measures for both of the above constructs as well as a reading and a writing assessment. They found that students' self-efficacy and outcome expectancy beliefs were positively correlated to their performance on reading and writing assessments. Although Shell et al. concentrated on the reading and writing products of self-efficacy, much of the research to date has centered on mathematics-specific self-efficacy.

Using hierarchical regression, Lent, Lopez, and Bieschke (1993) examined the relationship between math-related academic SE and OE and their effects on aptitude (ACT) and performance (grades). They reported a positive correlation between math-related academic SE and performance on math tasks and a positive correlation between math-related academic SE and OE and the Mathematics section of the ACT. The regression revealed that, even though gender was always the first factor entered, math-related SE accounted for a significant portion of the R^2 change in the mathematics interest, intentions, and performance

(grades) regressions. Math-related OE also added significant R^2 change when factored in after math-related SE in the mathematics interest and performance (grades) regressions.

Brown, Eisenberg, and Sawislawski (1997) administered questionnaires to female college engineering and math education majors to determine the women's educational outcome expectancies and their occupational values. They attempted to determine whether differences in outcome expectancies could sort women in a traditionally male-dominated field (engineering) from women in a more open field (math education). Brown et al. found that outcome expectancies based on "traditional" vocations played a large role in differentiating between the women in the two majors, and self-efficacy for those "traditional" vocations played an even larger role than OE.

Lopez, Lent, Brown, and Gore (1997) used path analyses of math/science interest to support a model that reports the positive correlation between educational SE and educational OE as posited in SCCT (Lent et al., 1994). Lopez et al.(1997) also found a positive correlation between academic SE and achievement as measured by course grades. Lent, Lopez, and Bieschke (1991) used the relationships among sources of efficacy information and the relations among self-efficacy, outcome expectancies, and interest in mathematics courses to explore the overall association between mathematics self-efficacy and a science-based career choice. They used data retrieved from measures of mathematics self-efficacy and outcome expectancies, subject-reported interest in mathematics, career choice, and perceived source of mathematics self-efficacy to statistically determine the relationships. Lent et al. found that outcome expectancies "complimented self-efficacy" in predicting career choice (but the effects of self-efficacy itself were mediated by interest) and also

determined that efficacy information sources were particularly important in predicting mathematics self-efficacy (and in explaining sex differences on that construct).

Gainor and Lent (1998) examined the math-related academic SE and OEs of African-American college students. They found that math-related SE and OE had similar roles in this population as math-related SE and OE have been found to play in other studies with mainly European-American participants (Lent et al., 1991, Lent et al., 1993). They also found math-related SE to affect math-related interests directly and through math-related OE. In addition, Gainor and Lent (1998) found support for the positive correlation between math-related SE and OE, and achievement.

Smith and Fouad (1999) examined academic subject domain specificity of educational SE and OE. They found that educational SE and educational OEs are subject-specific in the educational domain. They did not recommend the use of educational SE or educational OE generalized across subjects but rather recommended treating each subject separately. These recommendations were based on the results of a factor analysis that could not produce a good fit for one factor SE or OE across educational subject areas. This prompted Smith and Fouad to recommend further study beyond the plentiful research done in the math/science realm (Lent et al., 1991, 1993, 1996; Brown et al., 1997; Lopez et al., 1997; Gainor & Lent, 1998) because the results indicated that it was possible that the findings in the math/science realm might not be generalizable to other subject areas.

Fouad, Smith, and Zao (2002) addressed this very issue by investigating SCCT principles, including the roles of SE and OE, across educational areas of art, social science, math/science, and reading/writing. Fouad et al. (2002), using structural equation models, found support for the SCCT-based concept of the relationship of SE and OE in the

educational domain: that SE and OE are positively correlated and influential in the educational domain. They found that relationships between SE and OE were similar across all four areas (art, social science, math/science, and reading/writing).

SE and OE in Education Domain: Summary

Research has supported the positive influence of SE on GPA (e.g., Lent et al., 1984; Brown et al., 1989, Lopez et al., 1997) and persistence (Lent et al., 1984, 1986, 1987; Brown et al., 1989). The GPA literature was particularly important to this thesis because it supported the influence of academic SE on GPA, but no findings have specifically supported a positive influence of educational OEs on GPA. Two studies reported null findings (Hackett et al., 1992; Lent et al., 1993) and one other study showed a link of OE to achievement (Gainor & Lent, 1998). A major task of this thesis was, based on that link, to find more evidence to support it. The persistence piece was of importance as well. Just as with GPA, there is a link provided between SE and persistence in the literature (Lent et al., 1984; Brown et al., 1989) but not between OE and persistence. Therefore, this thesis also investigated the predictive power of educational OEs on persistence as measured by continued enrollment. Research has also found SE and OE to positively affect reading and writing (Shell et al., 1995). A number of studies have also found support for the role of SE in mathematics-related domains (e.g., Hackett & Betz, 1989; Lent et al., 1997). There has also been support for SE and OE in the mathematics-related domains (Lent et al., 1991; Lent et al., 1993; Lent et al., 1996, Brown et al., 1997; Lopez et al., 1997; Gainor & Lent, 1998) as well as across different educational domains (Smith & Fouad, 1999; Fouad et al., 2002).

Summary

Research has shown SE and OEs to have numerous impacts. For example, SE and OEs have been shown to play a role in the choice of career (e.g., Wheeler, 1983; Lent et al., 2000). Conceptual articles have attempted to define the role of SE and OE in career development (e.g., Morrow et al., 1996; Hackett & Byars, 1996; Chartrand & Rose, 1996). These articles advocated the positive influence of SE and OE on career development. In addition, SE and OEs have also been shown to play a role in educational achievement (Brown et al., 1989; Lent et al., 1997). In fact, numerous studies on the specific category of academic SE—personal beliefs about one's ability to perform in an academic setting—(e.g., Shell et al., 1995; Lent et al., 1997; Hackett & Betz, 1989) and academic (or educational) OE—personal beliefs about the outcomes of his or her education—(e.g., Lent et al., 1991; Brown et al., 1997) exist in the literature as well. The research presented in this section showed SE and OEs to be positively correlated in a variety of career- and education-related areas. This provides support to the SCCT position that SE and OE are related.

Outcome Expectancies in the Career and Educational Domains

As was shown in the previous section, research has supported the positive correlation between SE and OEs. Remember that OEs are personal beliefs about probable outcomes. According to SCT, people act partially on the beliefs they have about the possible consequences of their actions. The areas in which these consequences are manifested include, but are not limited to, physical, social, self-evaluative, and educational outcome expectancies. These beliefs are OEs. Like SEs within a given domain, OEs can be domain-specific as well.

Although a great deal of research has been conducted on the SE end of the SE-OE

link, there has been relatively little of research on the career and educational areas studying OE apart from SE. As part of a literature search conducted on PsychInfo, the author found hundreds of articles published in the last 20 years about OEs (also known in some parts of the literature as outcome expectations). The great bulk of these articles are based on expectations for the effects of alcohol, the effectiveness of condom use, or other non-career related fields. Those articles that did concentrate on career- or education-related OEs were part of the SE-OE research base described in the preceding section. It appears that career- or education-based OEs have not been studied apart from research linking it to some form of SE.

Although career- and education-based OEs have had little research investigating it separate from SE, career-related and education-related SE has a wealth of literature measuring it on its own, as will be explored in a later section. One would expect, since SE and OE both play important roles in SCCT, that OE have a similar number of robust measures available. Unfortunately, that is not the case. What follows is a review of what the author feels are appropriate measures of educational OE, given the criteria that the scale must tell the researcher something across items (in other words, there must be some form of summing procedure that yields results informative of an overall educational OE of the subject) and it must be applicable to a wide range of people.

Measures of Outcome Expectancies

Five articles contained potential educational OE measures. This thesis used the requirements that the scale must tell the researcher something across items (in other words, there must be some form of summing procedure that yields results informative of an overall educational OE of the participant) and it must be applicable to a wide range of people,

especially college students. An appropriate scale would be tailored to college students' level of educational attainment. Only one of the five studies met these criteria.

The Educational Outcome Expectancy Scale (EOE). Springer, Larson, Tilley, and Gasser (2001) developed a six-item Likert-type scale to assess the results an individual expects from his or her education. The six items allow the scale to completely reflect the Holland RIASEC dimensions. The scale showed promise as single factor (educational OE) as supported by loadings provided in the Larson et al. (2000) paper. The EOE meets the criteria for the thesis as described above. Further investigation is needed to determine the validity of this measure, as recommended by Dawis (1987) in his paper on scale construction.

Other Measures of OE. There have been relative few attempts to capture this construct in a format applicable to a wide range of subjects. Brooks and Betz (1990) created a measure of occupational values, but that measure was based on examining each item individually rather than summing across the items, a trait embodied by the EOE. Multiple papers have proposed and developed outcome expectancy scales that maintain utility within a smaller range than desired for the purposes of this paper. Riggs, Warka, Babasa, Betancourt, and Hooker (1994) created the Personal Outcome Expectancy Scale. Even though this scale has been factor analyzed, it still does not meet the criteria for an educational OE measure because it is intended for people already in the workplace and is not appropriate for college students.

Another measure (Bores-Rangel, Church, Szendre, & Reeves, 1990) provided outcome expectancy scores based on a ranking of the most important value—or, in the language of Lent et al. (1994), consequences you desire—out of a list of values. Hackett, Betz, Casas, and Rocha-Singh (1992) developed the Outcome Expectations Scale.

Unfortunately this scale is limited in its focus to successfully completing a bachelor's degree in engineering. Other related educational OE measures have focused in subject-specific outcomes (e.g. Fouad & Smith, 1996; Fouad, Smith, & Enochs, 1997) so those measures were not considered.

Summary

There is a lack of research in the area of career- and education-related OEs as a separate construct from career- and education-related SE. This is manifested by the great difference between the number of robust career- and education-related SE measures in existence and the number of robust (according to the specifications of this paper) career-related and education-related measures of OE. In fact, only one measure reviewed in this paper matches those criteria, and that is the EOE (Springer et al., 2001). Therefore, the author used the EOE as the measure of educational outcome expectancy for this paper. The problem, as noted above, was while the EOE had already been factor analyzed and shown to have promise representing a single factor, the validity of the scale had not been ascertained yet.

In establishing the validity of the EOE, it was useful to keep in mind the same rigorous standards applied to the extant measures of OE above. One way to do this was to find convergent validity. Convergent validity can be determined by running the EOE along with a scale or scales created to measure a similar or related construct. Because of the prevalence of SE measures and OE's relation to SE, measures of SE appeared to be the easy choice.

Measures of SE

Domain-Specific Measures of SE

Some studies used measures of SE broken down by domain (e.g. self-efficacy in math and science or SE in verbal ability). These studies were included in this section. Of the 24 studies that created, studied, or otherwise included measures of SE, nine were domain-specific.

Occupational Self-Efficacy Scale (OSES). The OSES is a 20-item scale developed by Betz and Hackett in 1981 and was originally intended to investigate the mechanisms behind women's low career self-efficacy in "male-dominated" fields, such as engineering. This scale has been applied in numerous other ways to simply measure career self-efficacy in situations unrelated to the aforementioned one and in similar situations as well.

As noted above, the OSES can be applied in situations not involving career efficacy barriers. Williams and Betz (1994) used the OSES in a study comparing task-specific self-efficacy to the occupational self-efficacy measured by the OSES. They found that occupational self-efficacy and task-specific self-efficacy were "moderately related." They also discovered a sort of priming effect for the OSES when it was administered before the scale measuring task-specific self-efficacy.

The Task-Specific Occupational Self-Efficacy Scale (TSOSS). The TSOSS was designed by Osipow and Rooney in 1989 to assess the self-efficacy of an individual to successfully complete specific tasks required by an occupation for success in that occupation. The 230-item scale was condensed via factor analysis to a 60-item short form with the factors verbal, quantitative, physical, and aesthetic. Williams and Betz's (1994) study mentioned in the previous section uses the TSOSS to measure task-specific self-efficacy in their

comparison to occupational self-efficacy. Their use of the TSOSS served to confirm the stereotype that males were more efficacious regarding physical or mathematic-related items while females displayed higher efficacy on “people-skills-related” items.

The Career Decision-Making Self-Efficacy Scale (CDSME). One of the scales Lucas, Wanberg, and Zytowski (1997) used to establish validity on their fledgling Kuder Task Self Efficacy Scale (KTSES) was the CDSME. Taylor and Betz developed the CDSME in 1983 to measure the self-efficacy of subjects when completing tasks necessary to career development. Lucas et al. found their KSTES to be significantly correlated with the CDSME, which meant “students have higher self-efficacy for career tasks when they have higher self-efficacy for making career decisions” (Lucas et al., 1997).

Betz, after collaborating with Klein and Taylor (1996) to create a short form of the CDSME, evaluated along with Luzzo (1996) the uses of the CDSME in interventions designed to increase career decision-making self-efficacy. Among the many uses Betz and Luzzo provided for the CDSME, one finding seemed to stand out: in regressions using the CDSME along with several other domain-specific self-efficacy measures, the CDSME scores were the “predominant” predictor of generalized self-efficacy.

The Math Self-Efficacy Scale (MSES). Betz and Hackett’s (1983) MSES was used as a measure of student’s self-efficacy in math-related and, in some sections non-math-related areas. Hackett, Betz, O’Halloran, and Romac (1990) isolated a section of the MSES called the College Course subscale for the purposes of their study. This section consists of items designed to measure career self-efficacy as it pertains to math-related (“nontraditional”) and non-math-related (“traditional”) college courses.

As is usually the case with these types of studies Hackett et al. reported higher

efficacies for men than women on the math-related items. Conversely, the “dummy” or irrelevant task used as a control garnered more attention to detail and performance from the females, presumably because it was verbally based. They concluded that career-related self-efficacy was strongly and significantly related to interest, especially on the math-related items.

Measures of SE as they relate to the Holland code (RIASEC)

Rottinghaus, Larson, and Borgen (in press) presented the current status of the relationship between measures of RIASEC themes and measurements of specific dimensions of self-efficacy. The results demonstrated that self-efficacy and interests are moderately correlated. The following studies were included in this category. Some studies using measures of SE were conducted to show a relationship between an SE measure and Holland's (1959, 1997, 1999) RIASEC (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) code. Usually, the studies use the RIASEC code as a correlate for the SE measure or as a way of categorizing items on the SE measure. Of the 24 studies that are included as measures of SE, seven were conducted using the RIASEC code in some fashion.

Feehan and Johnston (1999) used the TSOSS as a self-efficacy measure in tandem with the information provided by administration of Holland's Self-Directed Search (SDS). Like Williams and Betz (1994), Feehan and Johnson chose to use the short form of the TSOSS. They found that several subscales of the SDS and factors of the TSOSS were significantly correlated. Yet unlike Williams and Betz, Feehan and Johnston found that the significant gaps between females and males in quantitative-related efficacies were narrower than hypothesized.

Betz, Schifano, and Kaplan (1999) examined the relationships among several measures of career self-efficacy, one of which was the TSOSS. Betz et al. attempted to correlate the subscales of the TSOSS to the subscales of two other scales measuring career self-efficacy based on the similarity of the names between scales (e.g. aesthetic and artistic). Betz et al. found, using the original version of the TSOSS, that the scale shared construct validity with the Skills Confidence Inventory (a scale that will be discussed in greater detail later) and that the quantitative section of the TSOSS (a section sparking much debate in the field of gender-related career and educational self-efficacy) was consistently related to mathematic ability as measured by the American College Test (ACT; 1997)-Math score. This correlation was important because it was the basis for part of this thesis. As discussed further in the methods section, the researcher attempted to find a relationship between the EOE and the ACT scores of the participants.

Schifano and Betz (1998) used the OSES to measure the self-efficacy of women on the “Realistic” Holland theme, a theme containing many careers in front of which many women have set up career efficacy and expectancy barriers. After providing the subjects with an intervention meant to raise efficacy in these fields, Schifano and Betz found a statistically significant increase in Realistic confidence compared to a control group, as measured on the OSES.

Betz and Hackett (1981) created their own scale to investigate the applicability of Bandura’s self-efficacy theory. They never did give the measure a name; rather they focused on the construct being studied by this unnamed measure: self-efficacy. They were intent on measuring self-efficacy in light of occupational choice, so they attempted to match efficacies with selected occupations that could fit into Holland’s RIASEC themes of Realistic,

Investigative, Artistic, Social, Enterprising, and Conventional. Because they were not only interested in efficacy as a whole but also the gender differences within that construct, especially as it pertained to mathematics, they created the nomenclature of “traditional” and “nontraditional.” This was seen above in reference to non-mathematic (or traditional interests for women) and mathematic (or nontraditional alternatives for women) items. They note that level of efficacy should be directly related to the range of career options without barriers for a particular person, meaning that with self-efficacy comes the strength to break down barriers (of tradition, in this example) or withstand the forces that attempt to build them in the first place. The evidence from the study supported that assumption. The titles “traditional” and “nontraditional” seemed to be supported as well, with men showing high efficacy with both types of items but women having a pronounced gap between the two as women endorsed “traditional” roles more often and with more confidence.

The Self-Directed Search (SDS). The SDS is not usually seen completely as a measure of self-efficacy. Holland’s (1990) SDS measure is a much broader measure, but Brown, Lent, and Gore (2000) isolated the Self-Estimates section from the SDS to provide a measure of Self-Rated Abilities (SRA). It should be noted here that Feehan and Johnston’s (1999) study mentioned earlier under the TSOSS heading also employed the SDS, but in its entirety since they had already supplied the TSOSS as a measure of self-efficacy.

At any rate, Brown et al. measured three variables in their 2000 study besides the above Self-Estimates. They also examined Occupational Self-Efficacy Beliefs (OSE) and Perceived Career Options (OPT), which drew items from the SDS. In this manner, they managed to employ the SDS as strictly a self-efficacy measure by isolating the sections that related to that construct. The final variable was Occupational Interests (INT), which was

measured using a completely different scale.

The Skills Confidence Inventory (SCI). The SCI (Betz, Borgen, & Harmon, 1996) is a 60-item measure of self-efficacy in expectations regarding the activities and tasks associated with each of the six Holland themes. The inventory has six 10-item scales that are General Confidence Themes (GCTs) measuring the Holland RIASEC dimensions. Level of self-efficacy can be approximated as the average score on the six GCTs. Because outcome expectancies are linked with self-efficacies (Bandura, 1986) the SCI can be used to establish construct validity for a career- or education-related outcome expectancy measure.

SCT-related Measures of SE

Some studies using measures of SE were conducted to develop an SE measure appropriate to Bandura's SCT (1986). For the most part, these studies were similar to SCCT (Lent et al., 1994) because they were applying SCT to the career realm. However, they also predated SCCT so they were categorized as SCT-related measures of SE. The following studies were included in this category. Of the 24 studies that were included as measures of SE, five were conducted using the SCT model in some fashion.

The Multidimensional Scales of Perceived Self-Efficacy (MSPSE). The MSPSE were developed by Bandura in 1989 as a means to test Bandura's self-efficacy theory. The measure consists of nine subscales created to approximate several versions of self-efficacy, specifically academic self-efficacy. Miller, Coombs, and Fuqua (1999) wrote a paper addressing what they felt was a paucity of follow-up research conducted on the MSPSE. So Miller et al. took it upon themselves to produce psychometric data confirming the validity and reliability of the measure. They found the results to be positive as a whole and regarding future uses of the MSPSE. However, they struggled to find a theoretical fit with the factor

analysis despite finding external variables to support the utility of the measure.

The Assessment of Academic Self-Concept and Motivation (AASCM). The AASCM was created by Gordon in 1995 to test the principles of the living systems framework (LSF) and motivational systems theory (MST), both of which were developed by Ford in 1992. MST closely resembles Bandura's (1986) model of triadic reciprocity in that it frames motivation as influenced by goals, emotions, and personal agency beliefs (self-efficacies). LSF contributed to this comparison by expressing that a person is always interacting with his or her environment. When Gordon-Rouse and Cashin (2000) set out to test self-efficacy in a diverse population, they chose the AASCM because they felt it had the most "global" applicability. Gordon-Rouse et al. were rewarded for their choice when the validity and consistency results showed that the measure was applicable to African-Americans, European-Americans, and Hispanic-Americans.

Coping with Career Indecision (CCI). The CCI (Larson, Toulouse, Ngumba, Fitzpatrick, & Heppner, 1994) is a broad-based career indecision instrument including 37 6-point Likert items. The items were intended to measure the negative and positive views of students involved in the career decision-making process. However, the researcher only included the 4-item section of the scale labeled, "Academic Self-Efficacy." This scale could also act as a measure of concurrent validity for an education-related outcome expectancy measure.

Other Measures of SE

Some SE measures do not fit into one of the three preceding categories, but were notable nonetheless because they investigate SE in the career realm. Of the 24 studies, 20 fit into one of the three categories. The remaining four were included in this section.

The Kuder Task Self-Efficacy Scale (KTSES). The KTSES was created based on the principles outlined by Kuder and Zytowski in their 1991 Kuder Occupational Interest Survey (KOIS). The main carryovers from the Kuder and Zytowski paper were the 10 occupational scales. The KTSES was meant to measure efficacy in the 10 areas of interest measured by the KOIS. Betz et al. (1999) noted in their paper that they decided not to include the KTSES in their paper in what appeared to be an effort to streamline the comparisons they were investigating by confining the scales used to those based or loosely based on Holland's hexagon.

Ironically, two years earlier when Lucas, Wanberg, and Zytowski were constructing the KTSES, they left out the TSOSS, claiming that its 230 items were too many. They attempted to create a shorter version, but decided that the factor structure was too difficult to replicate for the purposes of validating the KTSES. Lucas et al. collected data for their newly created KTSES and compared it to interest data from the KOIS and self-efficacy data from multiple other scales. The factor analysis had led them to believe that adopting Holland's six types (a more popular format) could be productive, but the factors actually fit better when divided into the original 10 factors from the KOIS on which the KTSES was based.

Two groups of researchers attempted to study the self-efficacy of students enrolled in a High School Equivalency Program (HEP) using versions of an occupational questionnaire. Bores-Rangel et al. (1990) used an occupational and educational activities questionnaire based on the six educational programs and the five subject matter areas of the HEP. They also took a novel approach to the situation by shunning occupational titles in favor of occupational activities; through this they hoped to eliminate some of the connotations and subjective qualities associated with many occupational titles. They found self-efficacy to be

moderately related to accomplishment and ability but found a stronger relationship between self-efficacy and extent of consideration (per occupational activity). Church, Teresa, Rosebrook, and Szendre (1992) also studied career self-efficacy in students enrolled in an HEP using an occupational questionnaire. Church et al. succeeded in replicating the Bores-Rangel et al. study while also succeeding in answering questions regarding the applicability of self-efficacy theory to minorities. They reported that the model was supported by their minority sample's results.

Summary of SE Measures

There was a wealth of SE measures in the literature. Many of these measures appeared more than suitable for the task of investigating convergent validity for the EOE. What was also evident was that a number of these measures are devoted to measuring SE in terms of the Holland (1959, 1997, 1999) RIASEC code (The OSES, Schifano & Betz, 1998; TSOSS, Betz et al., 1999; Betz & Hackett, 1981; SCI, Betz et al., 1996). Because SE and OE have been shown to be so closely related and so much of the literature measuring SE is framed in terms of the Holland RIASEC code, it should stand to reason that there be a measure of OE in terms of the RIASEC. However, there were no such studies. Betz et al. (1999) found that the quantitative section of the TSOSS was consistently related to mathematic ability as measured by the American College Test (ACT)-Math score. This correlation was important because it was the basis for part of this thesis. As discussed further in the methods section, the researcher attempted to find a relationship between the EOE and the ACT scores of the participants.

The EOE and RIASEC

As noted in the section about the research linking the RIASEC to SE, Betz and Hackett (1981) created a scale to investigate the applicability of Bandura's self-efficacy theory. They matched SEs with selected occupations that could fit into Holland's RIASEC themes. Also noted numerous times throughout this thesis was the strong evidence linking SE to OE. For example, SE and OEs have been shown to play a role in the choice of career (e.g., Wheeler, 1983; Lent et al., 2000). Conceptual articles have attempted to define the role of SE and OE in career development (e.g., Morrow, Gore, & Campbell, 1996; Hackett & Byars, 1996; Chartrand & Rose, 1996). These articles advocate the positive influence of SE and OE on career development. In addition, SE and OEs have also been shown to play a role in educational achievement (Brown et al., 1989; Lent et al., 1997). Multiple studies on the specific category of SE and educational OE (e.g., Lent et al., 1991; Brown et al., 1997) existed in the literature as well.

In summary, SE and OE have been shown to be related throughout the literature and SE and the RIASEC have also been shown to be related in numerous studies (The OSES, Schifano & Betz, 1998; TSOSS, Betz et al., 1999; Betz & Hackett, 1981; SCI, Betz et al., 1996). Specifically, SE and OE have been linked in the educational realm (Lent et al., 1991; Brown et al., 1997). Therefore, the researcher attempted to relate educational OE as measured on the EOE (Larson et al., 2000) to the Holland RIASEC code as embodied by the SCI (Betz et al., 1996). The EOE was the only study of educational OE that met the standards of this thesis as stated in the section on OE measures. The SCI was ideal because it was a measure of SE, which has been strongly linked to OE. The SCI also used the RIASEC, which the researcher used to interpret the results of the EOE. This is described in greater detail in

the Method section.

Summary of Literature Review

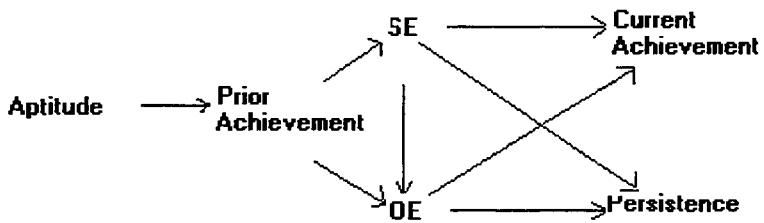
According to SCCT, SEs and OEs are related in that they each play an individual role in the triadic reciprocity model. As stated earlier, self-efficacy is defined in Lent et al. (1994) as the beliefs about one's ability to perform in a given domain. The nature of this construct is dynamic, and as such it is a mechanism that can develop over time. As was also earlier noted, OEs are personal beliefs about probable outcomes. According to SCT, people act partially on the beliefs they have about the possible consequences of their actions. Like SEs within a given domain, OEs can be domain-specific as well. The umbrella under which these domains exist, for the purposes of this study, is the career domain.

Research has shown SE and OEs to have numerous impacts. For example, SE and OEs have been shown to play a role in the choice of career (e.g., Wheeler, 1983; Lent et al., 2000). Conceptual articles have attempted to define the role of SE and OE in career development (e.g., Morrow et al., 1996; Hackett & Byars, 1996; Chartrand & Rose, 1996). These articles advocated the positive influence of SE and OE on career development. In addition, SE and OEs have also been shown to play a role in educational achievement (Brown et al., 1989; Lent et al., 1997). In fact, numerous studies on the specific category of academic SE—personal beliefs about one's ability to perform in an academic setting—(e.g., Shell et al., 1995; Lent et al., 1997; Hackett & Betz, 1989) and academic (or educational) OE—personal beliefs about the outcomes of his or her education—(e.g., Lent et al., 1991; Brown et al., 1997) exist in the literature as well. The research presented in this section showed SE and OEs to be positively correlated in a variety of career- and education-related areas. This provided support to the SCCT position that SE and OE are related.

There was a lack of research in the area of career- and education-related OEs as a separate construct from career- and education-related SE. This was manifested by the great difference between the number of robust career- and education-related SE measures in existence and the number of robust (according to the specifications of this paper) career-related and education-related measures of OE. In fact, only one measure reviewed in this paper matched those criteria, and that was the EOE (Larson et al., 2000).

This study presented a unique opportunity. Validity for the EOE is an important issue, as discussed in the section on OE measures. It appeared that concurrent validity for this measure could be obtained by collecting data on the EOE as well as data on an SE measure. Because of the large number of SE measures related to the RIASEC and the lack of OE measures that do the same, this study could use a standard education-related SE measure (such as the ASE, Larson et al., 1994) and an SE measure based on the RIASEC to find validity for the EOE, such as the SCI. This was something that would provide great support to the EOE because of the robustness of the SCI and its ability to measure both interest and SE. This was also of great interest because the author was unaware of any existing measure of educational OE that loads on the RIASEC interest code.

According to the research reviewed in this paper thus far, the model in the literature can be represented as follows:



Hypotheses

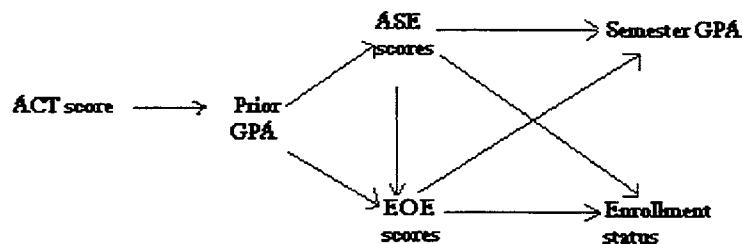
Based on this information, the researcher had the following hypotheses:

1. Educational OE will significantly and positively correlate moderately with academic SE.
2. Each educational OE item will correlate more strongly with the corresponding SE RIASEC items than with those RIASEC scores on the opposite end of the Holland hexagon. For example, the correlation between the Realistic (“R”) factor of RIASEC and the educational OE item “to have learned skills for my career” will be significantly stronger than the correlation between that item and the Social (“S”) factor, which is opposite R on the hexagon. Because the EOE (Larson et al., 2001) is the scale being used to measure OE in this thesis, an additional item was added to the original six EOE items in order to capture the construct of the RIASEC S score (the only construct score missing from the original EOE). This item was “to be better able to serve other people.”
3. Those who demonstrate educational persistence will report significantly higher educational OE and academic SE than those who do not.
4. Educational OE will significantly and positively correlate with aptitude.

5. After accounting for prior achievement, educational OE and academic SE will significantly predict achievement for the semester following the administration of the measures accounting for prior achievement.

Rationale for Hypotheses

Rationale for each of the preceding hypotheses is listed below. Based on the operationalization of the hypotheses proposed by the researcher the previously shown model would be represented thusly:



1. Educational OE will significantly and positively correlate moderately with academic SE. The research has already shown SE and OE to be positively related (e.g., Wheeler, 1983; Brown et al., 1989; Lent et al., 1997; Lent et al., 2000). Because of this relationship between SE and OE, it was the position of the researcher that educational SE (as measured by the ASE; Larson et al., 1994) should correlate moderately with educational OE (as measured by the EOE; Larson et al., 2000).

2. Each educational OE item will correlate more strongly with the corresponding SE RIASEC items than with those RIASEC scores on the opposite end of the Holland hexagon. Holland (1959, 1997, 1999) posits that career interest can be broken down into six

areas: realistic, investigative, artistic, social, enterprising, and conventional. Although the SCI is a measure of SE, it uses RIASEC to categorize the results. Each respective area of RIASEC matches up with an item on the EOE. The EOE items were written such that this would be the case. For example, the EOE item “to be able to better serve others” was meant to map onto the social area of the Holland code. If the EOE measures interest, this EOE item should capture a similar construct to Holland’s social construct, as measured in the “S” area of RIASEC. The researcher was attempting to show that, because the EOE embodies the six RIASEC areas similar to the SCI, the EOE also mapped onto RIASEC.

The Holland hexagon (1997, 1999) is a way of diagramming RIASEC (Figure 1, below) so that each corner of the hexagon represents one dimension of the RIASEC code. This was a useful tool because it also demonstrated the relationship among the dimensions such that closer corners on the hexagon (e.g., “R” and “I” for Realistic and Investigative, respectively) denoted dimensions that were more closely related than, say, corners that were opposite each other (e.g., “R” and “S” for Realistic and Social, respectively). In fact, dimensions represented on corners that are opposite each other are the least related.

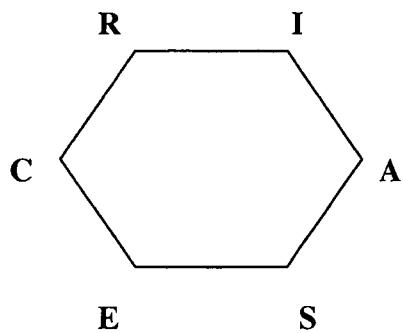


Fig. 1: Holland’s Hexagon.

Each EOE item is correlated with a dimension on the Holland hexagon (RIASEC).

For example, the EOE item “to be able to better serve others” was meant to map onto the social area of the Holland code. The researcher was attempting to show that, if the EOE embodies the six RIASEC areas similar to the SCI, the EOE will also map onto RIASEC. If it mapped onto the RIASEC, the EOE items should have correlated significantly higher with the RIASEC dimension they represented than with the dimension opposite on the hexagon.

These sets of correlations have been listed in the above Hypotheses section.

3. Those who demonstrate educational persistence will report significantly higher educational OEs and academic SEs than those who do not. Research has shown educational SE to be positively correlated to persistence, i.e. remaining enrolled in school (Lent et al., 1984; Brown et al., 1989). In line with the other research linking SE to OE (e.g., Wheeler, 1983; Brown et al., 1989; Lent et al., 1997; Lent et al., 2000), OE should be positively correlated with persistence as well. In other words, those with significantly higher EOE scores should have been more likely to remain enrolled than those with lower scores.

4. Educational OE will significantly and positively correlate with aptitude. Betz et al. (1999) found that the quantitative section of the TSOSS (Osipow & Rooney, 1989) was consistently related to mathematic ability as measured by the American College Test (ACT)-Math score. The literature linking SE and OE suggests that overall EOE scores should have been positively correlated with overall ACT scores.

5. After accounting for prior achievement, educational OE and academic SE will significantly predict achievement for the semester following the administration of the measures. Research has linked SE to GPA (e.g. Lent et al., 1987; Brown et al, 1989) by finding a positive correlation between SE and GPA. The research linking SE and OE suggests that there should have been a positive relationship between educational OE (as

measured on the EOE) and GPA.

Method

Participants

Data were collected from students ($N=846$) at a large Midwestern university. The sample included 428 (54.7%) females and 354 (45.3%) males. The age breakdown of the clients was as follows: .6% under 19 years old, 35.8% 19 years old, 37.8% 20 years old, 13.4% 21 years old, 5.8% 22 years old, 3.2% 23 years old, and 3.3% above 23 years old. The participants' majors are broken down by college in Table 1.

Table 1

College Majors by Gender

College	<u>Males</u>		<u>Females</u>		<u>Total</u>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Agriculture	20	7.0	33	9.1	53	8.1
Business	87	30.3	62	17.0	149	22.9
Design	7	2.4	20	5.5	27	4.1
Education	34	11.8	87	23.9	121	18.7
Engineering	47	16.4	18	5.0	65	10.0
Family and Consumer Sci.	8	2.8	15	4.1	23	3.5
Liberal Arts and Sciences	84	29.3	129	35.4	213	32.7
Total	287	100	364	100	651	100

This table was compiled using data collected for currently enrolled students ($N=651$, 287 males and 364 females).

Procedures

Data on three measures (the EOE, the ASE, and the SCI) were collected as part of a 90 minute-long mass-testing session that included multiple other measures from other researchers. Participants volunteered to take part in the study for extra credit in psychology courses. There was no penalty for participants that did not finish the session. There was also no penalty for those choosing not to take part in the session.

Additional data

As a part of the study, participants were randomly selected to have one of 300 consent forms attached to the measurement forms. These consent forms requested the participants' signed and dated consent for the researcher to obtain GPA and ACT information from the registrar's office at the university. As in the rest of the data collection, there was no penalty for failing to sign the consent form. In total, (n) participants signed, dated, and returned the consent forms with the rest of the measurement data.

Obtaining the additional data

The researcher contacted the university registrar's office. He was informed that obtaining GPA and ACT information was possible given the participants' respective signed consent. The researcher provided the registrar with a listing of the participants' identification numbers and whether they signed the consent forms, as per the registrar's request.

Instruments

Educational Outcome Expectancy Scale (EOE). Springer et al. (2001) constructed the EOE to measure educational OEs. The EOE is a six item Likert-type scale that requires the participant to gauge from 1 to 6 to what extent he or she expects an outcome (item) when he or she has completed his or her aspired education level (1=not at all expecting the

outcome, 6=very much expecting the outcome). Item examples include [To what extent do you expect to...] “be more competitive in the job market” and “reduce the chance of being fired.” The EOE as created by Springer et al. (2001) was originally six items. For the purpose of this study, a seventh item was added to capture the social construct as operationalized in Holland’s (1959, 1997, 1999) RIASEC code.

Springer et al. (2001) provided the results of the factor analysis on the EOE. They decided on using one factor (educational OE) that accounted for 69% of the variance. The internal consistency was reported as $\alpha=.77$ for the females and $\alpha=.83$ for the males in the sample. The confirmatory factor analysis yielded loadings ranging from .45 to .89 for the females in the sample and .53 to .86 for the males in the sample. The internal consistencies in the second sample were $\alpha=.83$ for the females and $\alpha=.86$ for the males. Springer et al. (2001) conducted a Pearson product-moment correlation to find test-retest reliability for the EOE ($r=.48$).

Academic Self-Efficacy Scale (ASE). The ASE is the 4-item scale of The Coping with Career Indecision Scale (CCI; Larson et al., 1994), a broad-based career indecision instrument including 37 6-point Likert items. Within the CCI, the ASE is the subscale labeled, “Academic Self-Efficacy” (ASE). The ASE is also a Likert-type scale measuring SE that requires the participants to rate the extent to which they agree or disagree (1=strongly agree, 6=strongly disagree). Items include “I have a high degree of math ability” and “I am confident in my ability to succeed academically in the courses necessary to enter my chosen or potential career.”

Larson et al. (1994) estimated internal consistency to be .71 for the ASE. The ASE emerged as a factor in the CCI with factor loadings ranging from .41 to .68. Among the

factors of the CCI (from which the ASE was taken), the only factor to correlate significantly with GPA and ACT was the ASE. This provides support to the use of the ASE as a validity measure for the EOE, especially because the researcher is interesting in correlating the EOE with GPA and ACT scores.

The Skills Confidence Inventory (SCI). The SCI (Betz et al., 1996) is a 60-item measure of self-efficacy in expectations regarding the activities and tasks associated with each of the six Holland themes. The inventory has six 10-item scales that are General Confidence Themes (GCTs) measuring the Holland RIASEC dimensions. The internal consistency reliability of the GCTs ranges from .84 to .88 (Schifano & Betz, 1998). Test-retest reliability over a three-week interval for the six GCTs are as follows: .83 (Realistic), .86 (Investigative), .85 (Artistic), .87 (Social), .84 (Enterprising), and .84 (Conventional) based on an N of 113 (Schifano & Betz, 1998).

The American College Test (ACT). The ACT (1997) is a standardized entrance requirement for Midwestern universities meant to predict the success (achievement) of incoming college freshmen. The ACT is divided into English, Mathematics, Reading, and Science Reasoning sections. The ACT has a mean score of $x=21$ and a standard deviation of $SD=3$.

Other Variables

Persistence. Persistence was defined as continued enrollment at the university the semester following the participants' completion of the measures.

Achievement. Achievement was measured in this study by the Grade Point Averages (GPAs) of the participants. The semester GPA is a 4-point scale (4.0=highest achievement, 0.0=lowest achievement) used to assess the general achievement of college students. It is the

average of each of the grades (also measured on a 4-point scale) the students received from their respective classes at the end of each semester. The cumulative GPA (also measured on a 4-point scale) is the semester GPAs averaged across the time the student was enrolled. The semester GPA is indicative of the achievement of the student for the current semester while the cumulative GPA is indicative of the student's overall achievement across the time of enrollment.

Operationalized Hypotheses

Based on this information, the researcher has the following hypotheses:

1. Educational OE will significantly and positively correlate moderately with SE as measured on the ASE.
2. Each EOE item will correlate more strongly with the corresponding SCI RIASEC score than with those RIASEC scores on the opposite end of the Holland hexagon.

Specifically:

- a. The correlation between the SCI Realistic score and the EOE item "to have learned skills for my career" will be significantly stronger than the correlation between that item and the Social score.
- b. The correlation between the SCI Investigative score and the EOE item "to have intellectual stimulation" will be significantly stronger than the correlation between that item and the Enterprising score.
- c. The correlation between the SCI Artistic score and the EOE item "to have grown as a person" will be significantly stronger than the correlation between that item and the Conventional score.
- d. The correlation between the SCI Social score and the EOE item "be able to

better serve other people” will be significantly stronger than the correlation between that item and the Realistic score.

- e. The correlation between the SCI Enterprising score and a) the EOE item “be able to make more money” will be significantly stronger than the correlation between that item and the Investigative score; and b) the correlation between the SCI Enterprising score and the EOE item “be more competitive in the job market” will be significantly stronger than the correlation between that item and the Investigative score.
 - f. The correlation between the SCI Conventional score and the EOE item “reduce the chance of being fired” will be significantly stronger than the correlation between that item and the Artistic score.
3. Those who re-enroll for Fall 2002 will report significantly higher EOE and ASE scores than those who do not re-enroll.
 4. EOE scores will be significantly and positively correlated with ACT scores.
 5. Scores on the EOE and ASE will significantly predict participants’ GPA for the semester following the administration of the measures after the prior semester’s GPA has been removed.

RESULTS AND DISCUSSION

Results

This section will report the results of the research. The results will be arranged in the same order as the previously discussed hypotheses. Before the results of the analyses for each hypothesis are discussed, descriptive information—means, standard deviations, and *t*-test information by sex and by comparison samples will be presented. Following this, the researcher will report the correlation between SE and OE as measured on the ASE and EOE, respectively. Then the researcher will report the correlations between EOE items and their corresponding RIASEC code, as measured on the SCI. These correlations will be compared with the correlations between EOE items and each of their respective opposite RIASEC codes, as measured on the SCI. The researcher will then compare the EOE and ASE scores of currently enrolled students with the scores of those who are not currently enrolled. Following this, the researcher will report the correlation between OE as measured on the EOE and aptitude as measured by the ACT scores. Finally, the researcher will report the extent to which OE and SE (as measured on the EOE and ASE respectively) predict achievement as measured by GPA.

Descriptive Information

Sex and Sample Comparisons

The researcher conducted analyses to determine whether the means and standard deviations on the instruments differed significantly between the sexes. The researcher also conducted analyses to determine whether the means reported for this study differed significantly from the means reported in earlier studies when applicable. The results of these analyses are reported in Table 2.

Table 2

Comparison of Means and Standard Deviations for the EOE, ASE, and SCI

Scale	Current Sample						Previous Samples						Comparison	
	Males		Females		Total		Males		Females		Total		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
EOE ¹	33.64	6.43	35.18	5.13	-3.63	.298	34.47	5.82	--	--	--	--	--	--
ASE ²	18.19	3.80	17.91	3.52	1.04	.000***	18.06	3.66	--	--	--	--	6.55	2.33
SCI ³														
Realistic	3.57	0.78	3.03	0.71	10.13	.000***	3.27	0.79	3.45	0.83	2.86	0.64	3.06	0.82
Investig.	3.30	0.73	3.02	0.76	5.38	.000***	3.16	0.75	3.25	0.81	2.90	0.97	3.02	0.80
Artistic	3.14	0.80	3.09	0.80	0.87	.383	3.12	0.80	3.08	0.86	3.02	0.86	3.04	0.86
Social	3.47	0.76	3.56	0.68	-3.45	.001**	3.57	0.72	3.60	0.82	3.81	0.69	3.74	0.75
Enterpris.	3.44	0.73	3.16	0.68	5.48	.000***	3.29	0.72	3.35	0.72	3.09	0.71	3.17	0.73
Convent.	3.52	0.73	3.17	0.74	6.72	.000***	3.33	0.75	3.21	0.82	3.01	0.74	3.08	0.77

¹**p*<.05, ***p*<.01 ****p*<.001¹The sample used for the current study had participants *N*=825 (374 males, 451 females).²The sample used for comparison to the current study had participants *N*=161 (57 males, 96 females; Larson and Majors, 1998) and did not report separate scores for gender.³The sample used for comparison to the current study had participants *N*=365 (132 males, 242 females; Rottinghaus, Lindley, Green, and Borgen, 2002).⁴ns indicates a not significant *t* value.

High scores on the EOE indicate the participant's high outcome expectancies for the participant's education. High scores on the ASE indicate the participant's high degree of self-efficacy as it relates to the participant's abilities in academics. High scores on the SCI factors indicate the participant's high degree of self-efficacy as it relates to the participant's skills in career fields.

Sex comparisons. The means for the current sample varied as to whether they significantly differed by sex. As shown in Table 2 above, only two of the comparisons for gender (the EOE and the SCI Artistic score) were not significant. The other comparisons were significant. However, the mean scores do not appear upon inspection of the naked eye to be significantly different. In fact only the SCI Realistic and Conventional scores reported sex differences that spanned greater than half of a standard deviation. The reported

significances may be due to the size ($N=825$) of the sample, which can affect the results of t -testing by increasing the odds of a significant result.

Comparison to prior samples. As noted in Table 2, the researcher used two separate prior samples for comparison to the current data. There were no prior data for the EOE. There may appear to be a rather large difference between the means in the ASE as reported by the current study and the means from prior research. This is due to differences in the scoring used by the researcher compared to the scoring used in prior research. The researcher scored the ASE on a Likert-type scale where participants respond to items like "I have a high degree of math ability" with a number ranging from 1 to 6. In the current study, the researcher used the rubric 1=strongly disagree and 6=strongly agree. In the prior study (Larson & Majors, 1998), the researchers used the opposite rubric of 1=strongly agree and 6=strongly disagree. In order to correct for the discrepancy in scoring, the data for the prior sample was reversed, producing a total mean score for the ASE of $M=17.45$.

In the comparison between the current ASE data and the data reported by Larson and Majors (1998), the t value for the comparison was significant at $p<.05$. This means that the means of the two samples are significantly different. However, the value of $p <.05$, was certainly not a stringent one. Of important note is the fact that the Larson and Majors sample was made up of gifted adolescents while the current sample was made up of college students from a Midwestern university. Also, the means did not differ by more than a half of the smaller standard deviation (in this case, the smaller standard deviation belonged to the prior study at $SD=2.33$). In addition, the size of the sample may have again influenced the results of the t -test, by increasing the odds of a significant result.

In the comparisons among the six scales of the SCI, as reported earlier, all but one of

the comparisons were significant. The prior sample (from Rottinghaus, Lindley, Green, & Borgen, 2002) is quite similar to the current one, as it was taken from the same Midwestern college as the current study. For the SCI Realistic and Conventional scores, the t-test showed a significant comparison difference ($p<.01$) for five of the six SCI GCTs: SCI Realistic, Investigative, Social, Enterprising, and Conventional. The comparison for SCI Artistic did not report a significant t value. None of the significant comparisons reported differences of greater than a standard deviation. This, in addition to the large sample size, calls into question the meaningfulness of the reports of significant differences in this case.

Item/Scale Correlations

The researcher conducted an analysis to determine the Pearson product-moment correlations within the EOE and SCI as well as between the measures used in the study including GPA and ACT. The results are shown in Table 3.

Table 3

Correlations for the Individual EOE Items, the EOE, the ASE, and the SCI Scales

	EOE ¹	EOE-E _a	EOE-E _b	EOE-S	EOE-C	EOE-I	EOE-R	EOB-A	ASE	SCI-R	SCI-I	SCI-A	SCI-S	SCI-E	SCI-C	CGPA ²	SGPA ³	ACT ⁴	Persist
EOE	--																		
EOE-E _a	.74***	--																	
EOE-E _b	.76***	.67***	--																
EOE-S	.79***	.45***	.45***	--															
EOE-C	.75***	.45***	.50***	.54***	--														
EOE-I	.80***	.48***	.47***	.61***	.54***	--													
EOE-R	.81***	.51***	.53***	.60***	.48***	.64***	--												
EOE-A	.78***	.42***	.47***	.62***	.45***	.63***	.66***	--											
ASE	.39***	.35***	.28***	.27***	.19***	.35***	.37***	.32***	--										
SCI																			
SCI-R	.13*	.18***	.14**	.07	.09*	.09*	.09*	.05	.25***	--									
SCI-I	.19***	.21***	.16***	.10*	.11*	.18***	.15**	.11*	.44***	.58***	--								
SCI-A	.12*	.09*	.03	.11*	.06	.16***	.12*	.11*	.07	.58***	.32***	--							
SCI-S	.29***	.18***	.12*	.34***	.19***	.25***	.21***	.30***	.14**	.30***	.26***	.42***	--						
SCI-E	.27***	.32***	.22***	.21***	.18***	.20***	.16***	.17***	.22***	.45***	.35***	.42***	.59***	--					
SCI-C	.22***	.29***	.25***	.11*	.18***	.12*	.14**	.10***	.38***	.54***	.57***	.15**	.25***	.55***	--				
CGPA	.04	-.04	-.07	.10	-.07	.11	.10	.10	.29***	-.09	.10	-.07	-.05	-.09	.03	--			
SGPA	.12	.09	-.02	.09	.00	.19**	.19***	.11	.35***	-.03	.17***	-.07	-.01	-.01	.16***	.73***	--		
ACT	.02	.07	-.02	-.09	.00	.09	.10	-.06	.25***	.02	.35***	.13	-.23***	-.09	.11	.33***	.43***	--	
Persist	.08	-.01	.02	.13*	.08	.11	.05	.06	.08	.03	-.07	-.03	-.02	.03	-.03	-.05	.10	.02	

* $p<.01$, ** $p<.001$, *** $p<.0005$ 1 The sample used for the EOE, ASE, and SCI factors was $N=825$, with 374 males and 451 females.2 CGPA stands for the Cumulative GPA of the participants prior to the administration of the measures. The sample, a subset of the overall sample that permitted the researcher to gather the scores, was $n=248$, with 99 males and 149 females.3 SGPA stands for the Spring semester GPA, the semester in which the participants were administered the measures. The sample, a subset of the overall sample that permitted the researcher to gather the scores, was $n=263$, with 108 males and 155 females.4 The sample that allowed the researcher to access ACT scores was $n=244$, with 96 males and 148 females.

High scores on the EOE indicate positive expectations for the outcome of the participant's education. High scores on the ASE indicate more confidence on the part of the participant regarding the participant's academic ability. High scores on the SCI factors indicate a high degree of confidence on the part of the participant regarding the participant's abilities in career fields.

Correlations within items of the EOE. As shown in Table 3, all of the items of the EOE were correlated with each other at the stringent $p<.0005$. There were not any noticeable trends within the correlation matrix for EOE items that gave the researcher new or unexpected information. The correlations ranged from $r=.42$ to $r=.67$. Because these correlations were so significant and substantial, the EOE appears to be measuring a unified construct.

Correlations within General Confidence Theme scores of the SCI. The SCI GCT scores were correlated with each other at $p<.001$ with all but one correlation significant at $p<.0005$. The correlations ranged from $r=.15$ to $r=.59$. The trend of SCI GCT scores being correlated with other scores closest on the Holland (1997, 1999) Hexagon was evident. The average for SCI GCT correlations for adjacent themes was $r=.50$, while the average for GCT correlations with opposite themes was much lower, at $r=.27$.

Correlations between the EOE total score and other scale scores. The EOE was correlated with the ASE at $r=.39$, which is discussed later in the results. The EOE was also correlated with each of the SCI GCT scores at $p<.01$. Correlations ranged from $r=.12$ to $r=.29$. These figures are not as high as the correlations reported within instruments, which lends credence to the assertion that the EOE and the SCI are measuring different constructs (OE and SE, respectively).

Hypotheses

Hypothesis 1

Educational OE will significantly and positively correlate moderately with SE as measured on the ASE. The Pearson product-moment correlation between educational SE (as measured on the ASE) and educational OE (as measured on the EOE) scores was .39,

$p < .0005$. This result supported the hypothesis.

Hypothesis 2

Each EOE item will correlate more strongly with the corresponding SCI RIASEC score than with those RIASEC scores on the opposite end of the Holland hexagon. This hypothesis includes several subsections based on individual comparisons between EOE item scores and SCI scale scores. The results of the analyses for this hypothesis are reported in Table 4 below.

Table 4

Correlations and z scores for EOE item and SCI GOT comparisons

Comparison	r	z	z Difference	p
Realistic EOE vs. SCI-R	.09	.09	-.12	.01**
Realistic EOE vs. SCI-S	.21	.21		
Investigative EOE vs. SCI-I	.18	.18	-.02	.34
Investigative EOE vs. SCI-E	.20	.20		
Artistic EOE vs. SCI-A	.11	.11	.01	.42
Artistic EOE vs. SCI-C	.10	.10		
Social EOE vs. SCI-S	.34	.35	.28	.001***
Social EOE vs. SCI-R	.07	.07		
Enterprising EOE _a vs. SCI-E	.32	.33	.12	.01**
Enterprising EOE _a vs. SCI-I	.21	.21		
Enterprising EOE _b vs. SCI-E	.22	.22	.06	.10
Enterprising EOE _b vs. SCI-I	.16	.16		
Conventional EOE vs. SCI-C	.18	.18	.12	.01**
Conventional EOE vs. SCI-A	.06	.06		

Significant p values indicate significant differences between z values. Significant differences between z values indicate that there is a significant difference between the correlations between like items versus the correlations between opposite items. A positive z difference indicates that correlations between like items were stronger than correlations between opposite items. As indicated by the Holland Hexagon (1997, 1999), opposite items are indicated by comparisons between Realistic and Social themes/items, Investigative and Enterprising themes/items, and Artistic and Conventional themes/items.

As seen in Table 4, the results for the different subsections varied. There were four significant differences between correlations and three results that were not significant. Of the

four significant differences, one did not support the hypothesis. Overall, three comparisons (those using the Social item, the first Enterprising item, and the Conventional item) were significant and supported the hypothesis. The results are discussed in further detail below.

2a. The correlation between the SCI Realistic score and the EOE item “to have learned skills for my career” will be significantly stronger than the correlation between that item and the Social score. As seen in Table 4, the Pearson product-moment correlation between the above EOE item and the SCI Realistic score was .09. The Pearson product-moment correlation between the above EOE item and the SCI Social score was .21. The z transformation yielded a difference for the z comparison of $-.12, p < .01$. However, this did not support the hypothesis. The hypothesis was that the first correlation would be significantly greater than the second. Because the z comparison was negative, the correlation for the first was less than the second.

2b. The correlation between the SCI Investigative score and the EOE item “to have intellectual stimulation” will be significantly stronger than the correlation between that item and the Enterprising score. As seen in Table 4, the Pearson product-moment correlation between the above EOE item and the SCI Investigative score was .18. The Pearson product-moment correlation between the above EOE item and the SCI Enterprising score was .20. The z transformation yielded a difference for the z comparison of $-.02, p < .34$. This hypothesis was not supported.

2c. The correlation between the SCI Artistic score and the EOE item “to have grown as a person” will be significantly stronger than the correlation between that item and the Conventional score. The Pearson product-moment correlation between the above EOE item and the SCI Artistic score was .11. The Pearson product-moment correlation

between the above EOE item and the SCI Conventional score was .10. The z transformation The z transformation yielded a difference for the z comparison of .01, $p<.42$. This did not support the hypothesis because the difference was not significant.

2d. The correlation between the SCI Social score and the EOE item “be able to better serve other people” will be significantly stronger than the correlation between that item and the Realistic score. The Pearson product-moment correlation between the above EOE item and the SCI Social score was .34. The Pearson product-moment correlation between the above EOE item and the SCI Realistic score was .07. The z transformation yielded a difference for the z comparison of .28, $p<.0005$. This result supported the hypothesis that the Social EOE item would be more strongly correlated with the SCI Social score than with the SCI Realistic score.

2e. The correlation between the SCI Enterprising score and 1) the EOE item “be able to make more money” will be significantly stronger than the correlation between that item and the Investigative score; and 2) the correlation between the SCI Enterprising score and the EOE item “be more competitive in the job market” will be significantly stronger than the correlation between that item and the Investigative score. 1. The Pearson product-moment correlation between the first Enterprising EOE item and the SCI Enterprising score was .32. The Pearson product-moment correlation between the first Enterprising EOE item and the SCI Investigative score was .21. The z transformation yielded a difference for the z comparison of .12, $p<.01$. This result supported the hypothesis that the first Enterprising EOE item would be more strongly correlated with the SCI Enterprising score than with the SCI Investigative score.

2. The Pearson product-moment correlation between the second Enterprising EOE

item and the SCI Enterprising score was .22. The Pearson product-moment correlation between the second Enterprising EOE item and the SCI Investigative score was .16. The z transformation yielded a difference for the z comparison of .06, $p < .10$. This did not support the hypothesis because the difference was not significant.

2f. The correlation between the SCI Conventional score and the EOE item “reduce the chance of being fired” will be significantly stronger than the correlation between that item and the Artistic score. The Pearson product-moment correlation between the above EOE item and the SCI Conventional score was .18. The Pearson product-moment correlation between the above EOE item and the SCI Realistic score was .06. The z transformation yielded a difference for the z comparison of .12, $p < .01$. This result supported the hypothesis that the Conventional EOE item would be more strongly correlated with the SCI Conventional score than with the SCI Artistic score.

Hypothesis 3

Those who re-enroll for Fall 2002 will report significantly higher EOE scores and ASE scores than those who do not re-enroll. The researcher conducted a t -test to compare the mean scores on the ASE and EOE measures for those who are still enrolled to those of non-enrolled students. The results are displayed in Table 5.

Table 5

Comparison of Means on ASE and EOE for Enrolled vs. Non-Enrolled Students

Measure	Enrollment Status	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
ASE	Enrolled	18.21	3.61	0.92	.37
	Not Enrolled	17.79	3.90		
EOE	Enrolled	34.68	5.70	2.19*	.03
	Not Enrolled	33.44	6.27		

* $p<.05$, $N_{\text{enrolled}}=682$, $N_{\text{not enrolled}}=143$.

High scores on the ASE indicate a high degree of self-efficacy in academics.

High scores on the EOE indicate high expectancies for the outcome of one's education.

The researcher conducted a *t*-test to compare the mean scores on the ASE for those who are still enrolled to those of non-enrolled students. The *t*-test for ASE yielded a $t=0.92$, $p<.36$ with equal variances not assumed. Equal variances were not assumed because the number of non-enrolled students ($N=143$) was so much smaller than the number of currently enrolled students ($N=682$). The Levine's test for equality of variances yielded results that indicated enough inequality in variances between groups to warrant using the statistics reported without the assumption of equal variances. The result did not support the hypothesis that ASE scores of the enrolled would be significantly higher than those students that did not continue enrollment.

The *t*-test for EOE yielded a $t=2.19$ with equal variances not assumed, as discussed in the previous paragraph. The EOE scores of the enrolled were significantly higher than those students that did not continue enrollment at $p<.03$. This result supported the hypothesis that

EOE scores for enrolled students would be significantly higher than the scores of those who were no longer enrolled.

Hypothesis 4

The EOE sum score will be significantly and positively correlated with ACT scores. The Pearson product-moment correlation between ACT scores and the EOE sum score was .02. This is not a significant result, because a correlation of .02 explains less than .04% of the total variance. This is not a significant nor a meaningful number. The number is not meaningful, because understanding less than .04% of the variance does not add any substantial amount of information to the knowledge base. Because of this, the result does not support the hypothesis that EOE scores would be significantly and positively correlated with ACT scores.

Hypothesis 5

After the prior semester's GPA has been removed, scores on the EOE and ASE will significantly predict participants' GPA for the semester following the administration of the measures. The researcher used a hierarchical regression to determine the predictors accounting for variance in Spring GPA (semester GPA following administration of the measures). The criterion variable was Spring GPA. The predictor variables were entered in stepwise fashion in the following order: prior cumulative GPA, ASE total score, and EOE total score. The results are summarized in Table 6.

Table 6

Results of Hierarchical Regression for Spring GPA in Hypothesis 5

	<i>b</i>	β	<i>p</i>	<i>R</i> ²	Adjusted <i>R</i> ²	Change in <i>R</i> ²	<i>F</i> Value for Change	<i>p</i>
1. Cumulative GPA	.73	.73	<.001	.53	.53	.53	287.06	<.001
1. Cumulative GPA	.70	.69	<.001	.54	.54	.01	7.10	<.01
2. ASE	.03	.12	<.01					
1. Cumulative GPA	.70	.69	<.001	.54	.53	<.01	.04	.83
2. ASE	.02	.12	<.02					
3. EOE	.01	.01	.83					

β is the standardized beta coefficient.

As noted in Table 6, the standardized Beta coefficient for the regression using only the prior semester's GPA as a predictor was $\beta=.73$, significant at $p<.001$. There was a significant leap in beta value from this model to the second model, which included ASE as a predictor of future GPA. The ASE had a Beta of $\beta=.12$, significant at $p<.01$. This supports the hypothesis in that over and above prior GPA, the ASE is a significant predictor of future achievement (GPA). However, there was not a significant leap in the beta value from the second model to the third, which included EOE as a predictor of GPA. The overall beta remained $\beta=.69$, significant at $p<.001$. Because the ASE did make a significant contribution ($\beta=.69, p<.001$), the result did partially support the hypothesis that over and above prior GPA, the ASE and the EOE would be significant predictors of achievement (GPA).

Additional Analyses

Hypothesis 3 Revisited

Hypothesis 3, the hypothesis that the EOE and ASE would respectively predict persistence (continued enrollment) yielded significant results for the EOE. The researcher conducted separate *t*-tests for each item of the EOE with enrollment as the independent variable in order to tease apart the differential effects of each item. The researcher hypothesized that each EOE item score for enrolled students would be significantly greater than the corresponding item score for non-enrolled students. The results are summarized in Table 7.

Table 7

T tests for Individual EOE Items for Enrolled Versus Non-Enrolled Students

EOE item	Enroll <i>M</i>	Enroll <i>SD</i>	Not Enroll <i>M</i>	Not Enroll <i>SD</i>	<i>t</i>	<i>p</i>
Realistic	5.20	0.97	5.06	1.03	1.48	.14
Investigative	4.85	1.02	4.55	1.19	2.87	.005**
Artistic	5.27	0.95	5.13	1.13	1.43	.15
Social	4.91	1.09	4.52	1.30	3.32	.001***
Enterprising _a	4.80	1.09	4.84	1.10	-0.38	.70
Enterprising _b	4.99	1.06	4.92	1.17	0.63	.53
Conventional	4.67	1.19	4.43	1.25	2.10	.04*

p*<.05, *p*<.01, ****p*<.001

High scores indicate a high expected outcome for the participant's education in the area indicated by the item. Significant *p* values indicate a significant difference between the means for enrolled versus non-enrolled students.

Realistic EOE Item. The *t*-test for the Realistic EOE Item, "To have learned skills for my career," for enrolled versus non-enrolled students yielded a *t*=1.48 with equal variances not assumed (this assumption is discussed earlier in the text). As noted in Table 7, the Realistic EOE item scores of the enrolled were not significantly higher than those students that did not continue enrollment. This does not support the hypothesis that scores on this EOE item differ significantly between enrolled and non-enrolled students.

Investigative EOE Item. As shown in Table 7, this item, "To have intellectual stimulation," did yield a significant result, with a *t*=2.87 significant *p*<.005. This supports the

hypothesis that Investigative EOE item scores for enrolled students would be significantly higher than the scores of their non-enrolled counterparts.

Artistic EOE Item. The *t*-test for the Artistic EOE Item, “To have grown as a person,” yielded a $t=1.43$, as noted in Table 7. This was not a significant *t* value. This means that the Artistic EOE item scores of the enrolled were not significantly higher than those students that did not continue enrollment. This does not support the hypothesis that scores on this EOE item differ significantly between enrolled and non-enrolled students.

Social EOE Item. As shown in Table 7, this item, “Be able to better serve other people,” yielded a significant result, with a $t=3.32$, significant at $p<.001$. This supports the hypothesis that Social EOE item scores for enrolled students would be significantly higher than the scores of their non-enrolled counterparts.

Enterprising EOE Item (1). The *t*-test for Enterprising EOE Item (1), “Be more competitive in the job market,” yielded a $t=-0.38$, which is not a significant value. Because the *t* is not significant, the Enterprising EOE item (1) scores of the enrolled were not significantly higher than those students that did not continue enrollment. This does not support the hypothesis that scores on this EOE item differ significantly between enrolled and non-enrolled students.

Enterprising EOE Item (2). The *t*-test for the Enterprising EOE Item (2), “Be able to make more money,” yielded a $t=0.63$, which is not a significant value. Because the *t* value is not significant, the Enterprising EOE item (2) scores of the enrolled were not significantly higher than those students that did not continue enrollment. This does not support the hypothesis that scores on this EOE item differ significantly between enrolled and non-enrolled students.

Conventional EOE Item. As noted in Table 7, the *t*-test for the Conventional EOE Item, “Reduce the chance of being fired,” yielded a $t=2.10$, significant $p<.04$. The significant *t* means that the scores of enrolled students are significantly higher than the scores of non-enrolled students on this item. This supports the hypothesis that Conventional EOE item scores for enrolled students would be significantly higher than the scores of their non-enrolled counterparts.

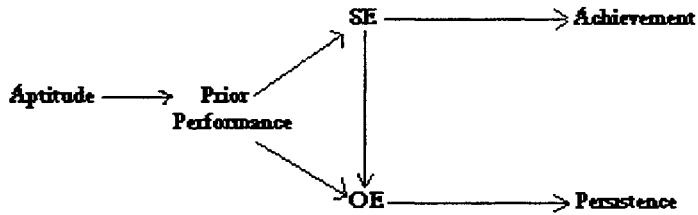
Discussion

In this section, the researcher will discuss the results of the hypotheses. The discussion will be arranged in the same order as the results reported in the previous section. First, the researcher will discuss the significant correlation reported between SE (ASE) and OE (EOE) in Hypothesis 1, and how that relates to the literature. Then, the researcher will discuss the correlations between EOE items and their corresponding RIASEC code versus their opposite RIASEC code, as measured on the SCI. This discussion will cover the range of significant and not significant correlations reported in the previous section for Hypothesis 2 and how that relates to the literature.

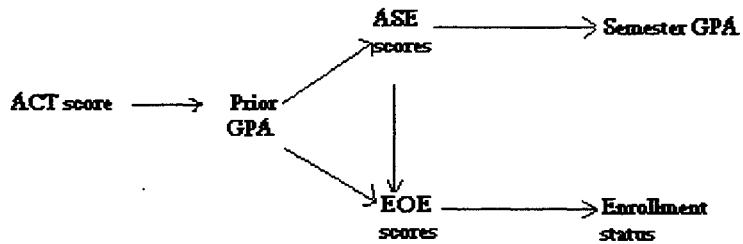
The researcher will then discuss the differences in EOE and ASE scores between currently enrolled students and students not currently enrolled. The results of the comparison for EOE in Hypothesis 3 were significant, but the results for the ASE were not; this will be discussed as it relates to the literature as well. In addition, the researcher will discuss the results of the additional analyses, which were a follow-up to Hypothesis 3 using individual EOE items to discern between enrolled and not enrolled students.

Following this, the researcher will discuss the relationship between the literature and the reported not significant correlation between OE (EOE) and aptitude (ACT) in the results of Hypothesis 4. Finally, the researcher will then discuss the results of the hierarchical regression in Hypothesis 5, in which prior achievement (prior cumulative GPA) and SE (the ASE) but not OE (the EOE) significantly predicted achievement as measured by GPA.

In contrast to the model presented earlier, the results of the current study show the model to be constructed thusly:



The logic behind the subtle shift in the model (relationships between SE and persistence and OE and achievement were deleted) is discussed as well. As operationalized in the hypotheses, the revised model would look as follows:



Discussion of Results by Hypothesis

Overall, one hypothesis (Hypothesis 1) was strongly supported, three others were supported to varying degrees (Hypotheses 2, 3, and 5) and one hypothesis was rejected (Hypothesis 4). The researcher will discuss the results of each hypotheses in order of original presentation, beginning with Hypothesis 1.

Discussion of the Results of Hypothesis 1

Hypothesis 1 was the only hypothesis that was strongly and unequivocally supported. The lack of other hypotheses in this category is most likely due to the multifaceted nature of the other hypotheses. In contrast, Hypothesis 1 was a straightforward assertion: the EOE, which measures Educational OE, should be positively and significantly correlated with the

ASE, which measures Academic SE. The basis for this lies in Lent et al.'s (1994) paper outlining SCCT. In this paper, the authors stated that SE and OE are largely related as they underlie the functioning of Bandura's (1986) model of triadic reciprocity.

The EOE and ASE are measures of academic (or educational) factors. The research on the roles of OE and SE in education (Lent et al., 1996; Shell et al., 1995, Brown et al., 1997; Smith & Fouad, 1999) suggests that OE and SE play similar roles in the area. Because the effects have been shown to be similar, it would stand to reason that the two constructs would be correlated. As reported in the results of Hypothesis 1, OE (as measured by the EOE) and SE (as measured by the ASE) are shown to be significantly positively correlated. The correlation was a moderate one, at $r=.39$, significant at the stringent $p<.0005$. Therefore, the results of Hypothesis 1 add to the literature that supports the moderate positive relationship between SE and OE.

Discussion of the Results of Hypothesis 2

Hypothesis 2 was divided into six parts in order to test each EOE item and each Holland code from the SCI separately. Because there are seven EOE items and two of them were enterprising items and relate to the Enterprising General Confidence Theme (GCT), the section regarding the comparisons using the Enterprising GCT was broken into two parts, one for each EOE Enterprising item. In total, there were seven comparisons; one for each pair of correlations. Each pair included a correlation with matching themes (Realistic EOE item-Realistic GCT, e.g.) and a correlation of opposing themes (Realistic EOE item-Social GCT, e.g.). For a description of the opposing RIASEC themes, refer to the Rationale for Hypothesis 2 at the end of the Literature Review section. Holland (1997, 1999) states that the RIASEC codes on opposite ends of his hexagon are the least alike. If the EOE maps onto the

Holland RIASEC code, EOE items should have significantly higher correlations with matching GCTs than with opposite GCTs.

Discussion of the results of Hypothesis 2, Part A: Realistic Item. The researcher reported a difference in z scores for the correlations in Part A that was opposite of what was predicted. This result did not support the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores. The Social section of the SCI was actually significantly and more strongly correlated with the Realistic EOE item than the Realistic section of the SCI.

The results contradict the trend in the literature that link OE to the career domain (Chartrand & Rose, 1996; Hackett & Byars, 1996; Morrow et al., 1996) in a positive direction because the EOE is an educational OE measure and the SCI is a career SE measure and this result showed a negative direction (the z difference was negative). This may be an indicator that either a) the item's phrasing did not indicate the characteristics embodied by the Realistic GOT, b) the sample did not read the item as intended, c) the Realistic EOE item is actually measuring characteristics associated with the Social GCT, or d) the EOE's items are so closely correlated that the Realistic item shares too much variance with the Social item.

The first two possibilities are difficult to test with the present data. The researcher could only test these possibilities by going back to the sample and collecting data on a variety of reworded versions of the Realistic EOE item. The third possibility is unlikely because of the wording of the item. The wording of the Realistic item, "to have learned skills for my career," seems unlikely to capture the helping and interpersonal association characterized by the Social GCT. Another possibility is that the word "career" may have cued many of the

participants to their chosen career. A look at the demographic shows that a plurality (see Table 1) of the sample are entering fields that would be classified as having Social General Occupational Themes, the basis for the SCI's GCTs (Betz et al., 1996).

The fourth possibility, however, is a viable one. This is evident from the Springer et al. (2001) study that showed the EOE as having a particularly strong one-factor model. While this bodes well for the EOE as a singular measure of OE in the Educational domain, it does not bode well as a measure of six separate factors (the GCTs in the SCI). This is also evident from the information presented in the current study for item and scale correlations. The EOE was by far the stronger intracorrelated measure when compared to the SCI. The SCI was a reliable and consistent enough measure to be included as a companion to the highly-valued Strong Interest Inventory. Because the correlations among items were so much higher than those on the SCI, it is possible that the EOE is too intracorrelated and therefore not likely to be able to measure six separate factors without some of the variance “spilling over” from one factor (EOE item) to the other. In this case, such an occurrence could explain the strength of relationship between the Realistic EOE item and the Social GCT score on the SCI.

Discussion of the results of Hypothesis 2, Part B: Investigative Item. The researcher reported no significant difference in z scores for the correlations in Part B. This result did not support the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores.

This is similar to the situation described in the above section dealing with the Realistic EOE item. The possible explanations for no z difference, therefore, are quite similar to those above. Again, these possibilities are a) the item's phrasing did not indicate the characteristics embodied by the Investigative GOT, b) the sample did not read the item as

intended, c) the Investigative EOE item is actually measuring characteristics associated with the Enterprising GCT, or d) the EOE's items are so closely correlated that the Investigative item shares too much variance with the Enterprising item. However, the odds of these possibilities are not exactly the same as in the prior section because the researcher did not find a significant "reverse" difference as above. The researcher will therefore examine each possibility.

The first two possibilities can be dispatched with the same response as before; they are difficult to test with the present data. The researcher could only test these possibilities by going back to the sample and collecting data on a variety of reworded versions of the Investigative EOE item. The third possibility is again unlikely because of the wording of the item. The wording of the Investigative item, "to have intellectual stimulation," seems unlikely to capture the characteristics of the Enterprising GCT, which is related to persuasion, leadership, and financial success. The problems with this are not as great as they were in the preceding section, mainly because the difference was not a significant one. As discussed at numerous points in this paper, the sample size is such that it is easier to obtain the standard .01 value for p , which is why more stringent p values have been reported. In this case, the z difference had a $p < .34$, not a difference. If the situation were reversed and the correlation for matched items had a .02 z difference above the correlation for opposite items, the researcher could not make a case for the matched correlation being substantially greater than the opposite correlation. Therefore, further discussion would give too much credence to the negative z difference; it is not a statistical difference and it is surely not a meaningful difference.

The overall problem is that the hypothesis was not supported. For lack of an alternative that can be tested with the current data set or without substantial cost and retesting, the researcher must fall back on one of the first two possibilities, namely: a) the item's phrasing did not indicate the characteristics embodied by the Investigative GOT, b) the sample did not read the item as intended. These possibilities are both candidates for future research.

Discussion of the results of Hypothesis 2, Part C: Artistic Item. The researcher reported a difference in z scores for the correlations in Part C that was in the direction of what was predicted, meaning that the z difference was a positive number. However, this result did not support the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores because the z difference was not significant.

In earlier sections of this discussion, the possibility that the individual EOE item was picking up variance from another item or mapping onto another construct was discussed. This is not the case for the Artistic item. It is unclear whether the Artistic item is mapping onto any construct except the overall construct of educational OE. Both correlations using the Artistic EOE item (the correlation between Artistic EOE item and Artistic GCT score and the correlating between Artistic EOE item and Conventional GCT score) were so low that they account for a negligible amount of the overall variance (1%). Looking back at the possible explanations discussed in the two prior sections, one explanation stands out in particular: explanation a). The wording of the item, "to have grown as a person," seems certainly to be the item of the seven that most relates to the Artistic GOT. However, it also seems that an item could have been written that better captured the creativity and imagination embodied by

the Artistic GOT. It may be worth the effort for the researcher to investigate possible phrasings of this item that may better capture the construct.

Discussion of the results of Hypothesis 2, Part D: Social Item. The researcher reported a difference in z scores for the correlations in Part D that was in the direction of what was predicted, meaning that the z difference was a positive number. Moreover, this result supported the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores because the z difference was significant (z difference=.28, $p<.001$).

In the literature, SE and OE have been shown to be related and SE and the RIASEC have also been shown to be related in numerous studies (The OSES, Schifano & Betz, 1998; TSOSS, Betz et al., 1999; Betz & Hackett, 1981). Specifically, SE and OE have been linked in the educational realm (Lent et al., 1991; Brown et al., 1997). Following this logic, the EOE (a measure of educational OE) and the SCI (a measure of career SE) should be related in the same positive direction as the literature describes. In addition, Holland's (1997, 1999) position that like (close on the hexagon) items should be more closely related than opposite (across from each other on the hexagon) adds another dimension. The overall logic of Hypothesis 2 is based on this.

Unlike the previous items, the Social item supported the hypothesis and showed the moderate positive correlation expected in the relationship between like educational OE and career SE, a relationship significantly stronger than the relationship between opposite items. This may have been because the Social item was worded in a manner that left little room for interpretation as to what construct it was tapping. The wording of the item, “to be able to better serve other people,” deliberately spells out the aspects of helping and relationships

emphasized by the Social GOT. This explanation would best match the earlier explanations that items that did not respond according as hypothesized because of the wording. If this item responded so well because of the way it was worded, this helps the case that the “ineffective” items did not respond well because of wording as well.

Discussion of the results of Hypothesis 2, Part E: Enterprising Items. The researcher will discuss the two Enterprising items separately. The researcher reported a difference in z scores for the correlations in Part E (1) that was in the direction of what was predicted, meaning that the z difference was a positive number. Moreover, this result supported the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores because the z difference was significant (z difference=.12, $p<.01$).

The first Enterprising item supported the hypothesis and showed the moderate positive correlation expected in the relationship between like educational OE and career SE, a relationship significantly stronger than the relationship between opposite items. Similar to the Social item, this item was worded in a manner that left little room for interpretation as to what construct it was tapping. The wording of the item, “be more competitive in the job market,” deliberately spells out the aspects of external achievement-motivated action emphasized by the Enterprising GOT. Again, this explanation would best match the earlier explanations that items that did not respond according as hypothesized because of the wording. This adds to the case stated at the end of the previous section that the “ineffective” items did not respond well because of wording as well.

The researcher reported a difference in z scores for the correlations in Part E (2) that was in the direction of what was predicted, meaning that the z difference was a positive

number. However, this result was not enough to support the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores because the z difference was not significant (z difference=.06, $p<.10$).

The second Enterprising item did not support the hypothesis, and therefore did not show the moderate positive correlation expected in the relationship between like educational OE and career SE, a relationship that should be significantly stronger than the relationship between opposite items. Unfortunately, this item was worded in a manner that left little room for interpretation as to what construct it was tapping. The wording of the item, “be able to make more money,” deliberately spells out the aspects of external achievement-motivated action emphasized by the Enterprising GOT. But a reexamination of the wording could lead one to posit that the wording, while in essence tapping the traits of the Enterprising GOT, may have also tapped a general desire from students to make money after they leave college. In this case, the item is capturing extra variance, which could explain the small difference between the like correlation and the opposite correlation when using the Enterprising item.

Discussion of the results of Hypothesis 2, Part F. The researcher reported a difference in z scores for the correlations in Part F that was in the direction of what was predicted, meaning that the z difference was a positive number. Moreover, this result supported the overall claim in Hypothesis 2 that like items and GCT scores would be significantly more strongly correlated than opposite items and GCT scores because the z difference was significant (z difference=.12, $p<.01$).

Like the Social and Enterprising (1) items, the Conventional item supported the hypothesis and showed the moderate positive correlation expected in the relationship between like educational OE and career SE, a relationship significantly stronger than the

relationship between opposite items. This may have been because the Conventional item was worded in a manner that left little room for interpretation as to what construct it was tapping. The wording of the item, “reduce the chance of being fired,” deliberately spells out the aspects of performing one’s duty and job maintenance emphasized by the Conventional GOT.

This explanation is also supported by the fact that the wording stood out from the other items (it began with “reduce” rather than the standard “to have” or “be”). This may have made the content of the item more salient, and therefore more likely to be read carefully. This also aids the earlier explanations that items that did not respond according as hypothesized because of the wording. If this item responded so well because of the way it was worded, this adds to the case that the “ineffective” items did not respond well because of wording as well.

Overall Discussion of Hypothesis 2. All in all, Hypothesis 2 had seven z comparisons, one for each item. Three were significant in a positive manner (Social, Enterprising (1), and Conventional) and one was significant in a negative manner (Realistic). Overall, this is some support for this hypothesis. To add perspective, the EOE is a seven-item scale. In comparison, the SCI as used in this thesis is 60 items divided into six facet scores. It may be asking too much of a seven- (or even a twelve-) item scale to successfully map onto constructs that are measured as completely as those on the SCI.

Discussion of the Results of Hypothesis 3

The researcher conducted t -tests to compare the mean scores on the ASE and the EOE for those who are still enrolled to those of non-enrolled students. The test for the ASE yielded $t=0.92, p<.36$. This result contradicts the literature that shows academic SE to be

moderately and positively correlated with persistence (Lent et al., 1984, Brown et al., 1989). The point of this hypothesis was to test whether the ASE stood up as a measure of academic self-efficacy and would be a sort of a baseline comparison for the EOE, as the correlation between educational OE and persistence had not been measured yet. Unfortunately, that baseline does not coincide with the previous literature. But used as a baseline, the ASE serves to highlight the positive results of the EOE comparison.

The *t*-test for EOE yielded a $t=2.19$, $p<.03$. This result supported the hypothesis that EOE scores for enrolled students would be significantly higher than the scores of those who were no longer enrolled. This should be taken as a result supporting the value of educational OE in predicting persistence and adding to the value of the EOE.

The EOE was assumed to have similar effects to the ASE when used as a comparison variable with persistence category (enrolled vs. non-enrolled) because of the wealth of literature positively linking the effects and predictive value of academic/educational SE and OE (e.g., Morrow, Gore, & Campbell, 1996; Hackett & Byars, 1996; Chartrand & Rose, 1996). Here, the EOE showed a different effect than the ASE. This can be taken to mean that educational OE has differential effects than academic SE, which in turn may mean that the educational OE has predictive value over and above that captured by academic SE. Even though the ASE results do not support the findings in the literature, it is encouraging news for the EOE and should stand as a basis for further research on the role of educational OE in persistence levels.

Discussion of Additional Analyses. Because the EOE piece of Hypothesis 3 was successful, the researcher ran individual *t*-tests for each item of the EOE to discern which items were showing the significant effects and which were not. The results showed

significant *t* values for the Investigative, Social, and Conventional items. That the Investigative item showed a significant effect was to be expected. The Investigative GOT would appear to be the theme most closely related to the internal reasons for attending college, i.e. to gain knowledge. While some students may become frustrated with the lack of results from their education (e.g., no immediate increase in salary in the case of the strong endorsers of the Enterprising item), others that are more intrinsically motivated would be less likely to be concerned with this “bottom line” and more concerned with the continuing of their educational experience. One would assume, therefore, that these students are less likely to discontinue their time in college.

The Social item showed the largest effect of all, with $p < .001$. Recall the earlier discussion that a large plurality of the sample was enrolled in Social-related majors, the same people expected to highly endorse the Social item. It may be that the people dropping out were simply not these people or that people with these majors are less likely to drop out. The researcher was unable to obtain major data for the students that did not re-enroll. Because of this, the researcher is only able to speculate as to why the Social item did so well in predicting enrollment status. It may just be that the Social item was so solid it was able to achieve larger effect sizes.

The Conventional item also showed a significant effect at $p < .04$. This could entirely be due to the wording of the item, “reduce the chance of being fired.” This could be mapping onto another source of variance, namely the participant’s desire to avoid failure. Desire for continued enrollment and desire for continued employment seem to be similar constructs that could be lumped together quite readily. Perhaps it is this shared “avoidance of failure” that prompted significantly higher scores in the continued enrollment group.

Discussion of the Results of Hypothesis 4

The fourth hypothesis, that EOE sum scores would be positively and significantly correlated with ACT scores was not supported. The literature (Lent et al., 1993) had shown support for the role of academic SE and educational OE in a regression of ACT scores. This particular prior study, the only one that showed significant effects for educational OE with ACT scores, used a subject-specific mathematics OE. The nature of the EOE is that it is designed to be effective across subjects so there is no math component or verbal component, etc. Because there was no support for this hypothesis in the literature, it is not surprising that the EOE sum score did not significantly correlate with the ACT scores. This hypothesis was an attempt to see whether the EOE as a singular measure of overall educational OE would correlate with ACT scores. It did not.

Discussion of the Results of Hypothesis 5

In the regression performed in Hypothesis 5, the researcher was looking for significant contributions from the ASE and the EOE to the variance in GPA the semester following administration of the measures. This was done in order to investigate the support this measure gave to the literature (Lent et al., 1984; Brown et al., 1989; Lopez et al., 1997) showing a positive link between academic SE and GPA.

The ASE portion of the hypothesis coincided with the literature, showing a significant β with $p < .01$. This effect was lessened slightly by the addition of the EOE to the regression, down to $p < .02$, but still significant nonetheless. The decision to make this leap was made mostly due to the literature linking SEs to OEs (e.g., Lent et al., 1991; Brown et al., 1997) in the educational realm. Unfortunately, the leap did not bear success, as the addition of the EOE added no significant contribution to the regression. This may be simply because SEs have an effect when it comes to achievement whereas OEs do not have an effect.

CONCLUSIONS

Additional Statements

The Educational Outcome Expectancy Scale was shown in this research to be divergently valid, as was shown specifically in Hypothesis 3. In these results, the EOE had a differential effect than the ASE. Not only does this provide support for the EOE as an instrument that can predict persistence but it also provides support for educational OE as a separate construct from academic SE. Because of these results, the EOE was also shown to be predictively valid, as it was a significant predictor of enrollment status. In addition, the EOE showed construct validity because it acted as a measure of educational OE should, as reflected in the Discussion section. Finally, the EOE showed content validity for an overall measure of educational OE as well because its items tapped the areas covered by the area of educational OE to the point that, even though it was a seven item scale, it was useful as a measure of educational OE.

The Educational Outcome Expectancy Scale, as noted numerous times and most saliently in the Overall Discussion of Hypothesis 2, is a seven-item instrument. Many of the hypotheses posited in this paper were either expecting much of this relatively short instrument or making logical leaps from the literature in determining predictions of its value. Four out of five hypotheses were supported to varying degrees, which speaks to the particularly solid single-factor structure of the EOE. It does what it purports to do: measure educational OEs. On multiple levels, as discussed in the previous section, it acts as an EOE measure should as well.

That these effects were achieved with an instrument as small and easy to administer as this is impressive to say the least. The EOE might benefit from expansion so that all pieces

of the RIASEC hexagon are represented with two items as the Enterprising item is. This would bring the item total to twelve items, hardly a monumental increase. Just as valid an argument could be made that the EOE should be pared down to six items, thereby eliminating one of the Enterprising items. A third possibility is the adoption of the 12-item model and then paring it down to the six items that each capture their Holland GOT best. However, the researcher wonders if the one-factor structure would be jeopardized by such an endeavor. To say the least, though, the EOE as it currently exists did fairly well as a comparison measure to career SE as measured on the SCI.

One thing was made clear through the literature used for this thesis: career and educational SE still occupy a large majority of the literature based on SCCT as opposed to career and educational OE. Perhaps the EOE will aid in the advancement and proliferation of research based on career and educational OEs because of its parsimonious yet effective manner. Overall the EOE appears to show great promise as an inexpensive (time-wise and currency-wise) measure of educational outcome expectancies.

Limitations

That having been said, this study was limited in several ways. One of these many ways is the wording of the items of the EOE. As noted in the Discussion of Hypothesis 2 several times, the wording of EOE items may have prevented them from representing the Holland GOTs as well as they could have. This may be a function of the relationship between educational OEs and career SE or it really may be a function of the wording. Perhaps there could have been better wording on a few items. However, as mentioned before, this could jeopardize the solid one-factor structure of the EOE as it currently exists; even though changing the items probably would not drastically alter the results of the factor analysis or

the value of the EOE, it could accidentally alter the construct validity of the instrument by muddying the construct being measured.

Another limitation of the study was the lack of information regarding the diversity of the sample. Ethnicity of the sample was not recorded during the large testing session at which the data for this study was collected. It would be interesting to see what role ethnicity plays in educational OE and academic SE.

A third limitation, related to the preceding one, is the absence of knowledge regarding the degree goals of the participants. The degree aspiration could have moderated many of the effects seen in this thesis, most notably the sections regarding persistence. Overall, the research could have covered more ground. Of course, this is said in hindsight. The expectations at the start of this thesis appeared reasonably high, so there may not have been any consistent way to anticipate some of the problems encountered here.

Suggestions for Future Research

There is a multitude of ideas that could be empirically tested as an offshoot of this research. The first and foremost would appear to be the wording issue. Perhaps a reformulation or creation of additional items to better tap the RIASEC scales. This could be tested in the same manner that these data were collected, through a large-scale testing session. This may provide some of the answers to the wording issue. Another piece of the wording issue is the participant's interpretation of the items. A way of testing this would be to ask for the participant's impressions of what the items were asking after completion of the measures.

Another idea for future research concerns the majors themselves. The EOE could be tested by individual major to a) check adherence to the RIASEC GOTs and b) determine

which majors seem to engender the best outcome expectancies (or conversely which majors are selected by people with initially high outcome expectancies). A corollary of this line of thinking is to test the undeclared students on the EOE and then, following the declaration of a major, retest the students. The researcher would think that the students would have higher EOEs than when they were undeclared. This would be due to a more definite outcome possibility being present, which would lend specificity to the OE.

A final possibility is to use the EOE to track educational OE in a longitudinal fashion beginning at a younger age. As mentioned earlier, the ASE data set used for comparison was from talented and gifted younger students. There does not seem to be a reason that the EOE would not work with high school students, as the students were cued to read the directions, which ask the participant to consider the outcomes (items) as they relate to the completion of their education. The data from this study could be used to predict later educational OEs. As seen throughout the thesis, educational OEs are correlated with academic SEs. Nurturing academic SE early could help raise educational OE, which could lower the chance of discontinuing enrollment (because the EOE was shown to be related to persistence).

These are not the only possibilities. These are the beginning. The EOE was originally created to provide a clear-cut measure of educational OE that applied across domains such as mathematics and verbal ability. These results showed that the EOE has value and hopefully the application and usefulness of the EOE will not end here.

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