1996

A Structural Analysis of a Social-Cognitive Model of Career Interests

Paul Anthony Gore
Loyola University Chicago

LOYOLA UNIVERSITY CHICAGO

A STRUCTURAL ANALYSIS OF A SOCIAL-COGNITIVE MODEL OF CAREER INTERESTS

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL

IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

DEPARTMENT OF COUNSELING PSYCHOLOGY

BY

PAUL ANTHONY GORE, JR.

CHICAGO, ILLINOIS

JANUARY 1996

ACKNOWLEDGMENTS

This dissertation represents a developmental step in my own personal and professional development; a step that would not have been possible without the guidance and support of many important individuals. First and foremost, I would like to acknowledge Mary Savoy Gore, for her unending patience and emotional support. Although the canyons of Utah may have escaped our observation this year, it is because of her sacrifice that we now embark on a new life course. I would also like to offer my deepest gratitude to Steven D. Brown, Ph.D. who did far more to effect the completion of this work than simply agreeing to chair my committee. He has served as my professional role model over the last four years; teaching me the importance of, and the distinction between, vocation and avocation, and he has been the catalyst for my transition into the academic profession. I thank Robert W. Lent, Ph.D. for his continued support of my professional efforts. Bob continues to fuel my professional imagination while respectfully challenging all of my assumptions. I would also like to extend my thanks to committee members, Jack Kavanagh, Ph.D. and Scott Azuma, Ph.D., for their timely feedback on initial drafts of this paper and their encouragement of my research efforts during my matriculation at Loyola University of Chicago. Special thanks go to Francis Harris, Ph.D. who has assumed a multitude of roles over the last year. As supervisor, research task-master, colleague, and friend, she has been instrumental in my professional

transition and my personal growth. Special thanks also go to Jill Birringer, Loyola University of Chicago, and the University of Utah without whose assistance the collection of data for this project would not have been possible. Finally, I recognize the important contribution that my family has had over the entire course of my professional training. Although they have always provided both emotional and practical support during difficult times, I am most thankful for their having instilled in me the value of education, the essence and necessity of inquiry, and a love of life.

ABSTRACT

In response to the growing empirical support for the utility of self-efficacy beliefs in the career domain, Lent, Brown, and Hackett (1994) recently proposed a social cognitive theory of academic and career interest, choice, and performance. Consistent with Bandura's (1986) social cognitive theory, Lent et al. hypothesize that career interests and subsequent goal behaviors and choices are partially determined by an individual's self-efficacy beliefs and outcome expectations in various career domains. These authors also suggest that the social cognitive career theory can serve as a platform for efforts aimed at theory convergence. Although portions of this theory have been investigated previously, the model outlined by Lent et al. has not yet been tested using hypothesis testing procedures such as covariance structural modeling. Moreover, relatively few studies have focused on the potential overlap between social cognitive career theory and other extant theories of career choice. The present study was designed to address both of these foci. First, the portions of the social cognitive theory of career interest were tested using covariance modeling techniques. Additionally, to compare social cognitive theory to the career choice theory described by Holland (1985) each of the models was tested separately within Holland's six personality - work environment dimensions. Preliminary confirmatory factor analyses supported the viability of the measurement models and suggest that the constructs defined in this study (i.e., self-efficacy beliefs, outcome

expectations, interests, and goals) account for unique portions of variance among the observed measures. Results from structural analyses strongly support the social cognitive theory of career interests. Moreover, consistently strong fit indices and statistics were obtained across Holland's six dimensions suggesting some compatibility between social cognitive career theory and Holland's typological trait-factor theory. These findings are discussed in relationship to existing literature and with a focus on implications for future research.

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CHAPTER 1

INTRODUCTION

Although the challenges faced by vocational specialists today were recognized centuries ago, the onset of the modern vocational guidance movement and the field of vocational psychology are often associated with the work of Frank Parsons at the turn of this century. Parsons (1909) recognized the need to focus both on career interests and abilities in order to help place individuals in appropriate and satisfying jobs. His approach to vocational guidance stressed an accurate understanding of the person (i.e., interests, limitations, abilities, and experiences) and an understanding of the world of work. These two foci resulted in the development of modern vocational guidance (focusing on the individual) and vocational education (focusing on disseminating occupational information). As a theory of vocational guidance, this trait-factor approach stood as the only model until the 1950's (Super, 1953). As a philosophy, Parsons' emphasis on the fit between person and the work environment and his acknowledgment of the importance of career-related interests and abilities permeates most contemporary theories of career development.

Career interests and abilities have been included as constructs in psychological theories of career development, exploration, choice, and satisfaction since the seminal work of the early 1900's. Although these variables have been recognized as important factors in the career exploration and choice process, competing models have differentially

emphasized one or the other or have delegated their influence to different developmental stages. Currently, career interests are most prominently represented in Holland's trait factor career choice theory (1959; 1985). Holland posited that individuals come to develop career interests through hereditary, learning, and socialization processes. Further, he provided a taxonomy that can be used to characterize interests along six dimensions (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional). According to this theory, an individuals' work personality is described using one or more of these dimensions and is typically obtained through formal interest assessment. Similarly , Holland proposed that work environments could be characterized along these dimensions by either describing the work environment as a function of the major dimensions represented by its inhabitants or by conducting detailed job analyses. In the trait-factor tradition, an individual could be matched with an occupation that is congruent with his or her interests or "work personality". The degree of congruence, according to Holland, predicts career outcome variables such as job satisfaction, job certainty, length of time spent in a job, and productivity.

While Holland's nosology has survived empirical analysis and the factor structure of vocational interests frequently approximates Holland's six dimensions (Guilford, Christensen, Bond, & Sutton, 1954; Strong, 1943; Thurstone, 1931), the predictive utility of the congruence construct has received mixed support. Recent meta-analytic studies of the relationship between congruence and academic and career outcomes (Assouline & Meir, 1987; Gore & Brown, 1995; Spokane, 1985; Tranberg, Slane & Ekeberg, 1993)

support the presence of a relationship between congruence and outcome variables such as job satisfaction. The magnitude of this relationship, however, is only modest in size (i.e., correlations ranging from 0.10 to 0.30). Heterogeneous methodologies and the operationalization of the congruence construct have been suggested as possible factors in these results. Lent and Lopez (in press), for example, described the impact of two methods of coding occupational environments on the calculation of congruence. Camp and Chartrand (1992) and Brown and Gore (1994), on the other hand, outlined theoretical and methodological differences across measures of congruence that may account for the discrepant findings in outcome studies. These studies argue for the utility of Holland's theory of career choice but also point out serious shortcomings that require further investigation. Clearly, given meta-analytic findings, variables other than person-environment congruence should be considered when attempting to identify predictors of career and academic outcomes.

In contrast to the focus on career-related interests in Holland's theory, independent work at the University of Minnesota resulted in the development of the Theory of Work Adjustment (TWA; Dawis, England, & Lofquist, 1964; Dawis & Lofquist, 1984). This trait-factor theory emphasizes the importance of an individual's career-related abilities and needs (or work reinforcers), while also focusing on the work environment's ability requirements and reinforcement systems. The degree of correspondence between an individual's abilities and the ability requirements of the job, together with the correspondence between an individual's values or vocational needs and

the ability of the job to reinforce those needs predict outcome measures such as job tenure and satisfaction. More specifically, correspondence between an individual's abilities and the ability requirements of an occupation predict satisfactoriness (a percept of the employer), whereas the correspondence between the reinforcement system of an occupation and the vocational needs predicts satisfaction (a percept of the individual). Empirical support for the relationships described by the TWA has been relatively consistent. Correspondence between vocational needs and occupational reinforcement patterns, for example, has repeatedly been shown to predict worker satisfaction (Rounds & Dawis, 1975; Rounds, Dawis, & Lofquist, 1987; Scarpello & Campbell, 1983; Tziner, 1983). Moreover, the hypothesis that satisfaction is a function of correspondence between an individual's abilities and the ability requirements of an occupation has also received some support (Ghiselli, 1966). Although TWA only implicitly addresses career interests, it does comprehensively outline the roles of both personal abilities and values, recognizes the perspective of the employer, and emphasizes stringent measurement techniques.

Career theories that focus on the human developmental process have also stressed the importance of personal interests and abilities. Ginzburg, Ginsburg, Axelrod, and Herma (1951) proposed a developmental theory of career choice that identified the period of adolescence as a time during which individuals are developing tentative academic and career goals based on budding interests and a self-evaluation of abilities. Super incorporated interests, abilities, and values into his construct of Career Self Concept

(1953). More importantly, perhaps, Super acknowledged the fact that "career-development" is a life long process and may interact with non-career life roles over time.

Krumboltz, Mitchell, and Jones (1976) proposed the first theory to truly integrate abilities and career interests. This theory described the development and implementation of self observational generalizations (self-referent thoughts), task approach skills (or decision making skills), and career entry behaviors using concepts borrowed from operant, classical, and social-learning theories. According to this theory, an individual will have a preference for an occupation (interest) when he or she has engaged in occupationally relevant behaviors and been reinforced for them, has seen models being reinforced, or has positive associations. Furthermore, individuals attempt to secure jobs that they prefer when appropriate training and opportunities are available only if their abilities are sufficient. The majority of empirical support for this model has concentrated in the area of the development of career preferences (Mitchell & Krumboltz, 1990). Krumboltz (1967), for example, developed Job Experience Kits that were designed to gradually increment mastery experience in job related tasks. Krumboltz, Baker, and Johnson (1968) reported that students who received experience with the kits expressed higher levels of interest in the corresponding occupations when compared to students receiving information about those occupations through more traditional means. Moreover, Osipow (1972) observed increased preference for tasks that were reinforced when compared to tasks that were not reinforced. Finally, Oliver (1975) identified the

importance of verbal persuasion in modifying an individual's stated choices in counseling.

Hackett and Betz (1981) also drew upon concepts from Social Learning Theory in an attempt to explain the under-representation of women in math and science intensive occupations. They proposed that self-efficacy beliefs --one's belief in one's ability to carry out actions to reach a desired goal -- are important mediators of the relationship between actual abilities and performance outcomes. According to Bandura (1986), these beliefs derive from personal performance accomplishments, vicarious learning, modeling, and physiological mechanisms. Self-efficacy beliefs influence the initiation of behavior towards a goal, the effort expended in that behavior, the persistence of in effort expenditure, and our ultimate performance of that behavior. The original work of Hackett and Betz has been expanded since it was first introduced, and findings have been encouraging with respect to demonstrating the utility of social-cognitive variables in explaining a variety of career constructs (Hackett & Lent, 1992; Lent & Hackett, 1987). As Hackett and Lent (1992) point out in a review of this literature, self-efficacy beliefs are generally predictive of indices of career entry behavior such as interests, range of occupational considerations, academic achievement, and persistence. Moreover, they also relate to career adjustment outcomes such as performance and coping with job loss. Finally, there is growing evidence for the construct validity of self-efficacy beliefs.

Betz and Hackett (1981) reported that self-efficacy beliefs were related to expressed vocational interests and range of perceived career options. These relationships

have received strong and consistent support (Betz, Klein, & Borgen, 1994; Lenox & Subich, 1994; Lent, Brown, & Hackett, 1994). Wheeler (1983), for example, found that self-efficacy beliefs were significantly correlated with occupational preference when self-efficacy beliefs were measured as both perceived match of abilities to an occupation and as ease of success in that occupation. Post-Kammer and Smith (1986) reported that consideration of math and science related careers was significantly related to interests, as well as correlated with confidence in completing academic requirements (self-efficacy), although the latter finding was present in female participants only. Lent, Brown, and Larkin (1986) observed a significant correlation between self-efficacy beliefs for science and engineering careers and expressed interests in those careers. Moreover, in regression analyses, both interests and self-efficacy (when measured either as confidence in the ability to complete educational requirements or confidence in the ability to perform specific accomplishments critical to academic success in science and engineering majors) significantly predicted range of career options. Lent, Larkin, and Brown (1989) reported similar findings in science and engineering students. Rotberg, Brown, and Ware (1987) also reported significant positive relationships among career interests, range of occupational considerations, and self-efficacy beliefs. Finally, Lent et al., (1994) reviewed research on the relationship between self-efficacy and interests and presented meta-analytic findings suggesting that the average effect size of this relationship is 0.53.

Lent, et al. hypothesized that self-efficacy beliefs mediate the relationship between abilities and career-related interests. According to this proposition, individuals

do not develop interests in activities and occupations based on their actual abilities, but rather they develop interests in activities and occupations for which they have strong positive self-efficacy beliefs. In support of this hypothesis, Lent, et al. (1994) calculated partialled average correlations obtained from a meta-analysis of relevant research studies. Bivariate correlations among interests, abilities, and self-efficacy were all significant, but, when the effects of self-efficacy on interests were partialled out, the relationship between ability and interests fell to zero. These findings strongly support the contention that self-efficacy beliefs fully mediate the relationship between abilities and interests.

Additional research has focused on the sources of self-efficacy beliefs in an attempt to validate Bandura's (1986) contention that they derive primarily from personal performance accomplishments, modeling, social persuasion, and physiological mechanisms. Hackett (1985), for example, reported significant positive relationships between prior mathematics exposure, math ACT results, and mathematics self-efficacy beliefs. Lapan, Boggs, and Morrill (1989) also reported a significant relationship between mathematics performance and mathematics self-efficacy beliefs in college freshman. In a direct test of all four sources of self-efficacy, Lopez and Lent (1992) found that past performance and arousal sources were the most significant predictors of mathematics self-efficacy beliefs in high school algebra students. Vicarious learning and persuasion did not account for significant variability in mathematics self-efficacy after past performance, arousal, and academic grades had been controlled for. On the other hand, Matsui, Matsui, and Ohnishi (1990), found that performance accomplishments,

arousal, and vicarious learning predicted self-efficacy beliefs with only the verbal persuasion variable failing to reach significance. Lent, Lopez, and Bieschke (1991) found significant first order correlations among the sources of self-efficacy but found that, once personal performance accomplishments had been accounted for, the remaining sources of self-efficacy failed to account for significant variance in mathematics self-efficacy. Preliminary qualitative research also seems to support the primary role of personal performance accomplishments in the development of self-efficacy beliefs (Lent, Brown, Gover, & Nijjer, 1994). Finally, Lent, Lopez, Brown, and Gore (1995) used confirmatory factor analysis to explore the latent structure of mathematics self-efficacy beliefs in both high school and college students. Specifically, they compared several different factor models to the theoretically defined four factor model. The model specifying four sources of self-efficacy (consistent with Bandura's theory -- personal performance accomplishments, vicarious learning, social persuasion, and arousal) provided the most accurate description of the sample covariance matrices in both high school and college samples.

Several investigators have directly addressed the relationship between self-efficacy beliefs and a variety of conceptually related constructs in an attempt to establish the construct validity of self-efficacy beliefs. Brown, Lent, and Gore (1994) investigated the construct validity of self-efficacy beliefs by including measures of this construct in conjunction with measures of career interest, occupational consideration, and self-rated abilities in confirmatory factor analyses. They reported clear evidence suggesting that

self-efficacy beliefs account for unique variance among the observed variables in their study. It is important to note, however, that despite this finding, the two factors were significantly intercorrelated. Moreover, their results clearly show that self-efficacy beliefs, career interests, and range of perceived career options represent separate, though correlated, constructs. In support of their conclusions that self-efficacy beliefs and the conceptually similar self-rated abilities are separate constructs, they reported that these two constructs differentially predict career interests. Self-efficacy beliefs also appeared to be separate from academic self-concept, a conceptually related construct. Lent, Brown, and Gore (1995) reported that self-efficacy beliefs differed from academic self-concept and academic adjustment using confirmatory factor analysis.

In addition to predicting interests and occupational considerations, self-efficacy beliefs are related moderately to strongly to academic persistence and performance measures. Lent, Brown, and Larkin (1984), for example, reported that students with higher self-efficacy beliefs for math and science related educational requirements achieved higher grades and persisted longer in technical majors. In a related study, these authors (1986) reported that self-efficacy beliefs (when measured either as confidence in the ability to complete educational requirements or confidence in the ability to perform specific accomplishments critical to academic success in science and engineering majors) predicted both grade point average in technical courses and persistence in technical/scientific majors over the course of one year. Interestingly, these authors found that technical/scientific interests were not related to GPA or persistence. These findings

contrast with those described above in which interests and self-efficacy beliefs were related to the range of perceived career options. Such findings suggest that although interests and self-efficacy beliefs may contribute to the generation of career options, more distal outcome measures such as persistence and performance, may be influenced solely by self-efficacy beliefs or may be fully mediated by intermediate variables. Finally, Multon, Brown, and Lent (1991) conducted a meta-analytic investigation of the relationship between self-efficacy beliefs and academic outcomes. They reported an average effect size of 0.38 for performance measures and 0.34 for persistence measures.

An additional line of research has focused on the relationship among self-efficacy beliefs, performance, and measured ability or aptitude. Hackett and Betz (1981) initially proposed that self-efficacy beliefs would mediate or explain the relationship between abilities and outcome variables such as task persistence and performance. Brown, Lent, & Larkin (1989), however, reported that self-efficacy beliefs can actually serve as moderators of the relationship between aptitude and performance. Although their findings varied depending upon the measure of self-efficacy beliefs employed, academic performance and persistence of individuals with lower measured aptitude was enhanced if they possessed higher levels of self-efficacy beliefs for educational requirements. Alternatively, the performance and persistence of those individuals with higher measured aptitude were unaffected by the level of self-efficacy beliefs. O'Brien, Brown, and Lent (1989) also reported that the academic performance of lower aptitude adults was increased if they possessed strong self-efficacy beliefs. Finally, O'Brien, Brown, and

Lent (1990) reported that the degree of correspondence between aptitude and self-efficacy is important in predicting future performance. They reported the highest level of performance in individuals who's self-efficacy beliefs match their measured aptitude. Individuals who underestimate their aptitude are likely to perform at a level predicted by their abilities while those that overestimate their aptitude are likely to perform at levels somewhat below their measured aptitude.

The growing empirical support for the utility of self-efficacy beliefs in understanding career variables was recently expanded into a global social cognitive theory (SCCT; Lent, et al., 1994). This treatise outlines three inter-related and dynamic models which describe the development of career and academic interests, choice, and performance. This theory represents a significant advancement in career psychology for a number of reasons. First, SCCT acknowledges the socio-cultural and environmental contexts in which career development and exploration take place. By calling upon Bandura's (1986) concept of triadic reciprocality, SCCT is able to describe how personal attributes such as cognitions, affective states, and physical characteristics, overt behavior, and the environment interact and can affect one another bidirectionally. Second, SCCT is offered as a possible platform for continuing efforts aimed at identifying overlaps among existing career theories. SCCT describes career development from a life-span perspective with specific attention focused on social-cognitive variables and their interaction with social and environmental contexts. Finally, and perhaps most importantly, SCCT places previously described social-cognitive variables within a theoretical context and clearly

postulates both the inter-relationships among these variables and the causal mechanisms involved in their interaction.

Lent et al. (1994) propose that individuals' environments expose them to a variety of career relevant experiences throughout the life span. Through the social cognitive process of vicarious learning (i.e., observing others in career-related tasks) and operant mechanisms involved in direct experience (i.e., engaging in career relevant tasks and being reinforced), individuals are differentially reinforced for pursuing certain activities and not others and for achieving satisfactory performance in those activities. These experiences gradually result in the development of personal efficacy beliefs for wide domain of activities. Through learning experiences similar to those described for self-efficacy beliefs, individuals also come to develop expectations about the outcomes of their performance for various tasks. According to SCCT, individuals will develop and foster career interests in areas in which they feel efficacious and perceive the likelihood for positive and desirable outcomes.

The authors of SCCT make several very specific predictions with respect to the relationships among interests, outcome expectations, and self-efficacy beliefs. According to this theory, an individual's academic or career-related interests will be positively related to his or her concurrent self-efficacy beliefs and outcome expectations. Changes in self-efficacy beliefs and/or outcome expectations will be associated with concomitant changes in interests. Moreover, when taken together, self-efficacy beliefs and outcome

expectations will account for more variance in career interests than will either variable if taken in isolation.

According to this theory, developing interests, along with existing self-efficacy beliefs and outcome expectations, will influence the establishment of goals. Thus, an individual who has strong positive science self-efficacy beliefs and perceives positive outcomes resulting from entering into a science intensive field will develop strong interests in science and will establish goals consistent with these interests (i.e., to take additional science classes or to seek out information on science related careers). When these goals are translated into actions, the resulting consequences or outcomes reciprocally feedback to inform the continued development of self-efficacy beliefs and interests. For example, if the young person mentioned above completed a biology course with the grade of "A", her or his self-efficacy beliefs may be strengthened (i.e., via personal performance accomplishment source of self-efficacy). Moreover, events involved in completing the course or information gathered during the course might serve to further strengthen this individual's outcome expectations.

SCCT also proposes specific hypotheses to describe the relationships among self-efficacy beliefs, interests, outcome expectations, goals and actions. According to this theory, there is a strong positive relationship between interests, choice goals, and actions. The relationship between interests and actions, however, is mediated by choice goals. Self-efficacy beliefs and outcome expectations are also postulated to relate to choice goals and actions. Self-efficacy beliefs affect choice goals and actions both directly and

indirectly (through academic and career-related interests). Outcome expectations affect choice goals in a similar fashion. Unlike the relationship described between self-efficacy beliefs and actions, however, the relationship between outcome expectations and actions is hypothesized to be completely mediated by choice goals.

The basic SCCT model is presented in Figure 1. As is evident from this model, the environment or social context plays an important role in the development of self-referent beliefs and their transformation into goal-behaviors and actions. Self-efficacy beliefs and outcome expectations develop primarily through environmental forces according to this model. One's environment offers certain contextual opportunities, for example, that either permit or restrict one's ability to explore various activities. Performance outcomes related to activity involvement serve as important determinants in the further development or attenuation of both self-efficacy beliefs and outcome expectations. Social persuasion and vicarious learning are also important determinants in the development of these self-referent beliefs and are, in part, a product of one's environmental context.

In addition to the important role of the environment in the continued development of self-efficacy beliefs and outcome expectations, Lent et al. (1994) also described the role of contextual environmental factors more proximal to career and academic choice points. Although the distinction between proximal and distal environmental factors is somewhat arbitrary (i.e., contextual influences proximal to career choice might sometimes be incorporated into outcome expectations), it is helpful to distinguish them as

such in an attempt to represent the timing of environmental and contextual influences. Environmental factors proximal to important choice points may serve to moderate the transformation of developing interests into subsequent goals and actions. Thus, for example, an individual who has strong developing interests in medicine may be restricted from transforming those interests into goals (i.e., plans to take additional science courses) or actions (application and entry into medical school) due to economic or family considerations.

Several additional points relevant to the current study should be noted in the model depicted in Figure 1. Lent et al. (1994) acknowledged a point originally proposed by Bandura (1986); outcome expectations might be directly influenced by self-efficacy beliefs. This postulate rests on the notion that people will have positive outcome expectations more readily for activities in which they perceive themselves to be efficacious versus those activities for which they perceive poorer self-efficacy. Second, the SCCT proposes that self-efficacy beliefs and outcome expectations will have some direct influence on goal behaviors as described above (independent of interests). People establish goals and engage in activities not only based on their interests, but also because they perceive positive outcomes and/or have self-efficacy beliefs. As Lent et al. (1994) noted, many individuals pursue occupations based almost exclusively on self-efficacy beliefs and/or outcome expectations. It is plausible, for example, that some individuals working in the automobile manufacturing industry do so not because of intense interest in the activities involved but rather because they believe they have the ability to do so

and/or those activities will provide desirable outcomes (i.e., a steady paycheck, geographic proximity to family).

The authors of the social cognitive career theory also suggest that the model might serve as a platform for exploring overlaps among extant career theories. Although convergence surfaced in the psychotherapy literature over a decade ago, it was not thoroughly explored in the career literature until more recently. Osipow (1990), in tracing the development of career theories, asserted that existing theories of career development (i.e., trait-factor, social-learning, and developmental) have come to resemble each other in significant ways. Hackett, Lent, and Greenhaus (1991) suggested that attempts focused on conceptually integrating existing career theories should 1) explore conceptually related career constructs, 2) investigate the similarity among the common outcomes predicted by career theories, and 3) account for relations among seemingly different career constructs. As a result of increasing interest in theory convergence, a conference was convened to explore relevant issues and problems (Savickas & Lent, 1994).

The social cognitive career theory allows for career theory convergence in that it addresses a number of important variables that are stressed in other extant career theories. First, SCCT is a developmental theory. The establishment of self-efficacy beliefs, outcome expectations and interests is postulated to occur over time in a social/environmental context. Although SCCT does not propose specific "stages" of career development, a characteristic frequently observed in developmental theories, it

does propose that career interests stabilize during early adulthood. Such a contention is consistent with longitudinal data (Hansen & Stucco, 1980; Hansen & Swansen, 1983; Joselyn, 1968; Swansen, 1984; Swansen & Hansen, 1988). Lent et al (1994) recognize the importance of significant life events, however, and suggest that moderate to dramatic changes in career interests can occur latter in life if significant life events occur. Such a shift in basic interests is likely to occur according to the mechanisms already outlined by the theory.

Another potential overlap exists between SCCT and the theory of work adjustment (TWA; Dawis & Lofquist, 1984). Briefly, while TWA postulates that correspondence between and individual's abilities and the ability requirements of an occupation is predictive of important outcomes such as longevity in a job, SCCT postulates that self-efficacy beliefs might be important moderator of the relationship between abilities and career performance (Brown et al., 1989). Second, outcome expectations might incorporate a component that is conceptually similar to TWA's operationalization of work values. While TWA stresses the importance of valence (i.e, the personal importance a work value holds for an individual), SCCT's outcome expectations incorporate both valence and instrumentality (the expectation of a particular outcome).

A third point of overlap between SCCT and existing career theory is the importance placed on career interests. As mentioned above, Holland's theory of career choice stresses the importance of career interests and the degree of fit between interests

and the work environment. Lent et al, (1994) propose that SCCT might provide a more thorough description of factors influencing the development of interests, a description that is incomplete in Holland's theory but recognized as plausible (Gottfredson, 1990; Holland, 1990). In contrast to Holland's focus on the relatively static relationship between interests or work personality and occupational choice, SCCT postulates that this relationship is both mediated by self-referent mechanisms (personal goals) and moderated by influential environmental barriers (opportunity structures). Finally, SCCT may facilitate our understanding of the mechanisms of congruence by postulating important precursors to interests by describing how these variables might serve to moderate the relationships between interests and choice (i.e., direct influences of self-efficacy beliefs and outcome expectations on interests and goals described above).

Some early studies examining the utility of self-efficacy within Holland's framework have been conducted. Lent, Brown, and Larkin (1987) reported significant relationships among self-efficacy beliefs, abilities, and academic achievement. Holland's congruence construct, however, failed to account for additional variance in academic persistence once self-efficacy beliefs and abilities were entered into a regression. They did, however, report that the congruence variable predicted range of career options after self-efficacy and abilities had been controlled for. Some more promising research was reported by Lent et al. (1989) who found that self-efficacy beliefs were differentially predictive of interests across Holland themes. They reported, for example, that engineering self-efficacy correlated significantly with both Realistic and Investigative

themes on the Strong Campbell Interest Inventory, whereas scientific self-efficacy correlated with only the Investigative themes. Similarly, engineering self-efficacy beliefs correlated with the Science and Mechanical activities Basic Interests Scales of the SCII while scientific self-efficacy correlated with the Mathematics and Science scales but not the Mechanical Abilities scale. Similar patterns were observed on the Occupational Scales of the SCII. Lapan et al. (1989) also reported strong relationships between self-efficacy beliefs and occupational interests when the two measures are bound within the same Holland theme. Their findings suggest that this trend holds true across themes as well. Given these findings, SCCT may well be able to incorporate Holland typology. Specifically, this model may partially explain how people come to resemble Holland personality types and may offer additional predictive utility beyond that provided by congruence alone.

Summary and Experimental Hypotheses

The research outlined above clearly establishes the role of self-efficacy beliefs in the career exploration and choice process. Hackett and Betz's (1981) early contention that these beliefs somehow mediate the relationship between abilities and performance outcomes has been borne out by subsequent research. Further, these beliefs seem to explain the relationship between abilities and other career related variables. SCCT (Lent, et al., 1994) provides a framework for embedding self-efficacy within a theoretical context and exploring the causal relationships between it and other social cognitive variables. Although retrospective research certainly supports many of the propositions

outlined by SCCT and helped to shape the theory, there have not been any comprehensive apriori tests of the structure of the SCCT. Lent et al. (1994) and others (Lent & Hackett, 1987; Brown, et al.,1994) have called for research that can establish the causal relations between social cognitive variables and outcome variables such as interests, goals, and performance. Causal modeling or covariance structural modeling is one statistical approach that permits investigating complex directional relationships. SCCT also offers opportunities for crossing existing theoretical lines in an attempt to describe career and academic interest, choice, and performance from a more unified position. Although there are several studies that address overlaps between social cognitive variables and variables of import in competing career theories, there are only a handful of studies that have directly compared SCCT to other theories. The present series of studies was designed to replicate previous findings on the construct validity of socio-cognitive measures, to extend these findings by including a measure of outcome expectations, to test the socio-cognitive model of career interests using procedures that permit statistical analysis of theoretical models, and to explore the relative fit of the SCCT model across Holland's six person-environment dimensions.

First, this study was designed to replicate previous investigations of the discriminant validity of self-efficacy beliefs, self-rated abilities, interests, and range of occupational consideration (Brown et al.,1994), and to extend those findings to include a measure of outcome expectations. The analyses proceeded in two stages. First, two models of self-efficacy beliefs and self-rated abilities were tested. A one factor model

which specified that the item composites for those two constructs loaded on one underlying factor was directly compared to a two correlated factor model in which self-efficacy items and self-rated ability items were specified to load on two separate but related factors. These factor solutions were tested separately for each Holland dimension using confirmatory factor analysis. These preliminary analyses were designed to directly replicate the procedures used by Brown et al. (1994). Based on previous findings, we expected that the two factor model specifying self-efficacy beliefs and self-rated abilities as two separate but related constructs would describe the sample data more accurately than a model specifying that these two variables represent one underlying construct.

Second, four separate but nested models were tested using self-efficacy belief, self-rated ability, outcome expectation, interest, and occupational consideration item composites. A one factor model was first tested in which the items composites for each variable were specified to load on one underlying construct. A three factor model specified that self-rated ability and self-efficacy belief item composites loaded on one factor, outcome expectation composites loaded on a second factor, and interest and range of occupational option item composites loaded on a third factor. A four factor model replicated the three factor model except self-rated ability and self-efficacy belief item composites were specified to indicate separate underlying dimensions. Finally a five factor model was developed to test the hypothesis that item composites from the five instruments would describe five separate underlying constructs. The second set of

analyses were designed to replicate the procedures outlined by Brown et al. (1994) and to extend them to include a measure of outcome expectations.

A previous confirmatory factor analytic study of the social cognitive variables described above revealed mixed results. Although self-efficacy beliefs, self-rated abilities, and interests all appear to be different constructs, and these findings are consistent across Holland dimensions, the nature of career interests and range of occupational considerations differed across Holland dimensions (Brown et al., 1994). Based on these findings alone, it seems plausible to predict similar findings in the present study. SCCT predicts that interests are theoretical constructs to be distinguished from goal behaviors. Unfortunately, range of occupational considerations, while perhaps representing a manifestation of interests, may fall short of clearly representing goals. Thus formulating a clear hypothesis regarding expected outcomes of these confirmatory analyses is difficult. The addition of a measure of outcome expectations in the present study requires that additional hypotheses be specified. Based on social cognitive theory, it is hypothesized that outcome expectations will represent a construct separate from the others described to this point.

The primary purpose of this study was to test a series of structural models which correspond to hypotheses generated by social cognitive theory (Lent et al., 1994). Although the confirmatory analyses described above were designed to replicate and extend previous empirical research, they are also essential preliminary steps in testing the viability of structural models. Figures 1 - 6 graphically represent the six models to be

tested. The six models are designed to answer two specific questions: (1) Is the effect of objective ability on career related interests fully, partially, or not mediated by self-efficacy beliefs, and (2) are the effects of self-efficacy beliefs, and outcome expectations on the range of occupational considerations fully, or only partially, mediated by career interests. Figure 1 shows a simple model in which the effects of objective abilities (as measured by GPA) on interests are completely mediated by self-efficacy beliefs. Moreover, this model specifies that the effects of outcome expectations and self-efficacy beliefs on the range of occupational considerations are fully mediated by interests. In contrast, Figure 2 shows a model in which the effects of outcome expectations and self-efficacy beliefs on range of occupational considerations are only partially mediated by interests. Figures 3 and 4 show the objective ability partial mediation alternatives to the models shown in Figures 1 and 2. These models specify direct effects of objective ability on interests as well as effects that are mediated by self-efficacy beliefs. Finally, Figures 5 and 6 show the non-mediated alternatives to the previous figures in which the only effects of objective abilities on interests are direct.

Previous research described above suggests that the effects of objective ability on career-related interests are only partially mediated by self-efficacy beliefs. Thus, models that describe this relationship (i.e., models 3 and 4) should perform better in terms of fit indices when compared to models that specify either full mediation (models 1 and 2) or no mediation (models 5 and 6). SCCT postulates that self-efficacy beliefs and outcome expectations will have both direct effects on goal behaviors as well as indirect effects on

this variable that are mediated by career-related interests. Given this theoretical position, we postulate that models that specify partially mediated effects of self-efficacy and outcome expectations on goals (models 2, 4, and 6) will outperform models that specify this relationship as fully mediated via career interests.

CHAPTER 2

METHODOLOGY

Subjects

Participants in this study were drawn from a total of three college populations. The first student sample consisted of 257 participants (81 Male, 176 Female) from a General Psychology research subject pool. These participants were all matriculating students at a medium size, private, midwestern university and volunteered to participate in this research project in return for extra-credit points. This sample had a mean age of 18.95 years (SD=3.47) and ranged from 17 to 52 years of age. Descriptive statistics for this sample are presented in Table 1. The sample consisted of 65% Caucasians, 11.3% Asian/Pacific Islanders, 7.8% Asian Indians, 7% Hispanics, and 5.8% African Americans. The majority of participants were freshman (74.7%) and sophomores (17.5%) at the university.

The second student sample consisted of 146 participants (72 Male, 74 Female) from two courses offered at a large public western university. Eighty participants (35 Male, 45 Female) from a 2 credit hour undergraduate course in Career and Life Planning and 66 participants (37 Male, 29 Female) from a 3 credit hour undergraduate Learning Skills course volunteered to participate in return for extra-credit points. Descriptive statistics for the two sub-samples obtained at this university are presented in table 2.

Students from the Career and Life Planning class tended to be slightly older (mean = 23 years; range 17 - 43 years) than their Learning Skills counterparts (mean = 20 years; range 18 - 44 years) and were more evenly distributed across academic year. These findings are consistent with the subject content of each course. The Career and Life Planning class is designed to provide an overview of the career exploration and job search process and tends to attract students of all levels. In contrast, the Learning Skill course is designed to provide entry level students with organizational and study skills.

Because this study was not specifically designed to address differences among demographically distinct groups, an apriori decision was made to combine data from all participants regardless of demographic differences. Demographic statistics for the total sample (N=403) are presented in table 3.

Procedures and Instruments

Prior to completing any instruments, each participant was asked to read and sign an informed consent document (included in Appendix 3) that briefly outlined the nature of the study and the procedures. This document also provided the experimenter with authorization to secure an official copy of each participant's academic transcripts. Participants were given a copy of this document (which included phone numbers of both the experimenter and the university IRB) for their records.

Each participant completed five research instruments (interests, range of occupational considerations, outcome expectations, self-efficacy beliefs, and self-rated abilities) and a background demographic questionnaire. The background demographic

form included questions about age, gender, racial-ethnic background, year in school, and marital status in addition to questions about choice of academic major and occupation which were not analyzed in this study. These instruments were arranged in a semi-random order of presentation in a manner that guaranteed that the self-efficacy beliefs and self-rated abilities measures were not presented sequentially. The background questionnaire was always presented first. Finally, these instruments were presented on different colored paper to highlight the differences among instruments. Copies of all instruments used in this study are presented in Appendix 3.

Career-related interests were measured using the Occupations section from the Strong Interest Inventory (Hansen & Campbell, 1985). This section of the Strong Interest Inventory lists 131 occupational titles and the instructions direct participants to respond on a three-point scale of "Like", "Dislike", or "Indifferent" to the question "... how you would feel about doing that kind of work". The occupational titles used represent each of the six Holland dimensions (14 Conventional, 14 Realistic, 19 Investigative, 28 Artistic, 22 Social, 33 Enterprising) based on first letter codes for the work environment. Individuals' scores on this instrument are represented by the total number of "like" responses endorsed. Indifferent and dislike responses were not included in any way during subsequent analyses.

The range of occupational considerations, self-efficacy belief, and outcome expectation variables within each Holland dimension were measured with modified versions of the Occupation section of the Self-Directed Search (Holland, 1985-b). These

instruments present the same list of 84 occupational titles equally representing each of the six Holland dimensions (14 each). The list of occupational titles was retained from the Self-Directed Search for these instruments, but the instructions and response alternatives were altered to reflect the construct being measured. Two of these instruments (occupational considerations and self-efficacy beliefs) have been used by the author previously and have produced adequate internal consistency reliability estimates (Brown et al., 1994).

The occupational considerations measure included the instructions: "..please indicate whether or not you would consider this occupation as a possible career". Participants were required to respond "yes" or "no". Additional instructions were, "for each 'yes' answer, please indicate how seriously you would consider it, followed by a 9-point scale ranging from "Not very seriously" to "Very seriously". Scores on this instrument included the scaled-response for occupations that the respondent indicated she/he "would consider this occupation as a possible career".

The self-efficacy beliefs measure included the instructions: "..please indicated whether or not you have the abilities to become a(n)...". Participants were required to respond "yes" or "no". Participants were also asked to indicate "..how sure you are" on a 9-point scale ranging from "Completely unsure" to "Completely sure" for each "yes" answer. Scores on this instrument included the scaled-response for occupations that the respondent indicated she/he "does have the ability to become a(n)...".

The outcome expectations measure included a brief description of "possible outcomes" prior to presenting participants with the instructions: ".. rate the degree to which you would get what you wanted from each occupation on a 9-point scale". No dichotomous response was elicited in this instrument. The description of possible outcomes prior to the instructions was included to familiarize participants with the nature of the questionnaire. Scores on this instrument represent the scaled-response for all occupations.

Finally, self-rated abilities were operationalized using the Self-Estimates section of the Self-Directed Search (Holland, 1985-b). This measure asks participants to rate themselves compared to other persons their age from 1 to 7 on specific tasks. Tasks are arranged to reflect each of the six Holland dimensions (two items per dimension). Scores on this instrument represent the scaled-response for each of the 12 items.

In addition to the measures outlined above, academic transcripts were obtained for each participant. Transcripts contained only coursework completed at the student's current institution and were requested following the end of the semester in which data were collected to maximize the chance that each student had completed some coursework. Courses for which no academic credit was granted were not included in subsequent procedures nor were students who had completed fewer than 9 credit hours at their current institution. At one institution, students are allowed to repeat coursework in an attempt to raise their course grade and GPA. In these instances, grades resulting from all attempts at an individual course were included in the calculation of GPA's.

All courses were Holland coded using the Holland College Major Coding scheme (Rosen, Holmberg, & Holland, 1990) based on the academic major corresponding to each course. Thus, for example, general psychology and abnormal psychology were both coded as SAI corresponding to the Holland Code for Psychology Majors. Six separate GPA's were then calculated corresponding to each of the Holland dimensions. An overall GPA was was calculated.

Analysis

The presentation of conceptual and statistical models used in confirmatory factor analyses and covariance structural equation analyses and the results of these analyses will follow the recommendations of Hoyle and Panter (1995). All models are graphically presented using the conventions outlined by Bentler (1980). All covariance analyses were conducted using EQS for Windows version 4.0 (Bentler, 1993) with maximum likelihood estimates using covariance matrices. Factor intercorrelations reported for confirmatory factor analyses are drawn from the Pearson-product moment correlation matrix. Only research participants with complete data were used and no outliers were deleted (Raykov, Tomer, & Nesselroade, 1991).

Several indices of fit were investigated to determine the accuracy of model specification. Based on the recommendations of Byrne (1994) and Hu and Bentler (1995), indices of fit used in this study will include (1) off-diagonal standardized residuals, (2) χ^2 goodness of fit, (3) non-normed fit index (NNFI), (4) comparative fit index (CFI), and (5) the number of iterations required to converge on a solution. The

standardized residuals represent discrepancies between the covariance matrix obtained from sample data and the restricted (or predicted) matrix that is outlined in the model specification section of the EQS program. Accuracy of a model can be partially determined by the distribution and size of these residuals with more accurate models resulting in smaller residual values that are distributed normally. The number of iterations required for a convergent solution also was observed as a measure of model fit with larger values representing poorer model specification.

The overall test of fit in covariance structural analysis assesses the magnitude of the discrepancy between the sample covariance matrix and the covariance matrix specified by the model. All indexes of fit utilize a test statistic (T) that is the product of sample size and a discrepancy function. This statistic is asymptotically χ^2 distributed in large sample sizes and is often referred to as the χ^2 test or the χ^2 goodness of fit test. χ^2 goodness of fit values are provided by EQS for Windows 4.0 (Bentler, 1993) and are used for preliminary assessment of model fit in this study. A significant χ^2 value suggests that the hypothesized model does not adequately describe sample data. Bentler (1983) among others (Bentler & Bonett, 1980; Steiger & Lind, 1980), however, noted problems associated with the indiscriminate use of the χ^2 statistic. He has argued that this test statistic is sensitive to both sample size and violations of the assumption of multivariate normality and has endorsed the use of alternative fit indices such as the non-normed fit index (Bentler & Bonnet, 1980) and the comparative fit index (Bentler, 1990). The T statistic may not be χ^2 distributed in small sample sizes and thus may be inappropriate for

model testing purposes in such samples. Moreover, increased power associated with this statistic in larger samples may suggest rejecting the specified model based on only trivial differences between the specified covariance matrix and the obtained sample matrix. Hoyle and Panter (1995) suggested the use of multiple fit indices to overcome the limitations of the χ^2 goodness of fit test. They recommended the use of one absolute index, one type two incremental fit index, and one type three incremental fit index. This convention will be followed in the present study.

The NNFI represents a type two incremental fit index and was developed for maximum likelihood estimation methods under normal distribution theory. This index provides a fit relative to a "null model" (the independence model in this case). While this index has enjoyed widespread popularity since its introduction, Bentler (1990) suggested that it underestimated fit in smaller samples. He introduced the comparative fit index (CFI; a type three incremental fit index) in an attempt to correct for this sampling phenomenon. The CFI and other type three incremental fit indexes provide information about the relative reduction in lack of fit as estimated by the noncentral χ^2 of a target model versus a baseline model (the independence model in this case). In larger samples such as the one obtained for this study, the NNFI and CFI should be similar although the CFI should still be taken as a less biased indicator of fit. For most models, both the NNFI and CFI will range between 0.00 and 1.00 with higher values representing better model specification.

A χ^2 change statistic (Bentler, 1980) can be used when one is able to specify alternative models that are nested within a hypothetical model. Two models are said to be nested if they both contain the same parameters, but the set of free parameters in one model is a subset of the free parameters in the other. The χ^2 change statistic (analogous to the F-change statistic in hierarchical regression) is used to determine which model better accounts for the observed data. Essentially the observed χ^2 value for the nested model is subtracted from the less restrictive alternative model. The value obtained is also χ^2 distributed with degrees of freedom equal to the difference between the degrees of freedom of the two models being compared. This statistic was used in the present study to compare nested confirmatory factor models and full covariance structural models.

CHAPTER 3

RESULTS

Instruments' Psychometric Properties

All items on the five substantive measures used in this study were completed by 403 participants. A full range of responses was obtained on all 84 items of the self-efficacy belief scale, all 12 items of the self-rated ability scale, and all 131 items of the interest scale. Full response range was obtained on 82 of the 84 items on the occupational consideration scale with the remaining items having a range of 8 (out of a possible 9). Finally, 13 of the 84 items on the occupational consideration scale had ranges of only 7 or 8 with the remaining items generating the full range of responses. Internal consistency reliability estimates (Chronbach's alphas) were calculated for the Self-Efficacy Belief, Outcome Expectation, Interest, Self-rated ability, and Occupational Consideration instruments. Items corresponding to each of the six Holland codes were analyzed separately for each instrument yielding six reliability estimates for each instrument. Results of these analyses are presented in Table 4. In general, the alpha coefficients obtained for the three instruments were within an acceptable range (i.e., approximately 0.90). Coefficients for scales of the Occupational Consideration instrument tended to be slightly lower than those of the other two scales (range = 0.77 - 0.92).

Item Combination Procedures

Prior to conducting confirmatory factor analyses, items from the self-efficacy beliefs, outcome expectations, interests, and occupational considerations instruments were analyzed using exploratory factor analysis in order to reduce the number of indicators per factor. Since the self-rated ability measure includes only two items per Holland dimension, raw scores from these items were used as indicators in subsequent factor studies. GPA was not used in confirmatory factor studies, though it was used (as a measured variable) in structural models (see below). Six factor varimax principal axis solutions were employed for the items from each instrument. The rotated factor loadings were then inspected for the purpose of creating item composites. All analyses yielded clear six factor solutions, and item loadings were generally consistent with Holland dimensions. Item loadings were first inspected for theoretical consistency. Six items were identified across a number of instruments which loaded on inconsistent factors (i.e., tree surgeon loading on Investigative factor and Master of Ceremonies loading on Artistic dimension) and were not included in the item composite formation for that factor. Then, strength of theory consistent item factor loadings was inspected. Any item having a factor loading of less than 0.30 or communality estimate of less than 0.15 was not included in the item composite. Additionally, items having strong multiple loadings (i.e., 0.30 or greater on more than one factor) were not included in creating item composites. Between 72 and 78 of the 84 total items contained in the Occupational Considerations, Outcome Expectations, and Self-Efficacy Belief instruments were retained to generate

item composites. Of the 131 total items on the Interest measure, 105 were ultimately retained to generate item composites.

Once items to be included in the composites were identified, three indicators for each instrument were formed for each Holland dimension by combining items based on their factor loadings. All composites were formed in the following manner. The number of retained items was divided by three to determine the number of items per composite. Composites were created by combining items with high and low loadings respectively. Thus, for example, if nine items were retained from the analysis in a given Holland dimension, the first composite would be composed of the highest loading item, the lowest loading item, and the second highest loading item. The second composite included the third highest, second lowest, and fourth highest items respectively. Finally, the third composite would be composed of the remaining items. Item composites represent sums of their constituent items. Item composites for the self-rated abilities instrument were created by summing the two items within each Holland dimension.

Descriptive statistics for all composite items and grade point averages are presented in Tables 5- 10. Mean GPA's were relatively consistent across Holland dimensions (range = 2.65 - 3.17) with the entire range of possible GPA's obtained in four of the six Holland dimensions. Only three of six Holland dimensions (Investigative, Artistic, and Social) yielded a sufficient number of GPA's for subsequent structural modeling analysis. Thus, GPA's used in the analysis of the Realistic, Enterprising, and Conventional structural models were overall GPA's. Mean self-efficacy belief item

composites tended to vary more across Holland dimensions with item means being highest in the Social dimension (3.79) and lowest in the Artistic dimension (1.98). This same general trend occurred in mean item composite values for self-rated abilities with ability ratings being highest for Social activities (5.8) and lowest for Artistic activities (3.89). The entire range of possible scores was obtained for self-efficacy and self-rated ability items across Holland dimensions. In contrast, item means tended to be highest for Artistic interest item composites (0.37), while Realistic and Conventional items composites tended to be much lower (0.13 and 0.11 respectively). Item composites from the outcome expectations and occupational considerations instruments tended to be highest in the Social dimension, while item composites within the Realistic and Conventional dimensions were somewhat lower on these instruments. An adequate range was obtained for all composites from the interest, outcome expectation, and occupational considerations measures.

Procedures for creating composites in order to decrease the number of indicators per factor are common practices in social and behavior sciences. Bentler (1993) for example has described a number of procedures that can be used to reduce the number of indicators used in analyses. When the observed set of items represent several meaningfully distinct dimensions (e.g., items representing cognitive, affective, and biological symptoms of depression), Bentler endorses a rational approach to creating item composites in which items representing these dimensions are combined together to form three distinct indicators. When the set of items do not represent distinct dimensions,

however, Bentler has endorsed both random assignment of items to indicators and the use of exploratory factor analysis to assign items to composite indicators. Several investigators (Brook, Russell, & Price, 1988; Mathieu & Farr, 1991) have used the factor analytic procedure in an attempt to optimize the number of indicators per factor. We feel that this procedure adequately addresses the issue of the ratio of indicators per factor without creating overly liberal indicators (i.e., by not selecting only the highest loading items from exploratory analyses). The use of composite variables is more reliable and covers a broader range of substantive content than any single items could cover. Furthermore, we feel that such a procedure is warranted in cases when investigators are not engaging in test construction practices (i.e., when investigators have previously determined the psychometric adequacy of an instrument and are only interested in defining, as accurately as possible, underlying latent dimensions).

Self-Efficacy Beliefs vs. Self-Rated Abilities: Construct Validity Evidence

Tables 11-16 contain intercorrelations among the composite variables for self-efficacy beliefs and self-rated abilities and descriptive statistics for each of the indicator variables used in these analyses. While skew values for self-rated abilities variables were only slightly negative and values for self-efficacy beliefs were slightly positive, all values were within acceptable limits. Kurtosis values for composite variables were also within acceptable limits suggesting that the variables used in these analyses were distributed normally.

Two explicit statistical models were tested within each Holland dimension. The one factor model (Figure 7) specified that both self-efficacy belief item composites and self-rated ability item composites loaded on one underlying factor. This model was associated with five degrees of freedom (15 observed variances and covariances and 10 estimated parameters). The two factor model (Figure 8) specified that the self-efficacy belief item composites and the self-rated ability item composites loaded on two separate underlying factors. Based on previous findings (Brown et al., 1994), covariance among the two factors (self-efficacy beliefs and self-rated abilities) was included as a parameter to be estimated in the models specifying two latent dimensions. Covariance among the error estimates for indicators, on the other hand, were fixed in all models. The two factor model was associated with four degrees of freedom (fifteen estimated variances and covariances and eleven estimated parameters). A common metric was established for latent factors by fixing one lambda estimate for each factor to a value of 1.0 (Long, 1983). In addition to the two explicitly tested models, EQS for Windows 4.0 provides a test of model fit in comparison to the null model where all items are postulated to load on separate factors (i.e., a five factor model). This test is provided in the form of the normed fit index (NNFI).

Virtually all indicators of fit suggest that the two factor model provides a better fit to the data than does the one factor model (Table 17). The average standardized (off diagonal) residuals averaged 0.058 across the six Holland dimensions for the one factor model, while residuals for the two factor model averaged only 0.020. Similarly, in all but

two of the comparisons, the two factor models converged more rapidly than did the one factor models. Two of the two factor models resulted in non-significant chi-square significance tests suggesting adequate model fit: Realistic and Conventional dimensions. While the other two factor models resulted in significant chi-square statistics (average chi-square across Holland dimensions = 22.53) suggesting less than adequate fit, the average chi-square statistic for the one factor models was considerably larger (121.90).

Alternative fit indices also recommend the two factor model. Average normed fit indices for the two factor solution were considerably larger than indices resulting from the one factor alternative. Comparative fit indices for the two factor model consistently fell above 0.95 (0.965 - 0.998), while the comparative fit indices for the one factor model fell between 0.854 and 0.934. A chi-square change statistic was computed to compare the relative increase in model fit of the two factor model over the nested one factor model. All chi-square change statistics were significant at the 0.01 level suggesting superiority of the two factor solution.

Since the two factor model represented the sample data more accurately than the one factor solution, only parameter estimates for the two factor solution are presented graphically. Standardized lambda coefficients (estimates of the relationships between measured indicators and latent constructs) for the two factor model across Holland dimensions are presented in Figures 9 - 14. Despite having to fix one lambda parameter to 1.0 for each latent construct, EQS provides a standardized estimated (but no statistical test of significance) for these fixed parameters. Moreover, parameters fixed to establish a

metric for latent constructs are not considered "free" in the calculation of model degrees of freedom. All lambda coefficients are significant at the 0.05 level. Coefficients for the self-efficacy belief indicators ranged from 0.785 to 0.946, while those for the self-rated abilities indicators ranged from 0.494 to 0.971. Intercorrelations (Pearson coefficients) among the two factors are also presented in Figures 9 - 14. These correlations were all significant at an alpha level of 0.05 and ranged from 0.356 for the Conventional Holland dimension to 0.647 for the Artistic dimension.

Self-Efficacy Beliefs, Self-Rated Abilities, Outcome Expectations, Interests, and Occupational Considerations: Construct Validity Evidence

In an attempt to replicate and extend previous findings on the discriminant validity of variables specified in the social cognitive theory, several additional confirmatory factor analyses were conducted.

Four separate statistical models were tested across the six Holland dimensions using self-efficacy belief, self-rated ability, interest, occupational consideration, and outcome expectation variables. Variable composites described above were used for all analyses. The one factor model identified all 14 variables as indicators of one underlying latent construct (Figure 15) with the factor metric being set by fixing one lambda parameter to 1.0. This model is associated with 77 degrees of freedom (105 observed variances and covariances and 28 estimated parameters). Previous research has suggested that occupational considerations (or range of occupational options) and interests might best be described by one underlying dimension in some conditions (Brown et al., 1994),

thus a three factor model was developed which specified occupational consideration and interest variables as indicators of one factor, self-efficacy belief and self-rated ability variables as indicators of a second factor, and outcome expectation variables as indicators of a third factor (Figure 16). This model is associated with 74 degrees of freedom (31 estimated parameters). A four factor alternative was developed which replicated the three factor model but separated the self-efficacy belief and self-rated ability variables and included them as indicators on separate factors (Figure 17). This model was associated with 71 degrees of freedom (34 estimated parameters). Finally, a five factor model which specified self-efficacy belief, self-rated ability, outcome expectation, interest, and occupational consideration variables as indicators on five separate factors (Figure 18). This final model is associated with 67 degrees of freedom (38 estimated parameters). Consistent with the social cognitive theory of career development and previous findings (Brown et al., 1994), intercorrelations among latent constructs were estimated parameters in the three, four, and five factor models.

Inspection of Tables 18 and 19 clearly suggests that the five factor model describes the sample data better than any of the alternative nested models. The standardized residuals for the five factor model were consistently lower than those of the alternative models. The average residual for the five factor model was 0.034 across Holland dimensions while residuals for the four, three, and one factor models averaged 0.045, 0.069, and 0.090 respectively. Similarly, a trend can be observed in the number of iterations to convergence across the four models which clearly illustrates that the five

factor model converged more rapidly than any of the alternative models across Holland dimensions. While none of the models resulted in non-significant chi-square test statistics, the five factor solution consistently resulted in smaller chi-square statistics than did alternative models. NNFI's also recommend the five factor model over alternative models. The average NNFI for the five factor model across Holland dimensions is 0.92, while NNFI's for the four, three, and one factor model are 0.87, 0.85, and 0.58 respectively. Moreover, the strength of the normed fit indices obtained for the five factor solution suggests that it is superior to the null model where all items are postulated to load on independent factors. Finally, comparative fit indices suggest that the five factor model represents the data more efficiently than do alternative models. Finally, the average CFI for the five factor model across Holland dimensions is 0.93 while CFI's for the four, three, and one factor model across Holland dimensions averaged 0.88, 0.86, and 0.59 respectively.

Because the four, three, and one factor models are nested within the less restrictive five factor model, it was possible to compare the former with the later using a chi-square change test. The five factor model resulted in significantly lower chi-square values when compared to the three alternative models across Holland dimensions suggesting that the former model offers significant increases in the degree of fit in comparison to the four, three, and one factor alternatives.

Since indicators of fit clearly suggest that the five factor model represents the sample data more accurately than do the four, three, or one factor solutions, parameter

estimates and factor intercorrelations will be presented for this model only. Lambda coefficients (estimates of the relationships between measured indicators and latent constructs) for the five factor model across six Holland dimensions are shown in Figures 20 - 25 for evaluative purposes. All lambda coefficients for the five factor model are significant at the 0.05 level with one exception. The error estimate for the first self-rated ability variable was constrained at the lower bound (i.e., 0.0) prohibiting the calculation of the lambda coefficient for this indicator. Bentler (1992) has suggested that such a condition prohibits only the interpretation of this estimated parameter and does not typically alter the overall fit of the model.

Intercorrelations among the five factors across Holland dimensions are presented in Tables 20 - 25 and the average factor correlations across Holland dimensions are presented in Table 26. All correlations presented are significant at an alpha level of 0.05. The highest observed correlations tended to be between occupational considerations and outcome expectations (r=0.72) and between occupational considerations and interests (r=0.63). In general, higher factor intercorrelations were obtained within Investigative, Artistic, Social, and Enterprising dimensions, while somewhat lower factor correlations were obtained within Conventional and Realistic dimensions.

Covariance Structural Models

Given the statistical adequacy of the measurement model defined in the first set of studies, subsequent covariance structural modeling was possible. Six separate statistical models were tested across the six Holland dimensions. Model 1 (Figure 26) specifies that

the effects of objective ability on interests are fully mediated by self-efficacy beliefs and that the effects of self-efficacy beliefs and outcome expectations on range of occupational considerations are fully mediated by interests. This model is associated with sixty-one degrees of freedom (ninety-one observed variances and covariances and thirty estimated parameters). Model 2 (Figure 27), on the other hand, specifies that the effects of self-efficacy beliefs and outcome expectations on range of occupational considerations are best described by both direct and indirect effects (i.e., partially mediated by interests). Model 2 is associated with fifty-nine degrees of freedom (thirty-two estimated parameters). Models 3 and 4 (Figures 28 and 29) represent two additional models in which the effects of objective ability on interests are partially mediated by self-efficacy beliefs (i.e., with both direct and indirect effects specified). Model 3 specifies the fully mediated effects of self-efficacy beliefs and outcome expectations on range of occupational considerations and is associated with sixty degrees of freedom (thirty-one estimated parameters). Model 4, on the other hand, specifies these effects to be only partially mediated and is associated with fifty-eight degrees of freedom (thirty-three estimated parameters). Finally, models 5 and 6 (Figure 30 and 31) represent the non-mediated alternative models in which the effects of objective ability on interests are direct (i.e., not mediated by self-efficacy beliefs). These two models are associated with sixty-one and fifty-nine degrees of freedom respectively (thirty and thirty-two estimated parameters). Once again, the two models are reproduced to include the fully mediated

effects of self-efficacy beliefs and outcome expectations on range of occupational consideration (model 5) and the partially mediated alternative (model 6).

Modifications to the desired models had to be made following preliminary inspection of measures of objective ability. When Holland-specific GPAs were calculated and summarized (Table 5), it was determined that only Investigative, Artistic, and Social dimensions contained a large enough sample to include these GPAs in structural modeling runs. Realistic, Enterprising, and Conventional GPA's were obtained for fewer than fifty-four people (Table 5). To compensate for this while still allowing for models to be tested within these dimensions, overall GPA was inserted into model specifications for the Realistic, Enterprising, and Conventional dimensions.

Tables 27 - 29 include indicators of fit for the six tested models. Inspection of Table 27 clearly suggests that model 2 provides a better fit to the sample data when compared to model 1. Average off-diagonal standardized residual values were consistently lower across Holland dimensions for model 2 (average = 0.35 vs. 0.067 for model 1) and the solutions converged more rapidly for this model in comparison to model 1. While none of the chi-square statistics were significant at an alpha level of 0.05, the absolute chi-square values were consistently smaller for model 2. The average chi-square value across Holland dimensions for model 2 is 271.58, while the average chi-square value for model 1 is 367.38. Moreover, NNFI and CFI values were consistently larger for model 2 (average NNFI = 0.926; average CFI = 0.941), when compared to values for the nested model 1 (average NNFI = 0.900; average CFI = 0.915). Comparison of the

nested model 1 to model 2 using the chi-square change statistic reveals that model 2 clearly describes the sample data better than the alternative model with all chi-square change values significant at an alpha of 0.05.

Inspection of Table 28 suggests that model 4 provides a better fit to the sample data when compared to model 3. Average off-diagonal standardized residual values were consistently lower across Holland dimensions for model 4 (average = 0.037 vs. average = 0.065 for model 1). The number of iterations to convergence also tended to be smaller for model 4 although model 3 converged more rapidly when tested in the Enterprising dimension and the two models converged in the same number of iterations when tested in the Artistic dimension. While none of the chi-square statistics were significant at an alpha level of 0.05, the absolute chi-square values were consistently smaller for model 4 (average = 270.65) in comparison to model 3 (average = 365.79). Moreover, NNFI and CFI values were larger across Holland dimensions for model 4 (average NNFI = 0.926; average CFI = 0.941) when compared to these values for model 3 (average NNFI = 0.901; average CFI = 0.916). Chi-square change statistics clearly suggest that model 4 describes the sample data better than the nested model 3 (all chi-square change statistics are significant at an alpha level of 0.05).

Finally, Table 29 presents measures of fit for models 5 and 6. Model 6 is clearly identified as a more accurate model based on all measures of fit presented. The average off-diagonal standardized residual across Holland dimensions for model 6 is 0.037 while the average for model 6 is 0.068. In all cases, model 6 iterated to convergence more

rapidly than did model 5. Absolute chi-square values, though not statistically significant, were consistent lower for model 6 across Holland dimensions (average = 272.05) in comparison to model 5 (average = 367.37). Both NNFI and CFI values were consistently lower for model 6 (average NNFI = 0.926; average CFI = 0.941) when compared to model 5 (average NNFI = 0.900; average CFI = 0.916). Finally, chi-square change statistics were significant ($p<0.05$) across Holland dimensions when comparing the nested model 5 to the more restrictive alternative (model 6).

Since the models that specify both direct and indirect paths from self-efficacy beliefs and outcome expectations to range of occupational alternatives (models 2, 4, and 6) consistently resulted in better fit to the sample data when compared to those models specifying only the indirect paths (through interests), models 2, 4, and 6 were then compared to one another in order to determine which specification of the effects of objective ability on interests best characterized the sample data. Models 2 and 6 can be considered nested within the more restrictive model 4, therefore, models 2 and 6 were compared to model 4 using the chi-square change statistic.

Tables 30 and 31 include measures of model fit and chi-square change statistics for three models under consideration. The average off-diagonal standardized residuals are similar across models with each Holland dimension thus providing relatively little help in identifying model differences. While model 2 appears to have converged more rapidly than the other models across most Holland dimensions, the NNFI and CFI values are almost identical across models within each dimension. Moreover, the majority of chi-

square difference tests comparing models 2 and 6 to the more restrictive model 4 were not significant ($p>0.05$). The exception to this finding is that model 4 appears to provide a significantly better fit to the sample data when compared to model 6 (chi-square change = 4.58, $p<0.05$) but not model 2 (chi-square change = 0.47, $p>0.05$).

Lambda coefficients for paths from objective ability to self-efficacy beliefs and interests were, for the most part, not statistically significant. The one notable exception to this finding was found within the Social dimension where path coefficients from objective ability to self-efficacy beliefs were significant in models 1, 2, 3, and 4 (all models specifying this parameter to be estimated). Corresponding paths from objective ability to interests, however, were not significant in models 3, 4, 5 or 6 (all models specifying this parameter to be estimated). A single structural diagram representing the models that include GPA is presented in Figure 32 for illustrative purposes.

In response to the absence of significant findings across models specifying the non-mediated, partially mediated, and fully mediated effects of objective ability on interests, two additional models were run which exclude the objective ability measure but include models which specify both total mediation and partial mediation of the effects of self-efficacy beliefs and outcome expectations on range of occupational considerations. This actually represents reproduction of models 1 and 2 from the previous analysis with the absence of the measure of objective ability. These models are associated with fifty and forty-eight degrees of freedom respectively (seventy-eight observed variances and covariances; twenty-eight and thirty estimated parameters corresponding to model 1 and

model 2 respectively) and will be referred to as model 1b and 2b to distinguish them from previous models.

Table 32 presents measures of fit for the two models. The average off-diagonal standardized residuals for model 2b are consistently smaller (average = 0.034) than corresponding residuals from model 1b (average = 0.074). Although the number of iterations to convergence was smaller for models in the Investigative, Social, and Enterprising dimensions, model 1b converged more rapidly in the Realistic and Conventional dimensions. None of the obtained Chi-square statistics were significant though they clearly suggest that model 2b describes the sample data more accurately than model 1b (average model 1b chi-square = 395.95; average model 2b chi-square = 285.21). Model 2b also resulted in larger NNFI and CFI values (average model 2b NNFI =0.928, CFI = 0.940; average model 1b NNFI = 0.902, CFI = 0.913).

Because model 2b provides a more accurate description of the sample data, path diagrams will be restricted to this model. Figures 31 - 36 show the measurement and structural models across Holland dimensions for model 2b. All lambda coefficients in the measurement models are significant ($p < 0.05$). All path coefficients are also statistically significant ($p < 0.05$) with the exception of the direct path from self-efficacy beliefs to interests in the Conventional dimension ($p > 0.05$). Total effect estimates are presented in Table 33. Total effects represent the combination of both direct and indirect effects of predictor variables on criterion variables. Thus, while direct path coefficients suggest that outcome expectations have a stronger effect on interests when compared to self-

efficacy beliefs, total effect estimates suggest that, in most cases, the combined direct and indirect effects of self-efficacy beliefs on interests exceed the effects of outcome expectations on the interest variable. Similarly, while outcome expectations tend have strong direct effects on range of occupational consideration, the total effects of self-efficacy beliefs on range of occupational consideration are larger in 4 of the 6 dimensions. Finally, in sharp contrast to the strong relationship between interests and occupational considerations, the direct effects obtained across most dimensions are relatively modest. The majority of the relationship between these two variables can be accounted for by spurious relationships (i.e., resulting from these two variables' shared causes).

CHAPTER 4

CONCLUSIONS AND DISCUSSION

Three major conclusions can be drawn from the present series of studies. First, results from the confirmatory factor analyses strongly suggest that (a) self-efficacy beliefs and the conceptually related construct of self-rated abilities are not homogeneous constructs, and (b) the primary social-cognitive variables of self-efficacy beliefs, outcome expectations, interests, and range of occupational considerations are not homogeneous. Second, the social cognitive model of career interests that specifies the relations among self-efficacy beliefs, outcome expectations, interests, and occupational considerations was supported by this study. Finally, the social cognitive model tested in this study resulted in strong and consistent fit indices when compared across Holland's person-environment dimensions. This discussion will focus on the results obtained in the present study, their relationship to previous research, implications for future research and practice that derive from the present findings, and possible limitations of the present series of studies.

Both self-efficacy beliefs and self-rated abilities have been identified as predictors of vocational interest, choice, and occupational performance (Brown et al., 1994; Hackett & Lent, 1992). Although these two constructs developed out of distinct theoretical traditions (i.e., self-efficacy beliefs developing out of the social cognitive tradition and self-rated abilities developing out of the trait-factor tradition), they are often described

quite similarly. Given the overlap between these variables' operational definitions and the similar predictive utility of each, it is possible that these variables (as they are currently operationalized) represent the same underlying latent construct.

Brown et al. (1994) tested this possibility in 229 college undergraduate students using confirmatory factor analytic techniques. They compared a one factor solution in which both self-efficacy belief variables and self-rated ability variables loaded on one underlying factor to a competing two factor solution in which self-efficacy belief variables and self-rated ability variables were freed to load on two separate but correlated factors. Their results clearly showed that the correlated two factor solution described the sample covariance matrix more accurately than did the alternative one factor solution. Moreover, the superiority of the two factor solution was consistent across the six Holland dimensions. The present study cross validated these findings in a separate sample of 403 college undergraduates using identical instruments and procedures. The two factor solution in the present study resulted in fit indices that were significantly larger than those resulting from the one factor solution, and these findings were consistent across the six Holland dimensions. Table 17 shows results from both the Brown et al. (1994) study and the present study. Differences in chi-square values between the two studies are likely the result of differences in sample size. Additionally, the two studies utilized different statistical programs resulting in different type three fit indices. Regardless of these differences, it is clear from inspection of this table that the two studies report similar

findings with the two factor model consistently resulting in significantly smaller chi-square values and larger type three fit values.

Thus, although self-efficacy beliefs and self-rated abilities represent operationally similar constructs, they are consistently described most accurately as two separate, but correlated, factors. The fact that these two factors retained unique variance in the current and previous studies may be a function of the slightly different ways that the two variables are measured. The Self-Directed Search measures self-rated abilities by instructing respondents to rate their abilities in various activities relative to a cohort reference group. Self-efficacy beliefs, on the other hand, are typically measured without specifically instructing respondents to compare themselves to a reference sample. It is plausible that this fine distinction is responsible for the differences observed (i.e., two factor model resulting in better indices of fit when compared to the one factor model) in the present study. Although this possibility may, at first glance, seem to have insignificant implications and argue for conceptual fusion of the two constructs, it may have important research and practice implications.

Differences in an individual respondents' level of self-efficacy beliefs and self-rated abilities for the same activity, for example, begs for further analysis. If an individual has strong positive self-efficacy beliefs but weaker self-rated abilities for the same activity, it is likely that this person is deflating his or her ability beliefs in comparison to others. A first empirical step in exploring this phenomenon might focus on comparing measures of self-efficacy beliefs and self-rated abilities that utilize identical

activities. This initial attempt would be a precursor to additional studies designed to explore possible precursors to such differential ratings and the possible behavioral ramifications of such discrepancies. This line of investigation would also address a point raised by Brown et al. (1994) that further investigation is needed on the factor structure of self-rated abilities and self-efficacy beliefs, when more recent measures of self-efficacy beliefs are used that employ items representing job specific tasks.

While the heterogeneity of the self-efficacy belief and self-rated ability factors may represent fine differences between the ipsative and normative nature of the instructions in the measures used, the strong positive correlations between the two factors in the present study might reflect similarities in the sources of these variables. Self-efficacy beliefs are thought to develop under the influence of personal performance accomplishments, vicarious learning, persuasion, and arousal as described by Bandura (1986). It is plausible that self-rated abilities are subject to similar developmental mechanisms. For example, it is easy to speculate that one's self-rating of ability in a particular activity is influenced by the outcome of one's prior performance in that activity. Moreover, it is likely that peer and adult persuasion, modeling, and physiological mechanisms all contribute to the early formation and maintenance of one's self-rated ability beliefs. While preliminary investigations of the sources of self-efficacy beliefs have been encouraging with respect to their factor structure and their relationship to self-efficacy beliefs, additional studies that measure these sources in diverse areas need yet to be conducted. Such studies might also incorporate measures of self-rated ability in

an attempt to determine the relationship between this variable and the self-efficacy source variables.

Finally, as Brown et al. (1994) pointed out, additional studies are needed to explicate the role of self-rated abilities in the social cognitive career theory. These authors speculate that self-rated abilities may have their effects on career-related interests indirectly through self-efficacy beliefs. While this hypothesis was clearly testable within the confines of this study, it was not directly addressed due to the number of additional structural models that would have been required to adequately test the plausible alternative hypotheses of partial and non-mediation.

The results from the present study can also be compared to previous confirmatory factor analyses that focused on the discriminant validity of self-efficacy beliefs, self-rated abilities, interests, and range of occupational considerations. Brown et al.(1994) included measures of career-related interests and range of career considerations in their study. Specifically, they tested four competing and nested factor models. A one factor model was tested in which all four variables (interests, range of considerations, self-efficacy beliefs, and self-rated abilities) were freed to load on one underlying factor. They compared this to a two factor model in which self-efficacy beliefs and self-rated abilities were freed to load on one factor and interests and range of consideration were freed to load on a separate by related construct. These two models were compared to a three factor solution in which self-rated abilities and self-efficacy beliefs were freed to load on separate factors while interests and range of considerations were specified to load on the

same factor and a four factor solution in which all four variables were freed to load on separate but related factors. Their conclusions were mixed with respect to the superiority of the three vs. four factor solutions. Although the four factor solution was suggested as the best solution in Artistic and Realistic dimensions, neither the three nor the four factor solutions appeared to offer any benefit over each other in the remaining Holland dimensions. These findings suggest that career interests and range of perceived occupational considerations might, in fact, represent a unitary underlying factor. Alternatively, it is possible that the factor structure of these variables is a function of Holland dimension.

The present study was designed to further explore the discriminant validity of the social cognitive variables described above and to extend previous findings by including a measure of outcome expectations. This measure, designed specifically for use in the present study, used occupational titles from the Occupation section of the Self Directed Search and instructions that asked participants to estimate the degree to which each occupation would fulfill their individual needs. Internal consistency reliability estimates from the six Holland dimensions of this instrument suggest that the six subsections of the instrument are measuring separate and consistent dimensions. The dimensions of this instrument tended to have some of the highest alpha coefficients of all of the instruments used in this study (see Table 4).

The four confirmatory factor models tested in the present study are summarized in Tables 18 and 19. The five factor model that specifies interests, outcome expectations,

self-efficacy beliefs, and range of occupational considerations to be separate but correlated factors consistently outperformed the competing nested models. This model repeatedly converged to final solution more rapidly, resulted in smaller, though non-significant, chi-square values, and resulted in larger fit indices in comparison to the competing 4, 3, and 1 factor solution. Moreover, the relative pattern of findings was consistent across the six Holland dimensions. When the nested models were tested statistically using the chi-square difference test, the five factor model resulted in statistically significant improvement over the competing models across Holland dimensions. Although the five factor solution appears to accurately describe the variables used in this study, it is important to note that these factors are moderately to highly intercorrelated (Tables 20 - 26), a finding that is generally consistent with both previous findings (Brown et al, 1994) and with the underlying social cognitive career theory. Thus, in contrast to the results reported by these authors, results from the present study strongly suggest that occupational interests and range of occupational considerations are separate but related constructs. Moreover, they retain a portion of variance among observed variables that is unique from that described by self-efficacy beliefs, self-rated abilities, and outcome expectations. Though these findings in isolation may not have direct implications for current career counseling practice, they are important from a measurement standpoint and add further support to the social cognitive career theory in that they clearly identify these important social cognitive variables as separate and viable entities.

Prior to conducting structural model analyses, it is essential that an adequate measurement model be identified (Bentler, 1980; Fassinger, 1987). The strength of the overall indices of fit for the measurement models in the present study (i.e., 0.891 - 0.970) and the adequacy of the lambda coefficients obtained suggest that these models are acceptable for further structural analysis. Future research might focus on increasing the adequacy of these measurement models and addressing several idiosyncratic findings (i.e., the loading of items on theory-inconsistent factors) by redesigning the instruments using factor analytic test construction procedures.

The fact that range of occupational considerations differ from career related interests is an important finding given the conceptual similarity of these two variables. Lent et al. (1994) mention the incorporation of vocational aspirations, expressed choice, and plans all represent an underlying goal dimension; a dimension that is distinct from overt actions. Although range of occupational consideration may not directly tap into stated choice goals, they do, we believe, represent a closely analogous concept of options. As options have been conceptualized, range of occupational considerations may represent an immediate precursor to internalized goals and are likely subject to the same independent causal factors (i.e., self-efficacy beliefs, outcome expectations, and interests) as are expressed goals. The fact that they differ from inventoried interests and appear to be influenced by causal mechanisms described by SCCT in the present study lends support to this contention.

Future studies aimed at characterizing interests, outcome expectations, self-efficacy beliefs and range of occupational considerations or the relationships among these variables would benefit from including multiple measures of each construct. Such an effort would help not only in the understanding the dimensions of each of these constructs, but would also facilitate the reduction of method error variance in the characterization of each construct. The development and implementation of multiple measures of the constructs explored in the present study was beyond the scope of the questions asked herein. Alternative measures of self-efficacy beliefs, for example, might have focused on occupationally specific activities. If such an instrument were designed to tap into job tasks across all six Holland dimensions, it would be prohibitively cumbersome for respondents.

Finally, as eluded to above, one of the limitations of the confirmatory factor analysis studies is the fact that only one method of measurement was employed for each construct. Although this method has been used previously to define constructs in both confirmatory factor analysis and covariance structural modeling (Brook et al., 1988; Mathieu & Farr, 1991), future studies should optimally include multiple measures, preferably measures that tap into multiple modalities. Despite this limitation, we feel that the focus of this study on confirming factor structure warrants the use of such procedures. Further, the procedure used to generate composite items for underlying factors, we feel, is a conservative one in that it averages across items that have a broad range of loadings on an apriori underlying factor and includes almost all of the items on the instrument (i.e.,

those with factor loadings of greater than 0.30). The conservative characteristics of the procedure used to generate item composite indicators in the present study can also be directly observed in the lambda coefficients presented in Figures 9 - 14 and 19 -24. A wide range of coefficients was observed both within the statistical definition of a factor and across factors. Less conservative item combination procedures (i.e., those designed to maximize the loading of each indicator on its respective factor) would likely have resulted in stronger and more uniform lambda coefficients.

The series of structural equation analyses was developed to address three primary questions. First, the relationship between abilities, self-efficacy beliefs and interests, appears to be one in which self-efficacy beliefs mediate the relationship between abilities and interests. The present study incorporated three analytic strategies to further describe this relationship. Models were designed to test the possibility that the effects of abilities on interests were non-mediated or partially or fully mediated by self-efficacy beliefs. Second, although the social cognitive career theory postulates that the effects of outcome expectations and self-efficacy beliefs on goals are only partially mediated by career interests, this postulate has not been directly tested to date against a competing notion that these effects might be completely mediated (i.e., that there are no direct effects of self-efficacy beliefs and outcome expectations on goals. The present study addressed these alternatives by comparing models that specified either direct and indirect effects to models specifying only indirect effects. Finally, Lent et al. (1994) outlined possible points of convergence between the social cognitive career theory and other extant theories

of career development. Some existing research (see above) points to possible points of overlap between the social cognitive theory and the theory of career choice (Holland, 1985). The present study was also developed to provide an initial test of this overlap by analyzing the social cognitive career model separately across the six Holland personality-work environment dimensions.

Unfortunately, the investigation of the relationship among objectively measured abilities, self-efficacy beliefs, and occupational interests was not possible in the present study. Beta coefficients describing the causal paths from grade point average to self-efficacy beliefs and interests were non-significant in all of the models tested. Moreover, no significant differences were observed when the three nested ability models were tested against each other (Tables 30 and 31). Given the absence of significant path coefficients and differences across the three models, grade point average was dropped from the subsequent analyses.

Several possible explanations for the absence of significant findings present themselves. First, the operational definition of grade point average in the present study has some inherent problems associated with it. GPA's were identified for each of the six Holland dimensions using the College Majors Finder (Rosen et al., 1990). A single Holland type (letter) was assigned to each course completed by identifying the department in which the course was offered and assigning the corresponding Holland Major designation for that department. Thus, if a student completed a course in General Psychology, his or her course grade in that class contributed to the Social GPA, whereas

if a student completed a course in Elementary Algebra, his or her course grade continued to the Investigative GPA. Although this method of assigning Holland codes to individual courses may be appropriate, it is not without problems. Heterogeneity within an academic discipline represents perhaps the most insidious of measurement problems associated with this procedure. General Psychology, for example, may not adequately assess an individual's "Social" aptitudes and would receive the same Holland code as an advanced undergraduate course in Psychological Statistics. Conversely, Elementary Algebra, may tap into Conventional abilities in many individuals rather than the Investigative abilities that would be inferred from its Holland code.

A second problem with GPA in the present study is that insufficient numbers of students completed coursework in Realistic, Enterprising, and Conventional courses. This is not surprising given that the majority of the students in the sample were freshman and sophomores who were, most likely, still completing their liberal arts core requirements (courses that are primarily Social, Artistic, and Investigative in nature). This limitation precluded the use of Realistic, Enterprising, and Conventional GPA's in the testing of these respective models. Future studies targeting general undergraduate populations might make extra effort to secure students of advanced standing across a wider range of academic disciplines. Additionally, future studies should endeavor to include multiple measures of objective ability in an attempt to define objective ability more definitively. Multon et al. (1991) in a recent meta-analysis found that the type of performance measure used across studies affected the relationship between self-efficacy

beliefs and academic outcome. It is possible that this phenomenon might also account for the lack of relationship obtained between GPA and self-efficacy beliefs in this study.

The nature of the relationship between self-efficacy beliefs, outcome expectations, and range of occupational considerations was addressed in this study. Clearly the model that specifies that self-efficacy beliefs and outcome expectations have direct effects on range of occupational considerations as well as indirect effects that are mediated by career interests was superior to the alternative model specifying only indirect effects. The results summarized in Table 32 show that model two consistently resulted in smaller, though non-significant, chi-square values, and larger fit indexes across all six Holland dimensions. Moreover, when the nested model was compared to the less restrictive alternative model, significant chi-square change values were obtained across dimensions.

These findings have very important implications for career counselors. One of the mainstays of career counseling practice is the measurement of career interests using instruments such as the Strong Interest Inventory (Hansen & Campbell, 1985), the Kuder Occupational Interest Survey (Zytowski & Kuder, 1985), or the Unisex edition of the ACT Interest Inventory (Lamp & Prediger, 1981). These instruments are often used as primary indicators of career direction, and clients often are encouraged to gather additional occupational information based on results from these instruments. While the results of the present study do not argue against such practices, they do suggest that career counselors be aware of potential impact of other variables in the career choice process. Because self-efficacy beliefs and outcome expectations can directly influence

occupational considerations independent of their influence on career interests, the potential for career mis-guidance exists if counselors continue to rely solely on measures of career interest. A more optimal situation in which clients explore their work related values and self-efficacy beliefs in addition to interests would guard against such misdirection.

A more thorough understanding of the relationships among self-efficacy beliefs, outcome expectations, interests, and goals requires additional empirical research. One limitation noted above is the fact that the current study used a proxy measure of career goals (range of occupational considerations). Future research in this area might focus on goal behaviors that are more consistent with SCCT and might extend the current findings to include distal outcome measures such as career entry behavior. Of equal importance, perhaps, would be studies designed to more completely describe the conditions under which self-efficacy beliefs and outcome expectations have more of a direct impact on career decision making than they do an indirect impact via career interests. SCCT provides some guidance in this area in that it hypothesizes the existence of environmental barriers that can moderate the translation of career interests into goals and actions. These barriers might cause an individual to re-evaluate the possibility of proceeding with career plans based on existing interests. As an alternative, this individual could conceivably seek out career alternatives that are inconsistent with his or her career interests but that would satisfy career-related values or that would make use of perceived skills. Whether

career choices based on interests or reactive to barriers provide more career satisfaction is worthy of study.

The direct effects of self-efficacy beliefs and outcome expectations on goals might also help to explain variance in career outcomes not accounted for by Holland's congruence hypothesis. The observed effects of these two social cognitive variables in the present study and the postulated relationship between self-efficacy beliefs and actions according to SSCT might account for variance in outcome variables such as major choice and satisfaction that cannot be accounted for by congruence alone. This hypothesis has already received some support. Lent et al. (1987) reported that both self-efficacy beliefs and Holland congruence predicted the range of career options in technical and scientific majors. Additionally, Rounds (1990) demonstrated that work value correspondence accounted for variance in job satisfaction beyond that accounted for by congruence, and Pryor and Taylor (1986) showed that together, interests and values accounted for more variance in the choice of academic courses than did either variable in isolation. A current study underway is designed to extend these findings by (1) using an alternative measure of range of career alternative and (2) including a measure of occupational outcome expectations. While preliminary findings were not available at the time of this writing, it is predicted that both self-efficacy beliefs and outcome expectations will account for additional variance in the range of perceived career options beyond that accounted for by congruence alone.

Closer inspection of Figures 32 through 37 reveals several trends. First, the path from self-efficacy beliefs to outcome expectations was significant across Holland dimensions and ranged from 0.422 to 0.617. This relationship has been previously discussed by a number of authors (Lent et al., 1994; Bandura, 1986). As Lent et al. (1994) described, this relationship explains the observation that people presumably expect to achieve positive and desirable outcomes in activities in which they feel efficacious. This relationship (i.e., strong positive self-efficacy beliefs, and desirable outcome expectations) is optimal, but not necessary, for the development of strong interests. That is, interests may develop in the sole presence of either self-efficacy beliefs or outcome expectations. The beta coefficients describing the causal relationship between self-efficacy beliefs, outcome expectations and interests certainly reinforce the contention that both predictor variables are strongly and positively related to career-related interests. Beta coefficients describing the relationship between outcome expectations and interests ranged between 0. 247 and 0.574. The coefficients describing the relationship between self-efficacy beliefs and interests were also relatively strong with one exception. The beta coefficients describing this relationship ranged between 0.078 and 0.391. The non-significant coefficient of 0.078 was obtained in the Conventional dimension and reinforces the contention that strong positive outcome expectations can sustain interests in the absence of strong positive self-efficacy beliefs.

From both a clinical and research standpoint, it might be informative to identify instances in which interests appear to be sustained in the absence of either self-efficacy

beliefs or outcome expectations and to identify the effects of this condition on subsequent career outcomes. Although SCCT makes no explicit predictions in cases such as this, it does suggest that the magnitude of career interest would be a key factor in predicting outcome. Thus, it would be important to determine the effects of this condition on the magnitude of interests relative to interests supported by both strong self-efficacy beliefs and outcome expectations. It seems likely that the absence of positive outcome expectations in such a case would result in a degree of dissatisfaction with perceived career options, while the absence of strong self-efficacy beliefs might result in lack of confidence in one's ability to carry out vital career tasks. SCCT does suggest, however, that the latter case would have a more deleterious effect on job performance given the postulated direct effect of self-efficacy beliefs on this outcome variable.

Although simple observation of the data presented in Figures 32 - 37 might lead one to conclude that outcome expectations have a stronger influence on the development and maintenance of interests compared to the influence of self-efficacy beliefs, it is important to consider not only the direct effects of self-efficacy beliefs on interests but also those effects that are mediated by outcome expectations. Table 33 provides information on the total estimated effects among the variables in this study. These data suggest that the effects of self-efficacy beliefs and outcome expectations on interests are partially a function of the Holland dimension being observed. Although self-efficacy clearly has a stronger total effect on interests in the Realistic, Investigative, and Enterprising dimensions, self-efficacy beliefs and outcome expectations have more

comparable effects on interests in the Artistic dimension. Outcome expectations, on the other hand, appear to be more salient in the maintenance of interests in the Social and Conventional dimensions.

The relationships among self-efficacy beliefs, outcome expectations, and interests were recently summarized meta-analytically by Lent et al. (1994). When the total effect estimates from the current study are compared to these summary findings, several interesting findings present themselves. First, effect estimates for the relationship between self-efficacy beliefs and interests from the current study correspond closely to meta-analytic findings (i.e., r=0.53) with two notable exceptions. Effect estimates in the Realistic and Conventional dimensions were substantially lower than 0.53. It is possible that these findings are an artifact of the sample employed in this study. Conventional and Realistic interests (an presumably self-efficacy beliefs and outcome expectations) are under-represented in the university environment. Inspection of Table 8 confirms the fact that Realistic and Conventional interests were slightly lower compared to interest patterns in other Holland dimensions. The lower effect estimates in these two dimensions, therefore, may represent a range restriction problem.

Total effect estimates for the relationship between outcome expectations and interests in the present study tend to be somewhat lower than the value obtained by Lent et al (1994; r=0.52). Outcome expectations appear to be most strongly related to interests within the Social dimension and least strongly related to interests in the Realistic dimension (Table 33). While the discrepancy between results obtained here and those

reported by Lent et al (1994) are noteworthy and deserve additional empirical attention, it should be noted that the population effect size estimate reported meta-analytically is based on only three empirical studies.

A second trend observed in the present data involves the direct effects of self-efficacy beliefs and outcome expectations on the range of occupational considerations. All obtained beta coefficients characterizing these direct effects were significant. Once again, however, the relative effects of self-efficacy beliefs and outcome expectations was dependent on the Holland dimension being measured. The direct effects of outcome expectations on the range of occupational considerations tended to be somewhat higher than the direct effects of self-efficacy beliefs in the Realistic, Investigative, Social, Enterprising, and Conventional dimensions, whereas the direct effects of self-efficacy on range of occupational considerations were stronger in the Artistic dimension. Such a finding may not be surprising if one considers the specificity of skills required for many Artistic occupations in contrast to the abundance of transferable skills required in other occupational dimensions.

When the total effects of self-efficacy beliefs and outcome expectations on the range of occupational considerations are considered by including both direct and indirect effects (as mediated by interests), a somewhat different picture emerges. The total effects of self-efficacy beliefs on range of occupational considerations are stronger in Realistic, Investigative, Artistic, and Social dimensions whereas the effects of outcome expectations are stronger in Enterprising and Conventional dimensions. These

relationships can also be compared to the population effect size estimates reported by Lent et al. (1994). The total effect size estimates describing the relationship between self-efficacy beliefs and range of occupational considerations in the present study tended to be slightly higher than the value obtained meta-analytically (r=0.40). While this value was obtained using a range of different measures, Lent et al. report that they obtained the strongest relationship when direct measures of choice intentions were used (i.e., enrollment intentions). Such findings are somewhat inconsistent with those reported in this study in that we utilized a less direct measure of choice intentions or goals in the form of range of occupational considerations. The enhanced relationships reported here may reflect a measurement artifact that reflects the similarity in the self-efficacy beliefs and occupational considerations measures. This possibility is currently being addressed in another study. Similar findings can be observed when effect estimates describing the relationship between outcome expectations and range of occupational considerations from the present study are compared to population effects size estimates obtained by Lent et al. (r=0.42).

Finally, the direct effects of occupational interests on the range of occupational considerations were significant and relatively stable across Holland dimensions. These effects ranged from 0.232 in the Artistic dimension to 0.359 in the Social dimension. The comparison of these values to those reported by Lent et al. (1994; r=0.60), however, reveals striking discrepancies. One possible explanation for the magnitude of the differences observed in comparing the two studies rests on the hypothesis described

above that the range of occupational considerations represents a precursor to goal intentions. As such, occupational considerations may represent a less crystallized form of goal intentions. As one's occupational considerations narrow and goals become more clearly defined (i.e., intentions to declare a major or to enroll in a specific course), the relationship between interests and goals is likely to increase in magnitude. Lent et al. pointed out that the strongest relationship between interests and choice intentions was obtained when more specific measures of choice were used.

In general, results from the covariance structural model analyses, support the viability of the social cognitive career theory. Lent et al. (1994) outlined avenues for future research that included a more thorough exploration of mediator effects within the model and tests of the model using procedures that support causal inferences. Results from the present study represent an initial attempt at responding to those recommendations. Lent and colleagues also offered the social cognitive career theory as a potential platform for theory convergence by outlining specific points of overlap between SCCT and extant career theories. The present study represents an initial attempt at confirming one point of overlap. Specifically, the results described above suggest that the inter-relations among social cognitive variables that are described by SCCT appear to be relatively consistent across the person-environment dimensions outlined by Holland (1985). This finding has important implications for career counseling practice.

In the last two decades, Holland's theory of career choice has permeated both the practice of career counseling and the career information industry. Most career counselors

adopt, to varying degrees, concepts and practices proposed or endorsed by John Holland. The nature of career interests and the utility of career congruence, for example, provide many practitioners with a foundation from which career counseling can proceed. Moreover, Holland's concepts have been incorporated into one of the most widely used psychological instruments in the world, the Strong Interest Inventory. Many career counselors encourage clients to use the RIASEC system in the process of gathering additional career information and making important career decisions.

The present study demonstrates that the SCCT is consistent with the structure of career interests as proposed by Holland. The fact that the model proposed by Lent et al. (1994) consistently describes the relations among important social cognitive variables across Holland dimensions, provides practitioners with important additional information that is embedded within a widely used and user friendly framework. Counselors can now more thoroughly explore the nature of career interests by including the important contributions of self-efficacy beliefs and outcome expectations (or values as previously conceptualized) without substantially deviating from existing practices. Moreover, findings from the present study have important implications for practitioners dealing with the career process at multiple levels of development and with clients who may deviate from the career decision making process as described by Holland.

In summary, the Social Cognitive Career Theory represents a major contribution to existing career literature. It characterizes the career process from a developmental perspective, acknowledges the important contribution of environmental influences,

endorses the concept of human agency, and proposes specific points of theory convergence. The present study provides some initial empirical support for the viability of important social cognitive variables and for the proposed social cognitive model. Moreover, it represents an initial attempt at describing how SCCT might converge with existing career theory.

APPENDIX 1

FIGURES

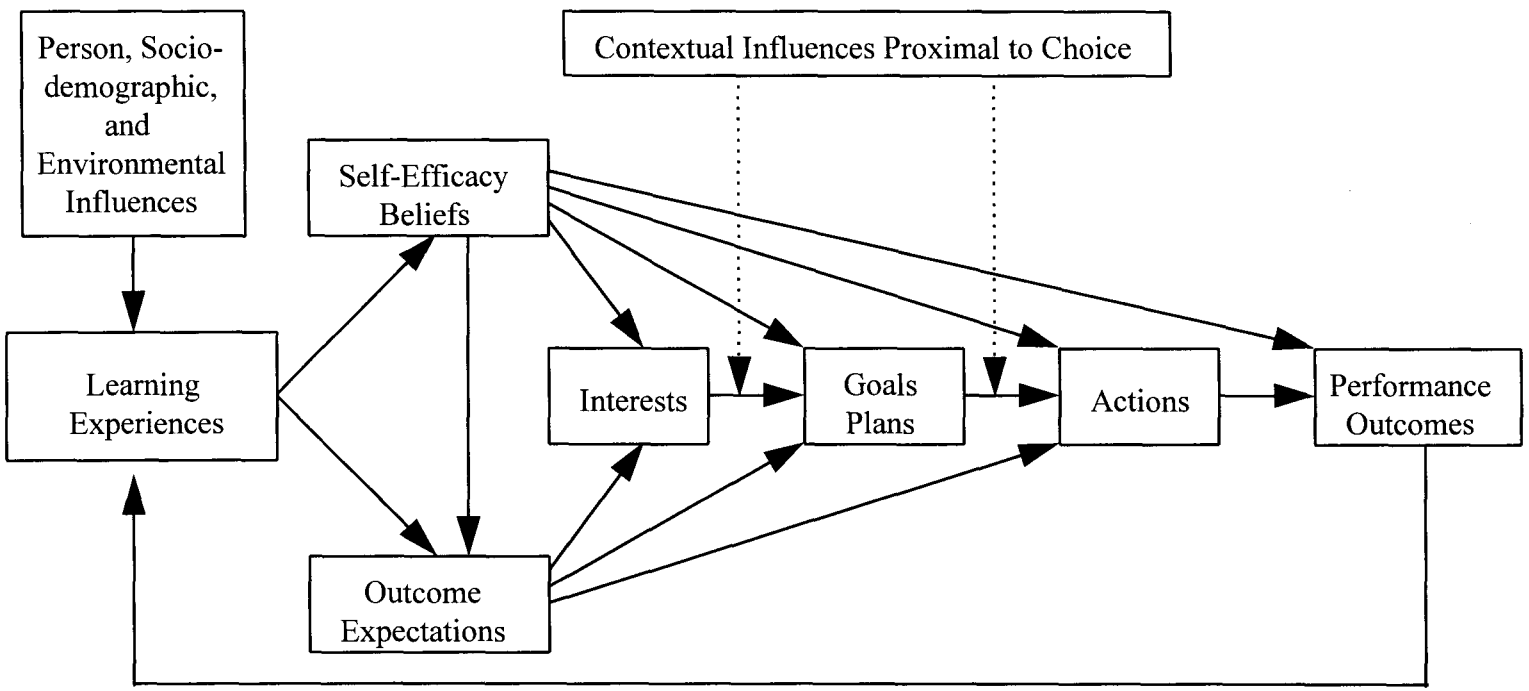


Figure 1. Model of the Social Cognitive Career Theory

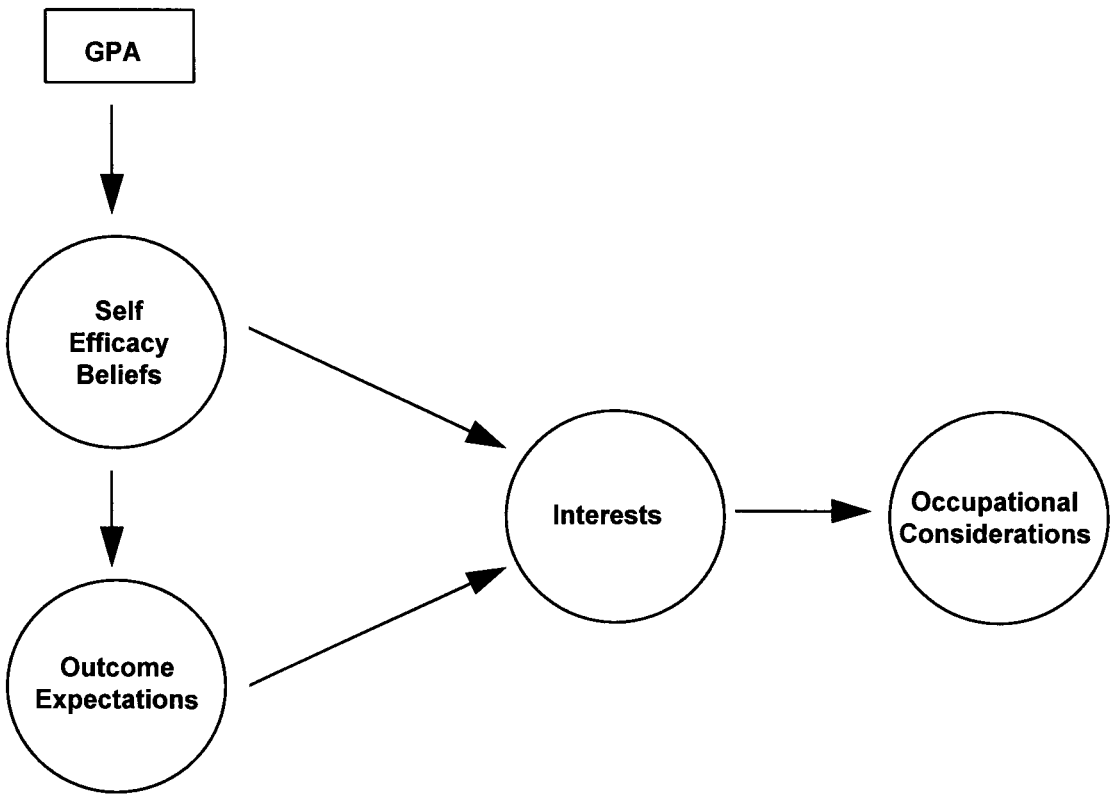


Figure 2. Conceptual Representation of Model 1

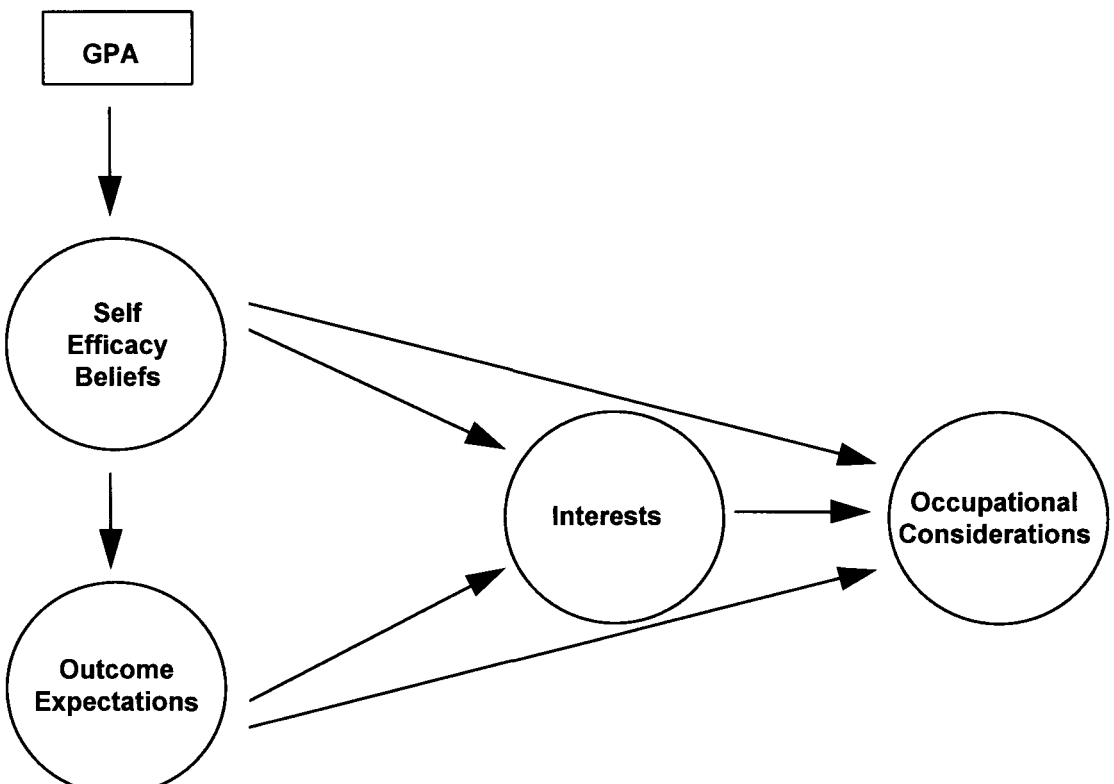


Figure 3. Conceptual Representation of Model 2

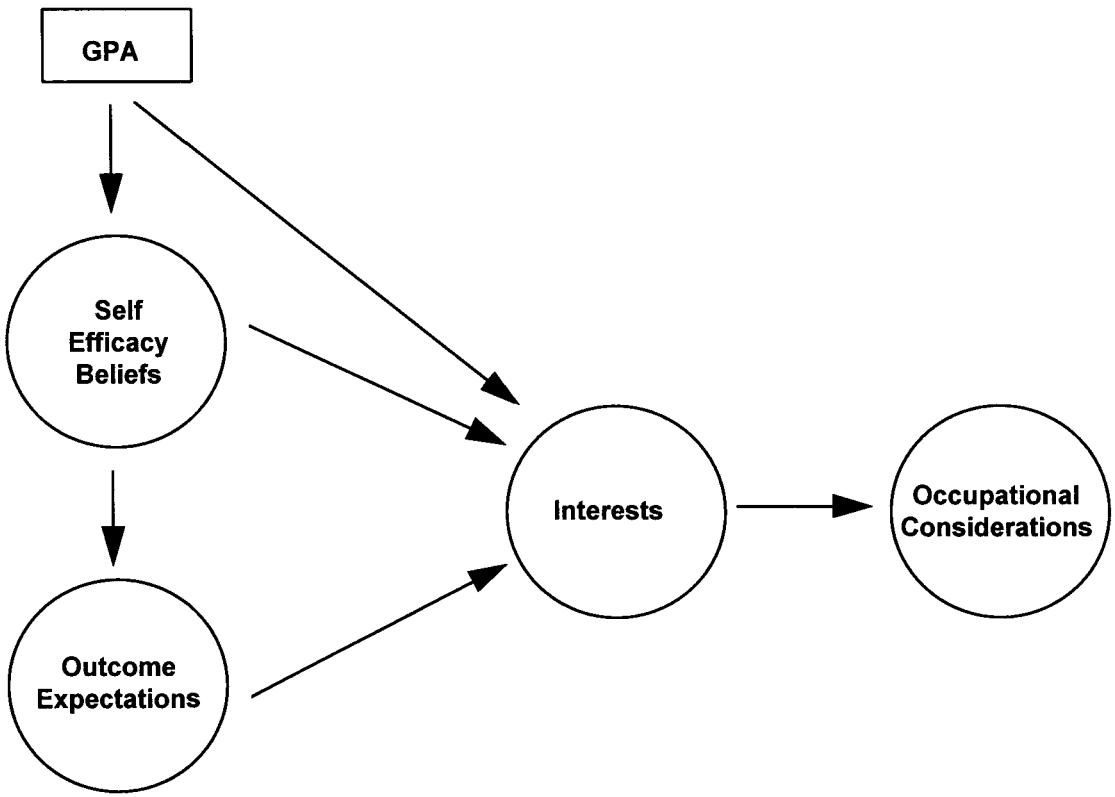


Figure 4. Conceptual Representation of Model 3

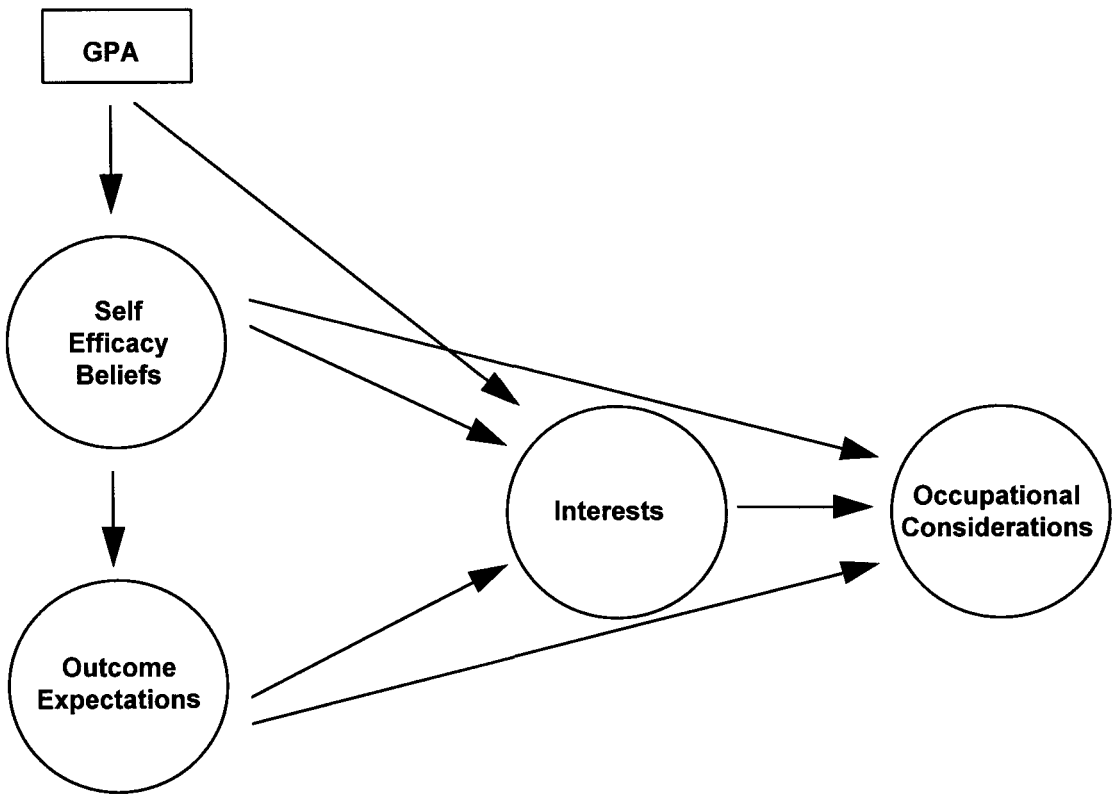


Figure 5. Conceptual Representation of Model 4

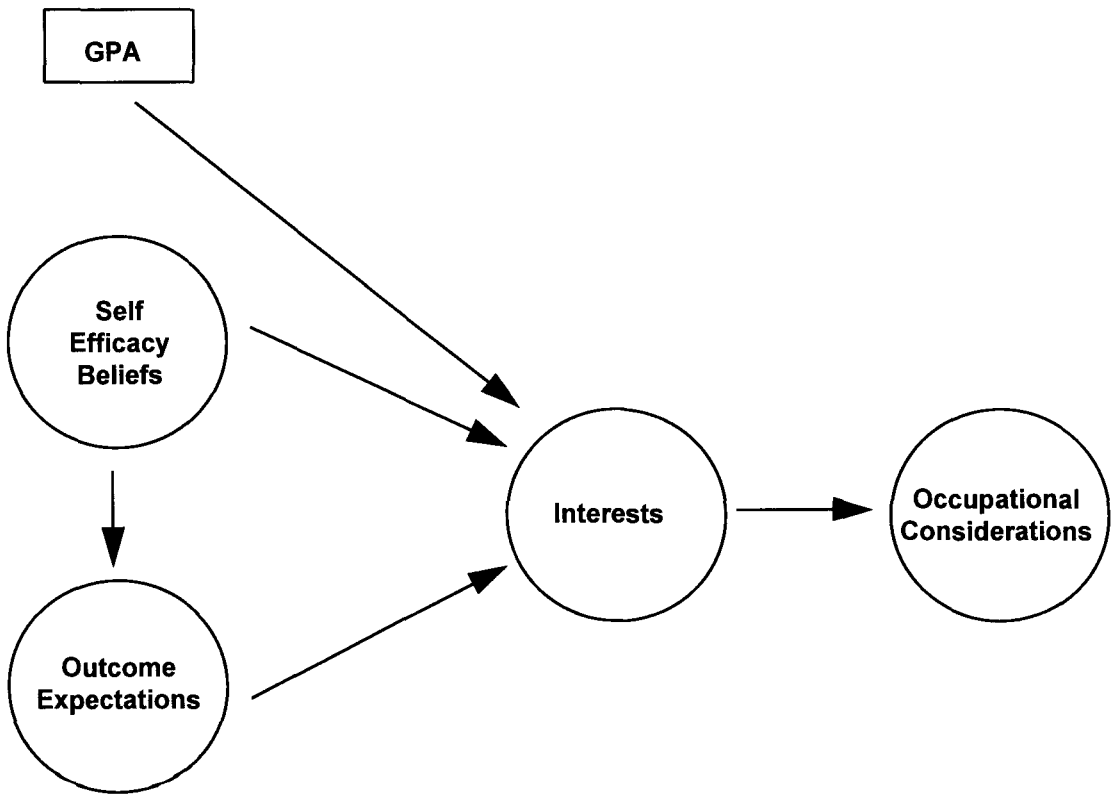


Figure 6. Conceptual Representation of Model 5

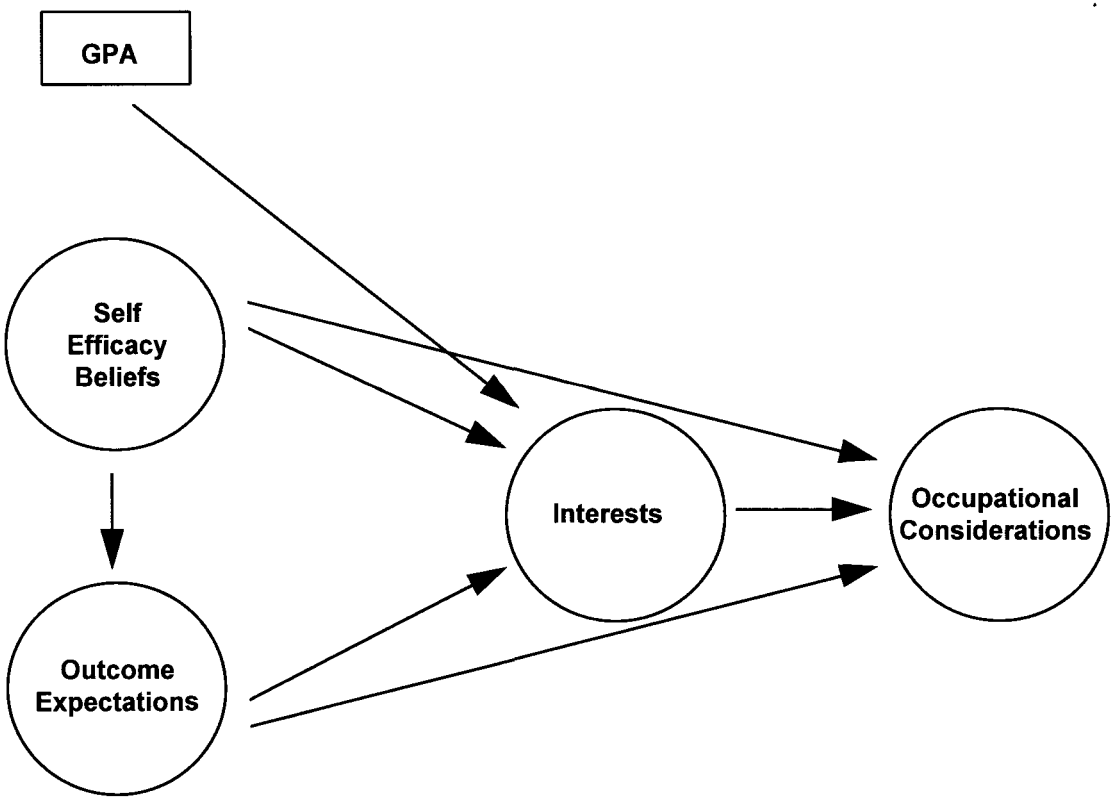


Figure 7. Conceptual Representation of Model 6

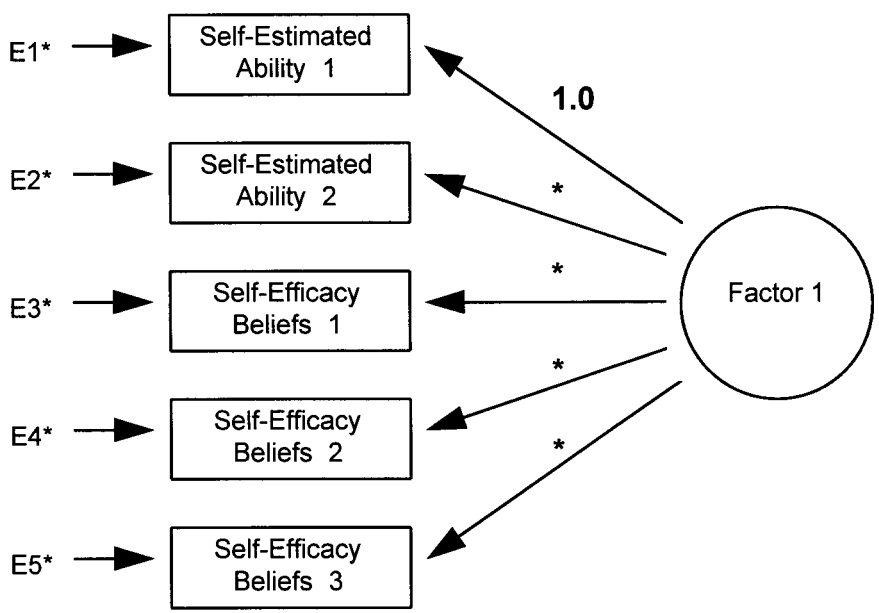


Figure 8. Statistical Representation of the One Factor Confirmatory Analysis

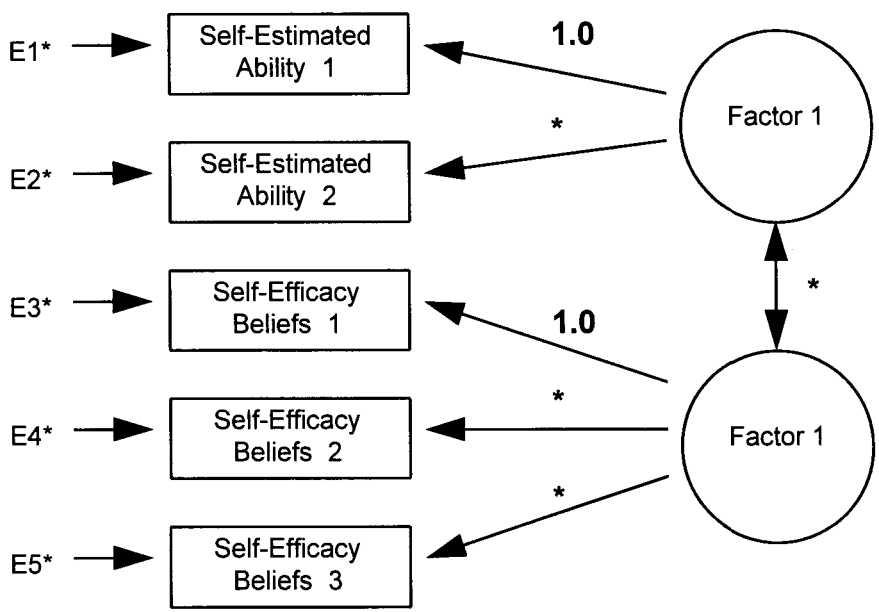


Figure 9. Statistical Representation of the Two Factor Confirmatory Analysis

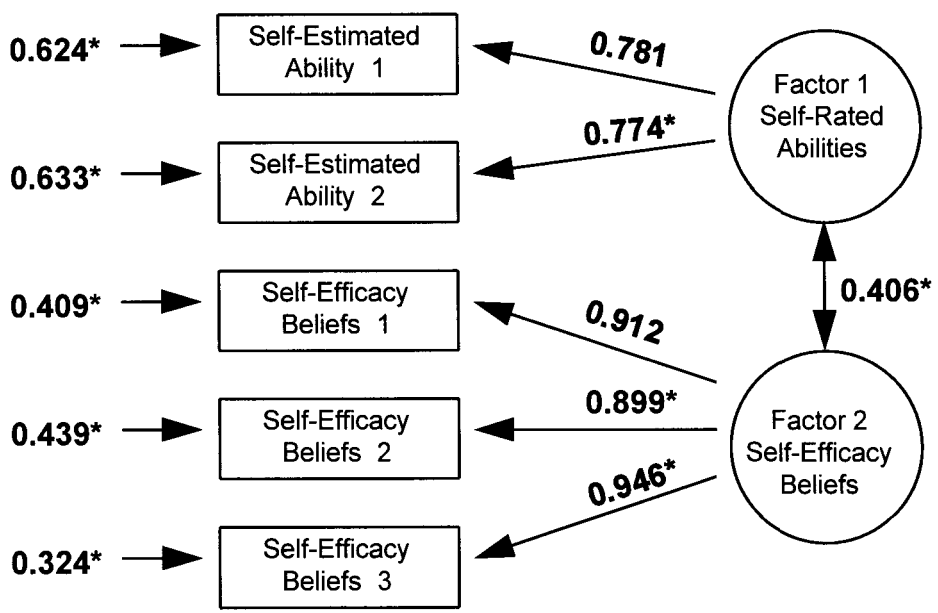


Figure 10. Two Factor Confirmatory Analysis Results: Realistic Dimension

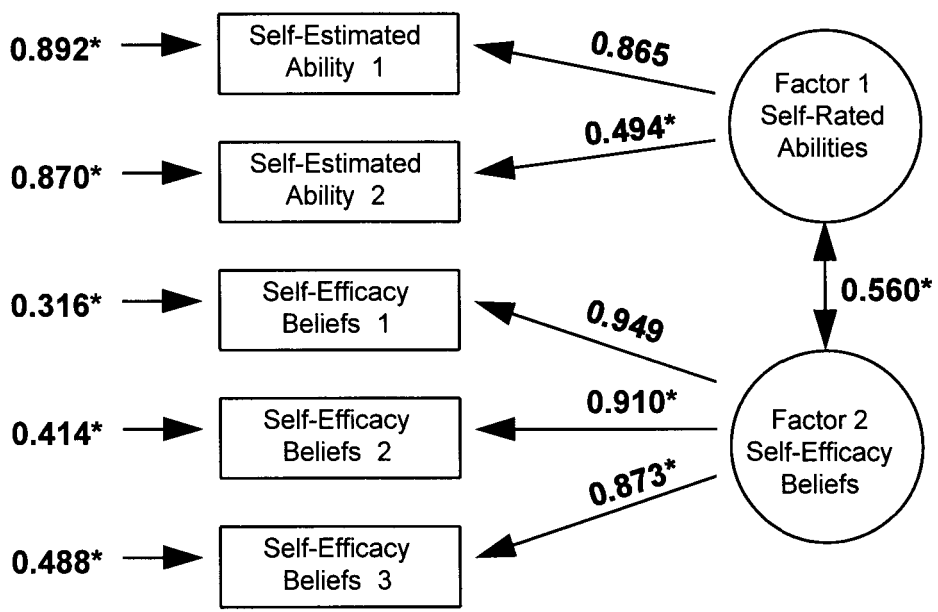


Figure 11. Two Factor Confirmatory Analysis Results: Investigative Dimension

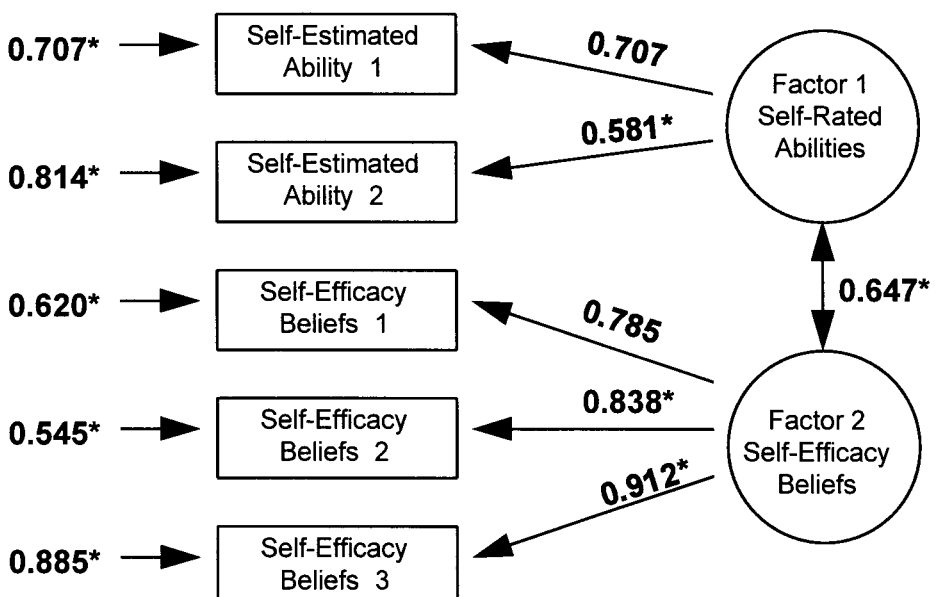


Figure 12. Two Factor Confirmatory Analysis Results: Artistic Dimension

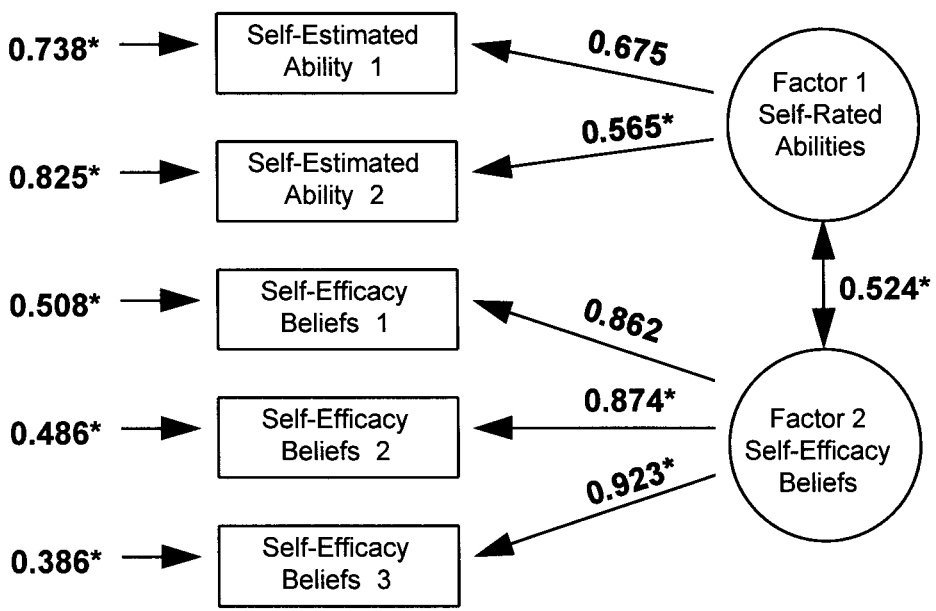


Figure 13. Two Factor Confirmatory Analysis Results: Social Dimension

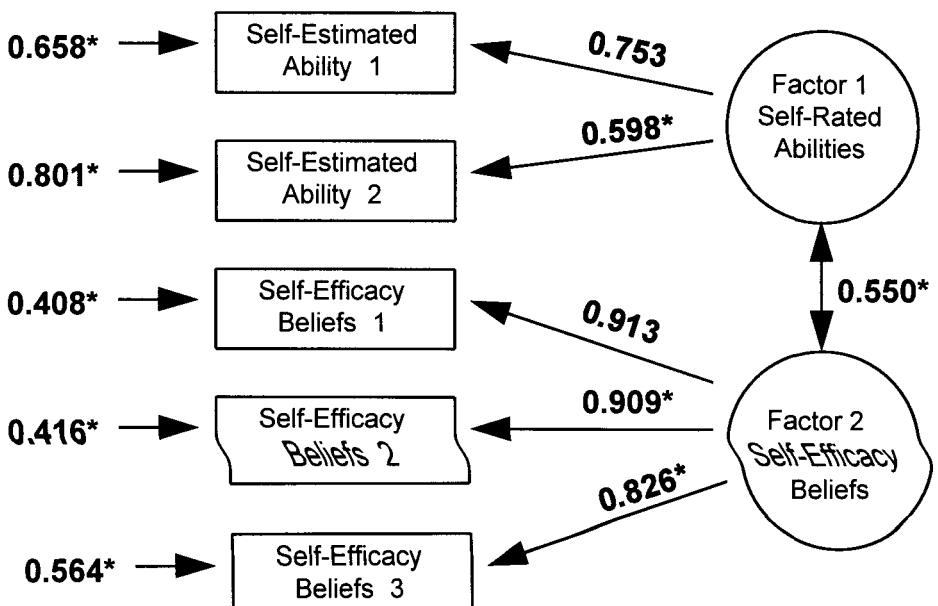


Figure 14. Two Factor Confirmatory Analysis Results: Enterprising Dimension

Figure 15. Two Factor Confirmatory Analysis Results: Conventional Dimension

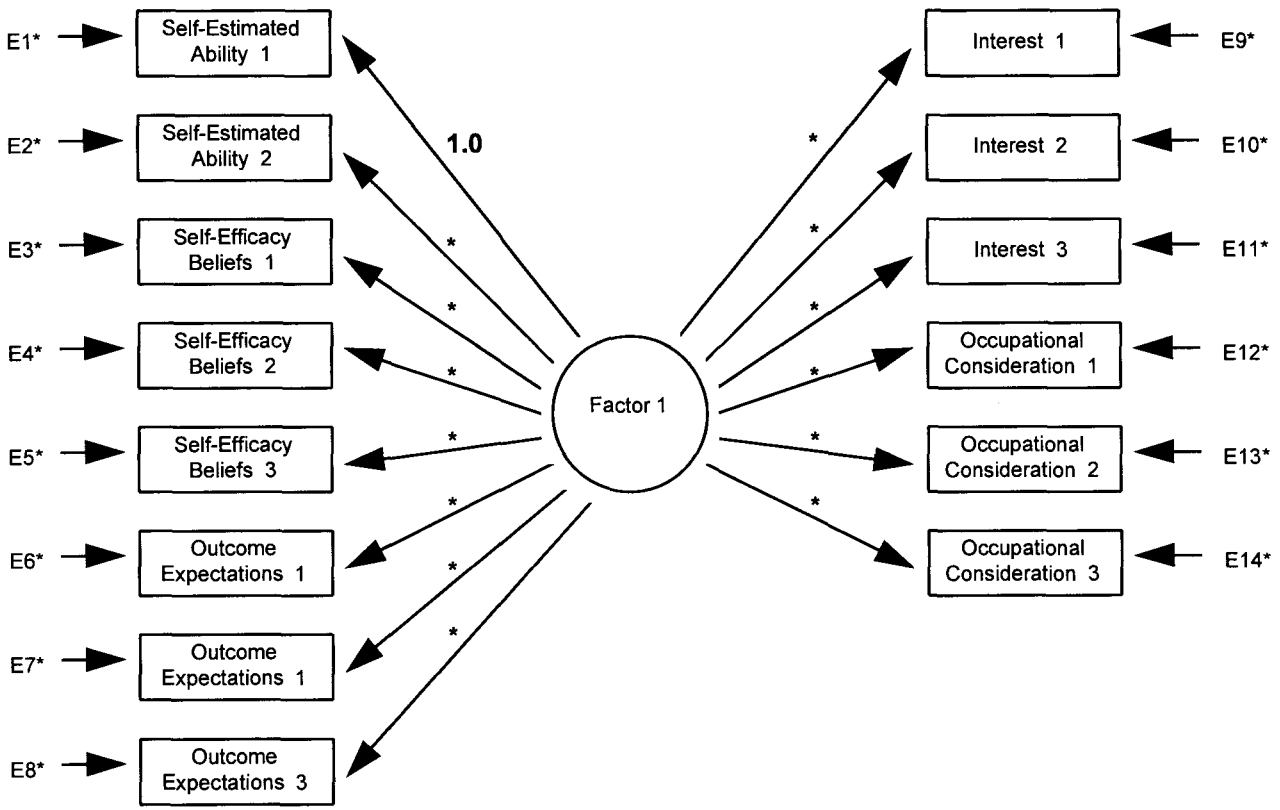


Figure 16. Statistical Representation of the One Factor Confirmatory Analysis

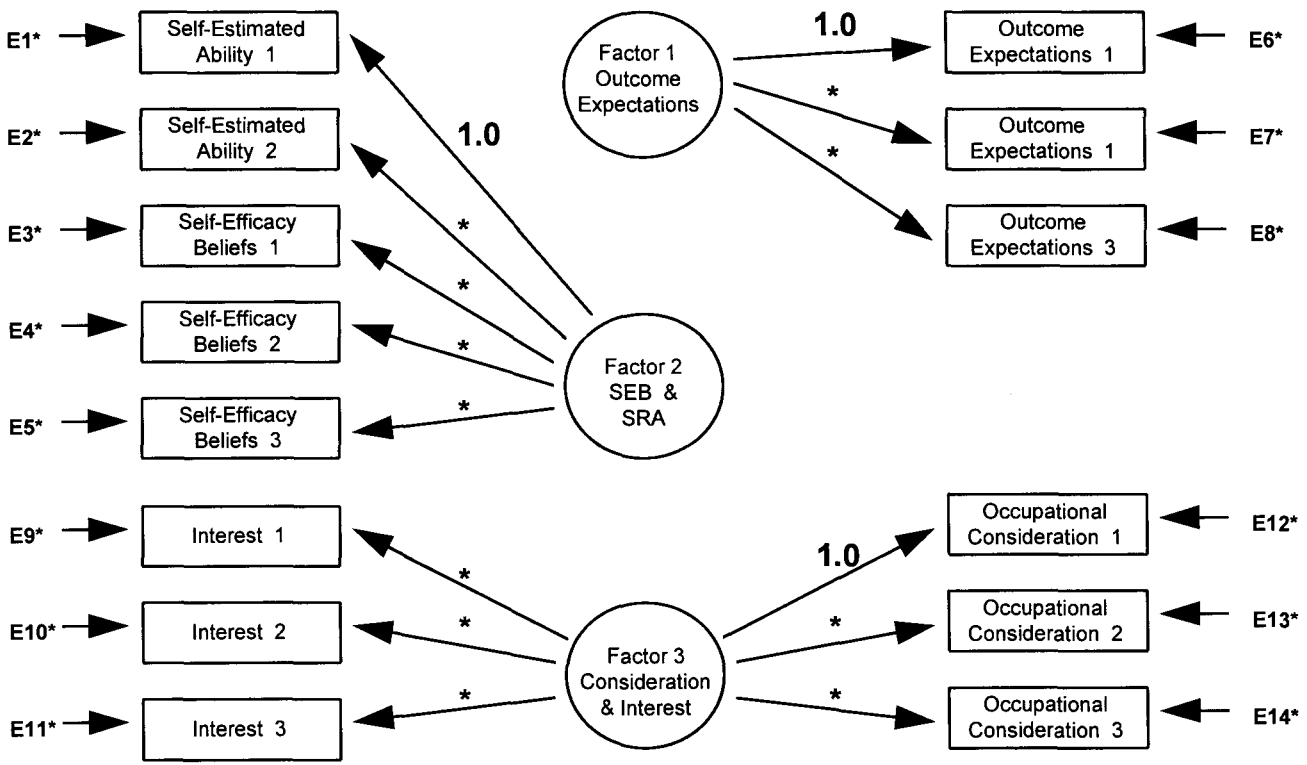


Figure 17. Statistical Representation of the Three Factor Confirmatory Analysis. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

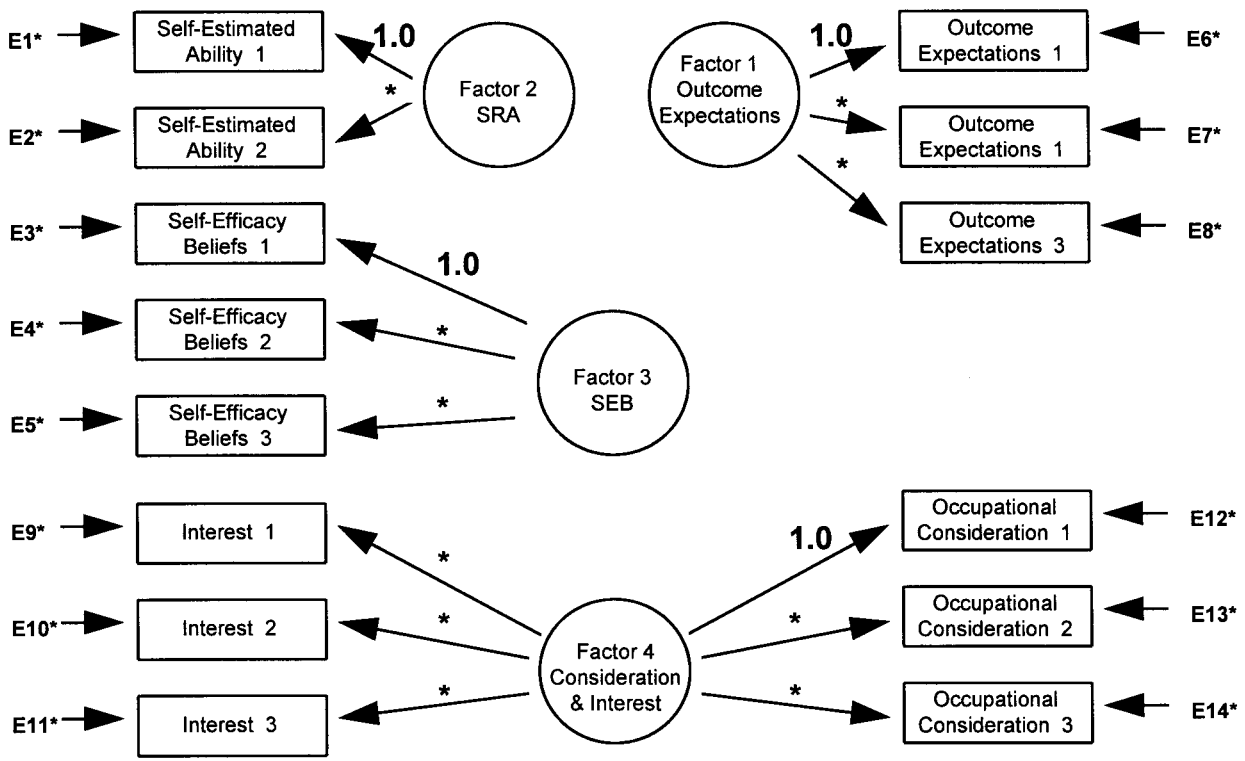


Figure 18. Statistical Representation of the Four Factor Confirmatory Analysis. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

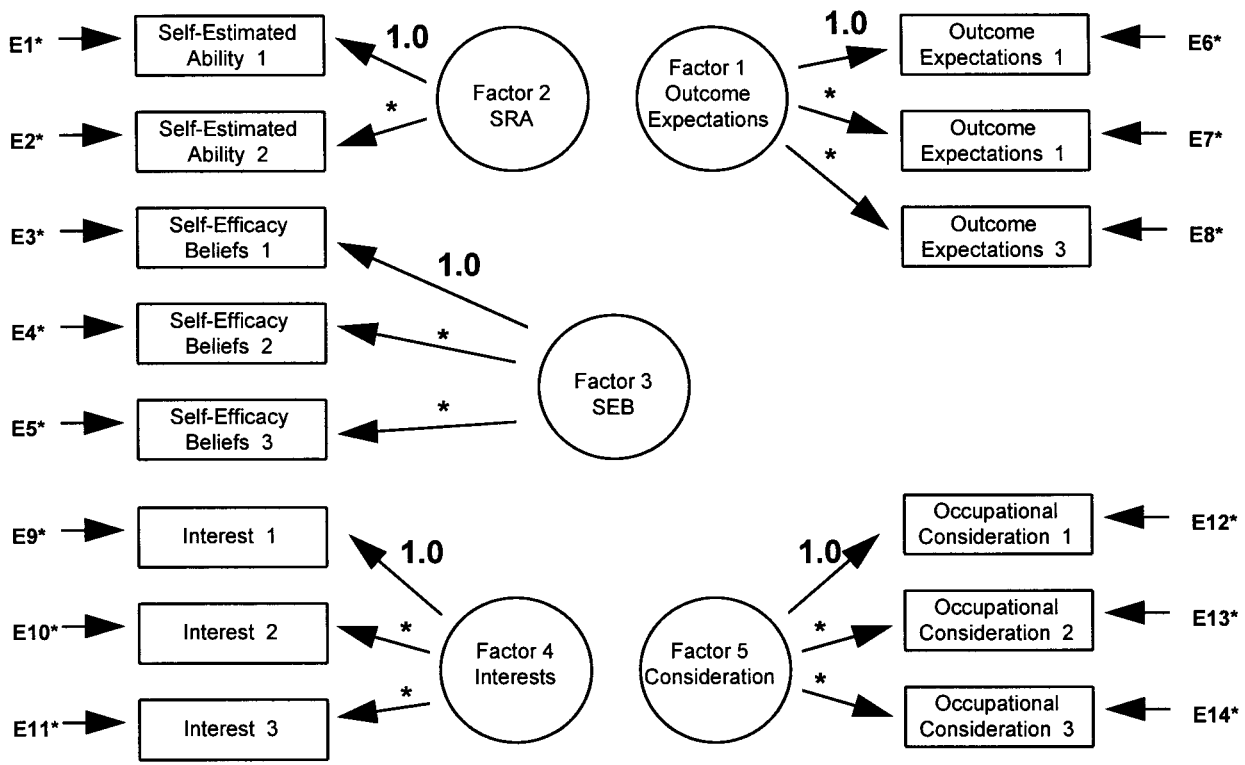


Figure 19. Statistical Representation of the Five Factor Confirmatory Analysis. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

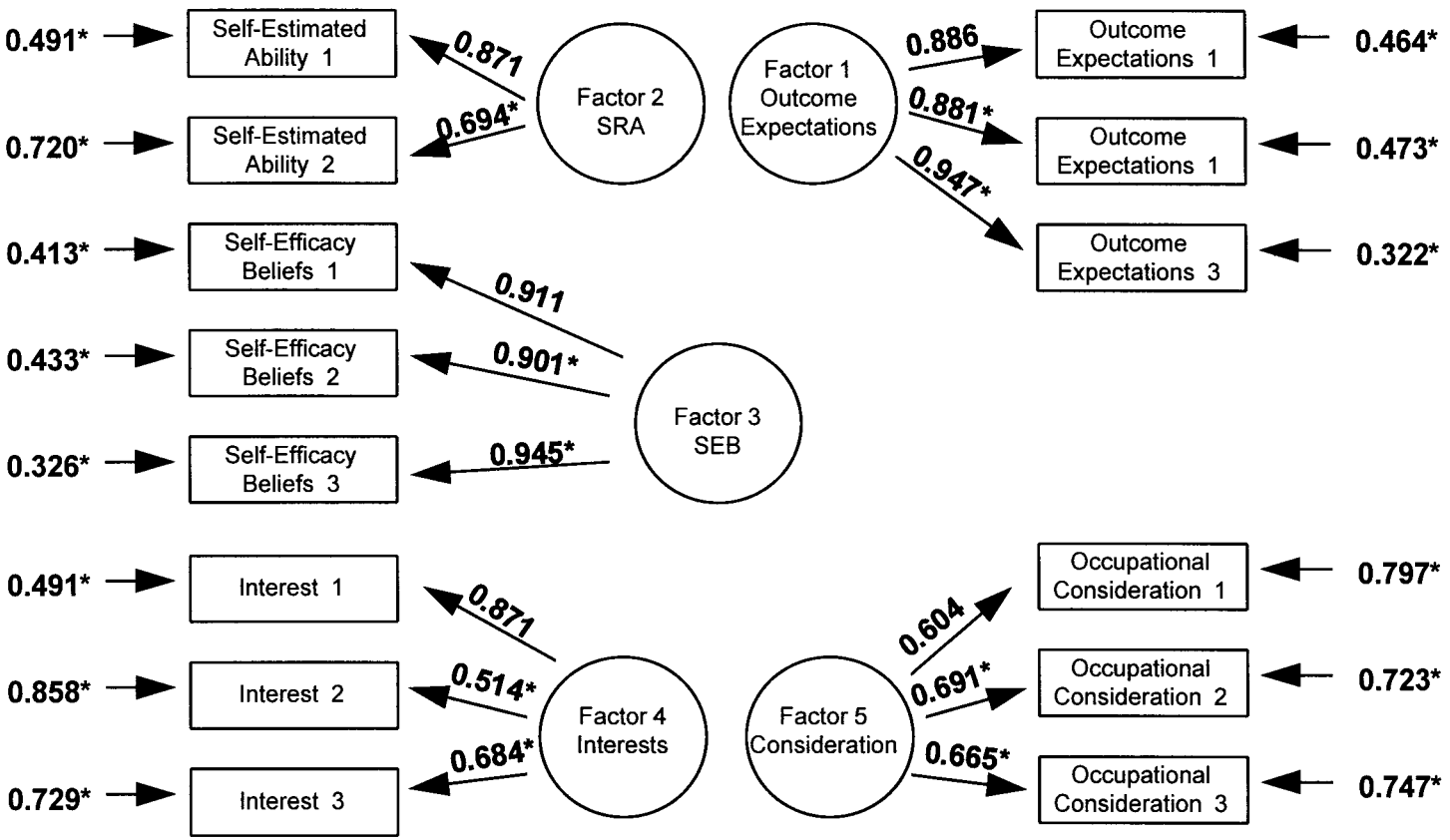


Figure 20. Five Factor Confirmatory Analysis Results: Realistic Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

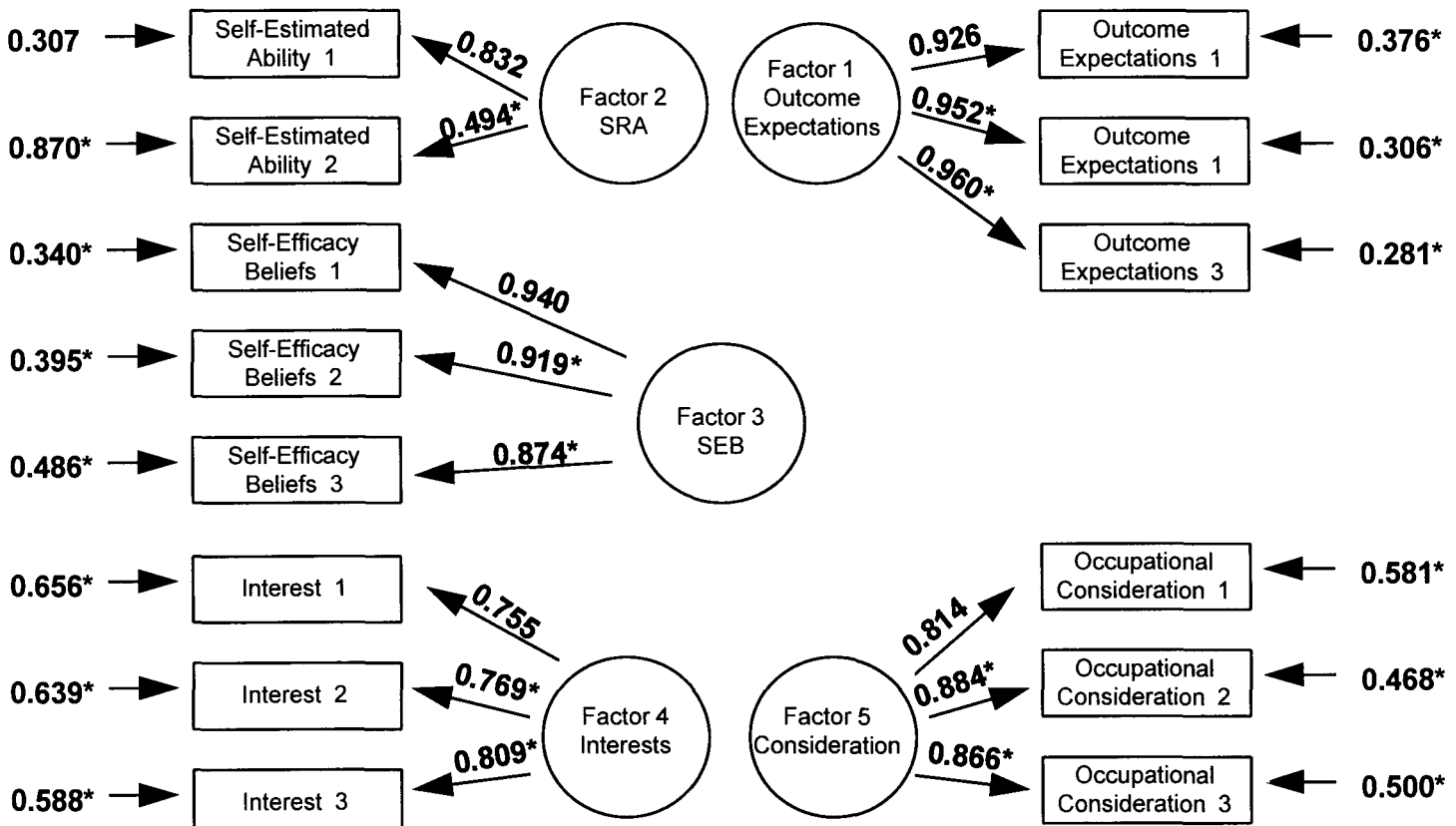


Figure 21. Five Factor Confirmatory Analysis Results: Investigative Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

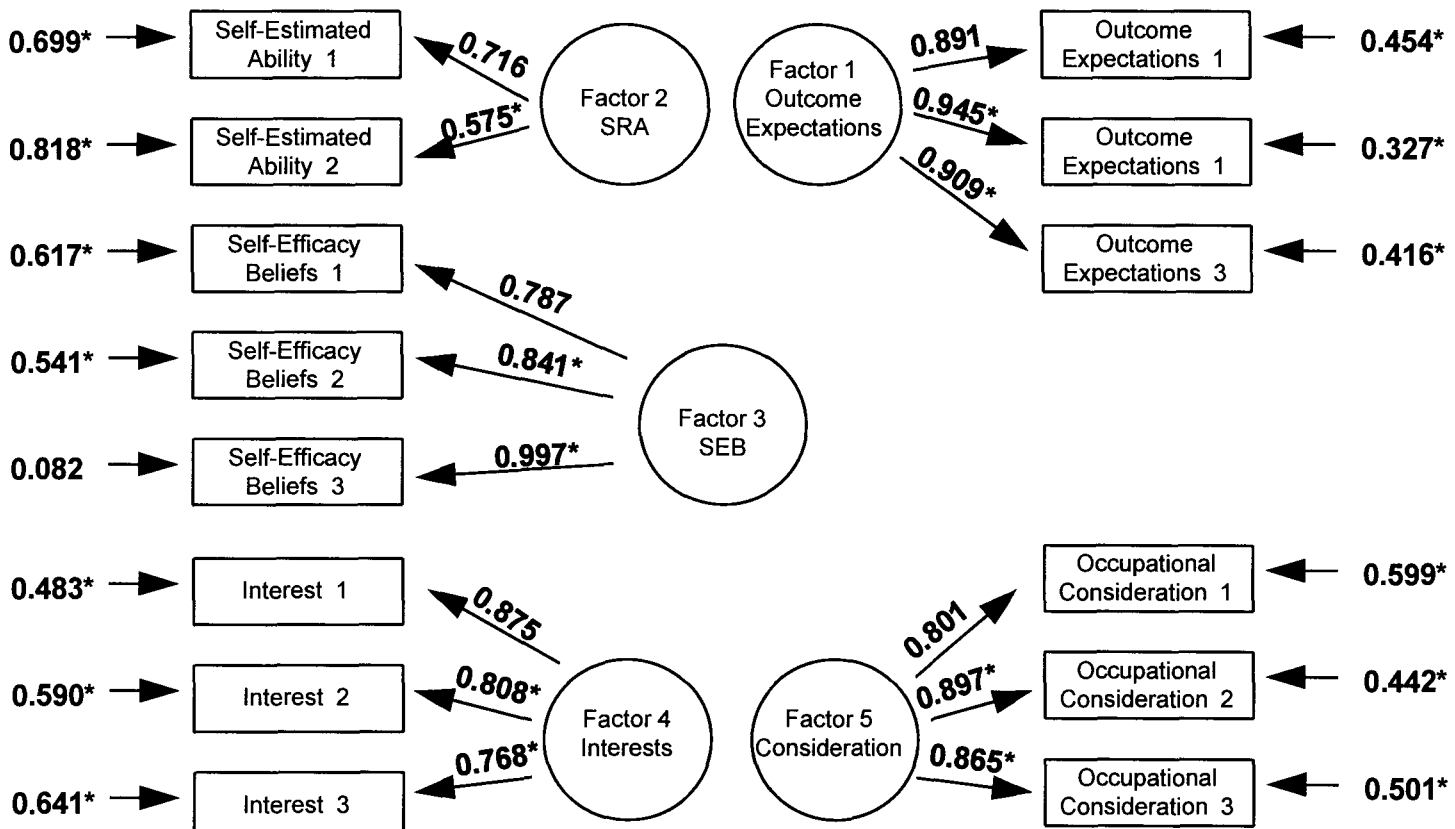


Figure 22. Five Factor Confirmatory Analysis Results: Artistic Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

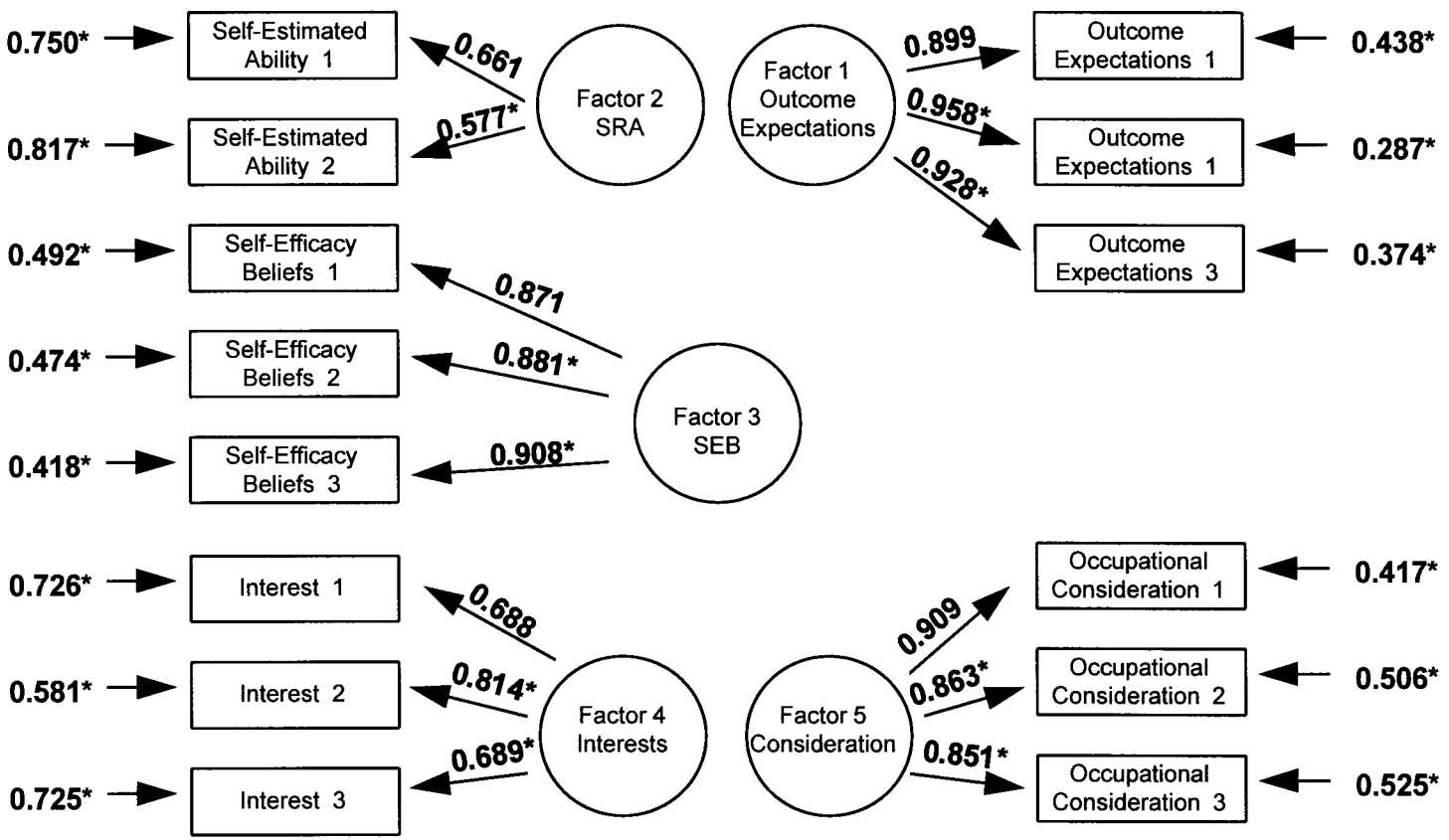


Figure 23. Five Factor Confirmatory Analysis Results: Social Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

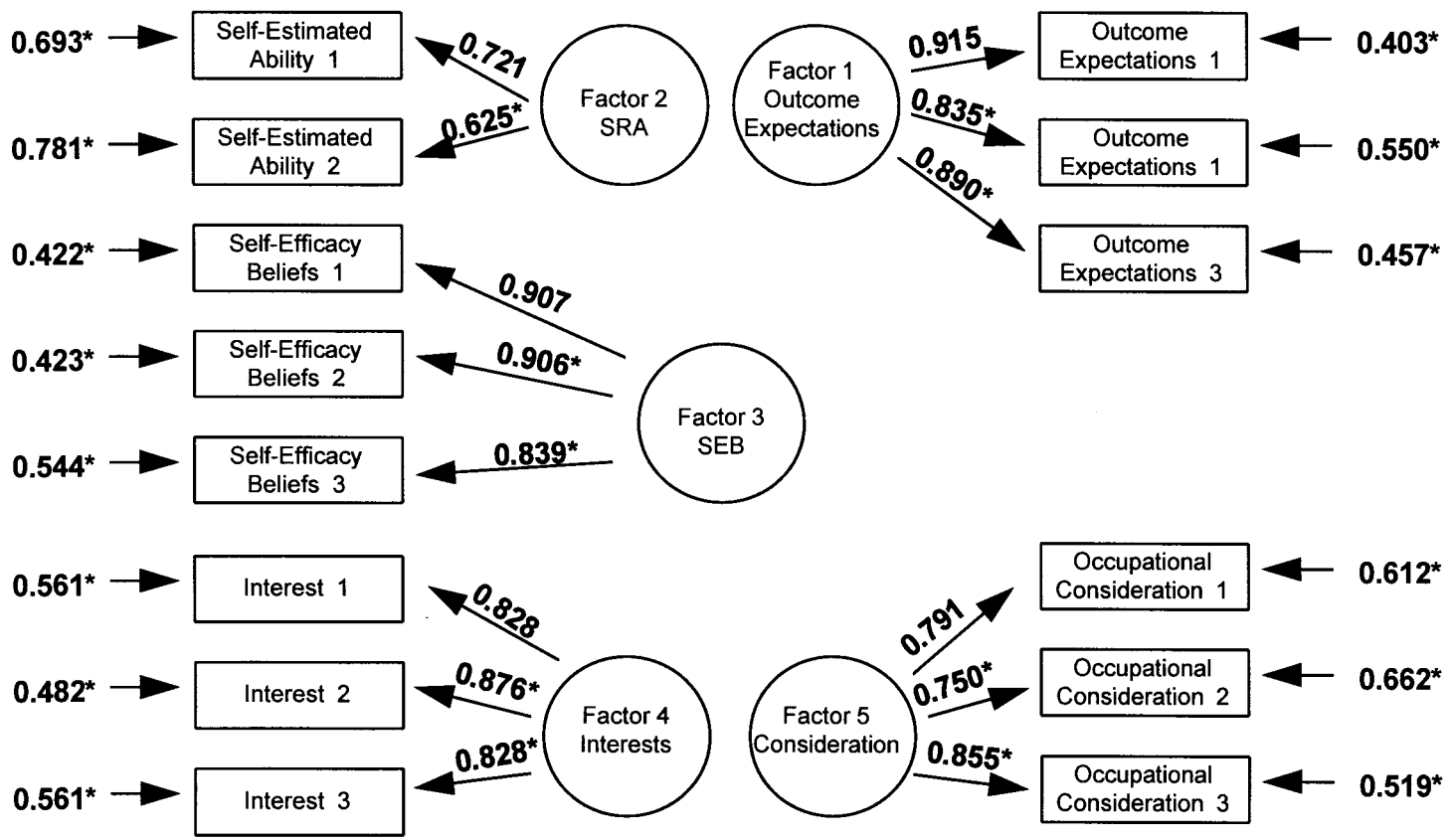


Figure 24. Five Factor Confirmatory Analysis Results: Enterprising Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

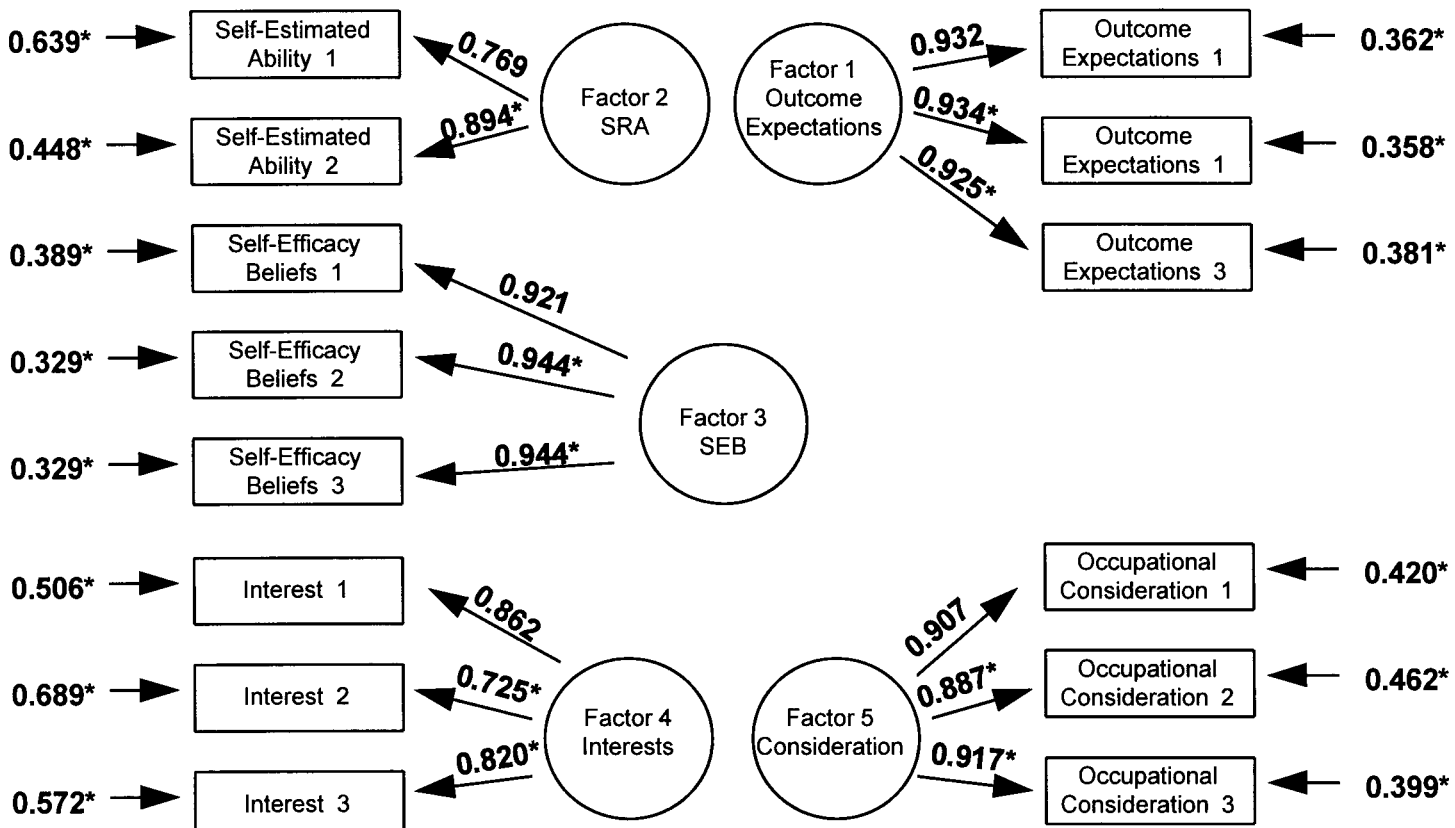


Figure 25. Five Factor Confirmatory Analysis Results: Conventional Dimension. **NOTE:** estimated covariance among latent variables is not represented in this figure but was calculated

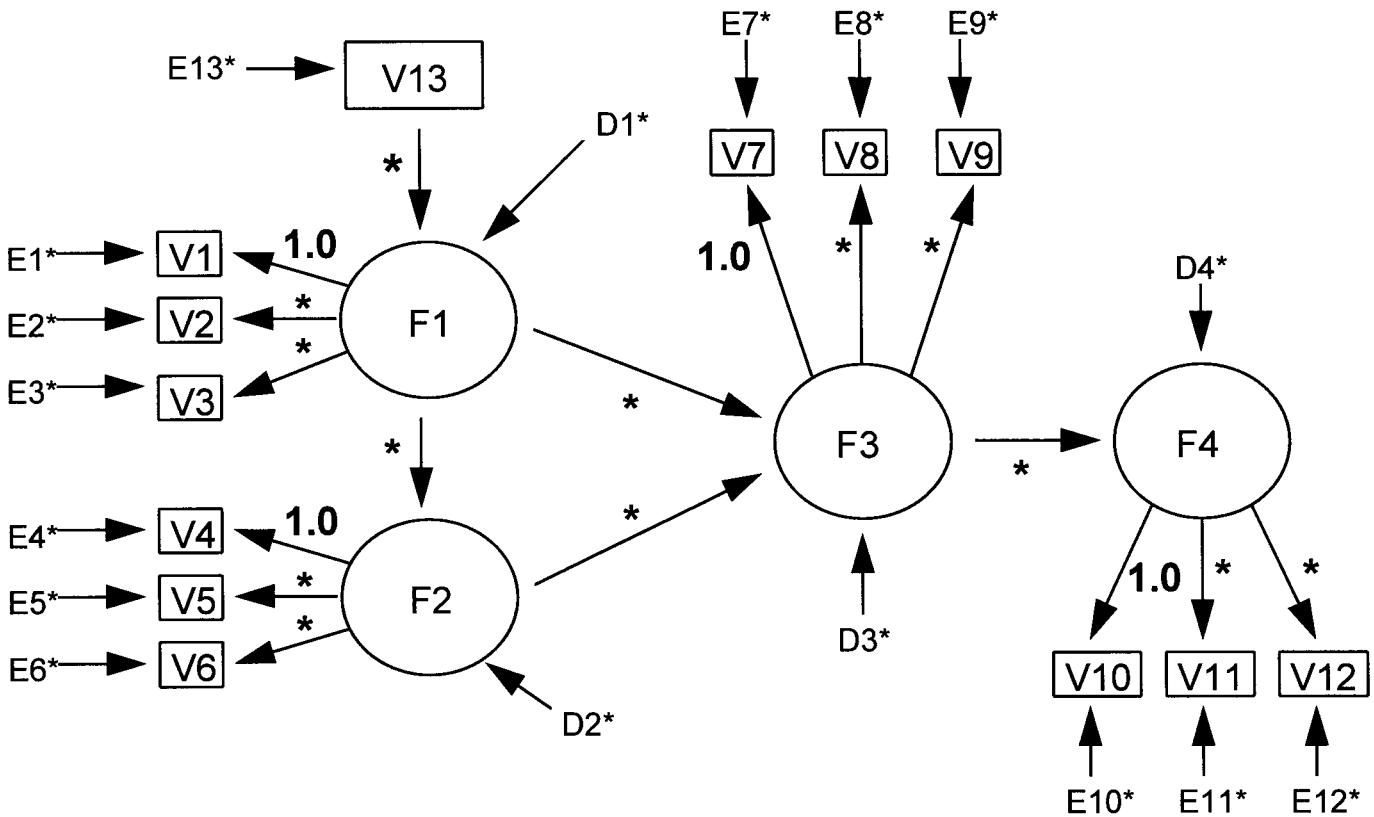


Figure 26. Statistical Representation of Covariance Structural Model 1

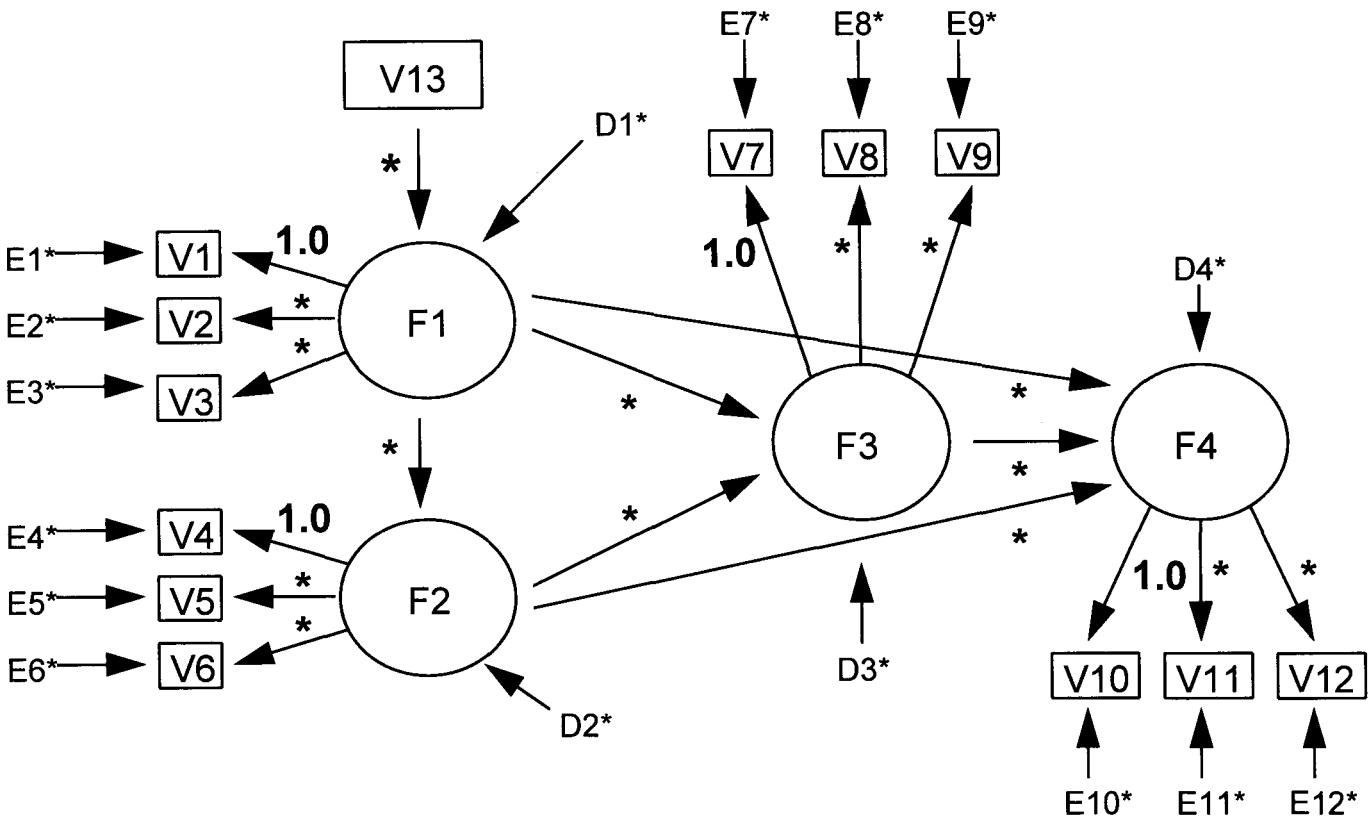


Figure 27. Statistical Representation of Covariance Structural Model 2

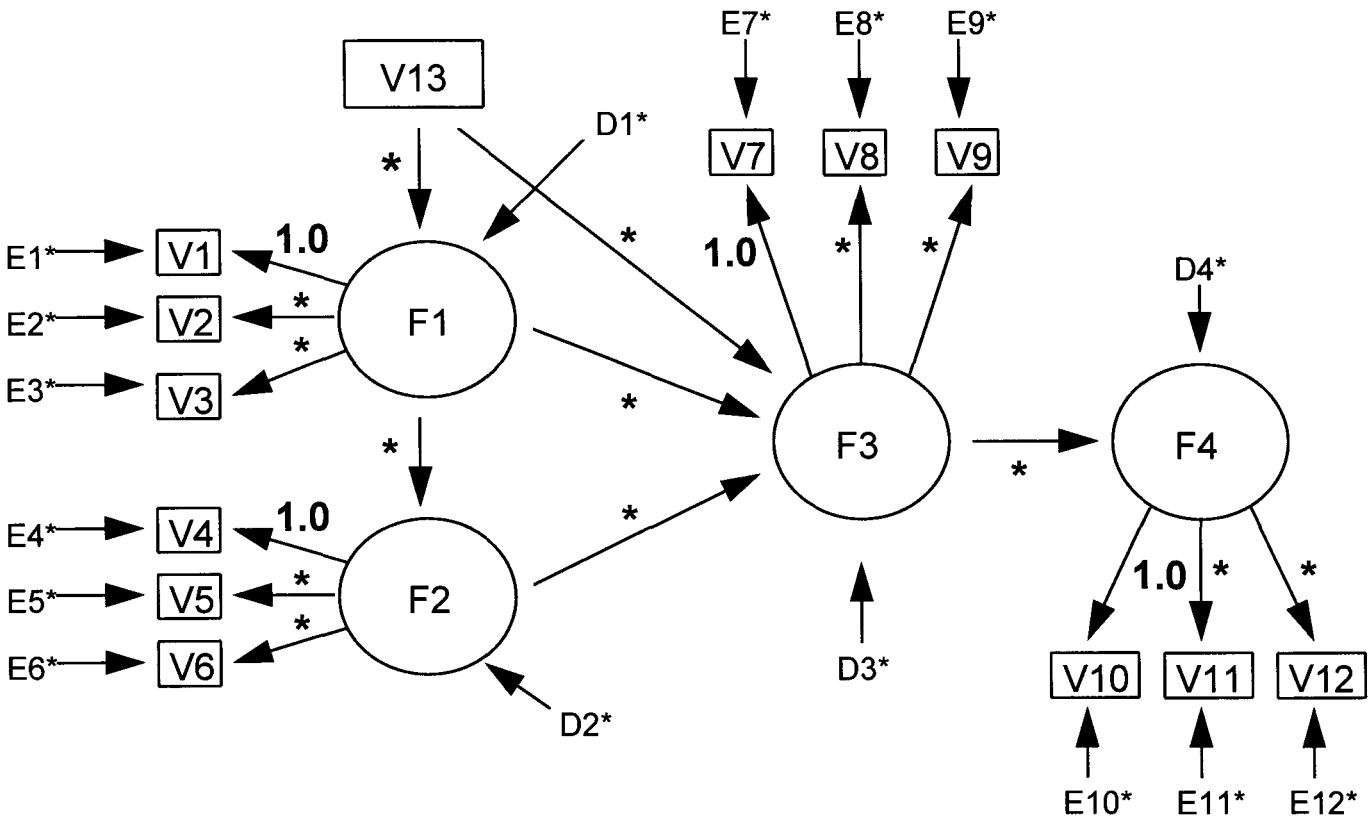


Figure 28. Statistical Representation of Covariance Structural Model 3

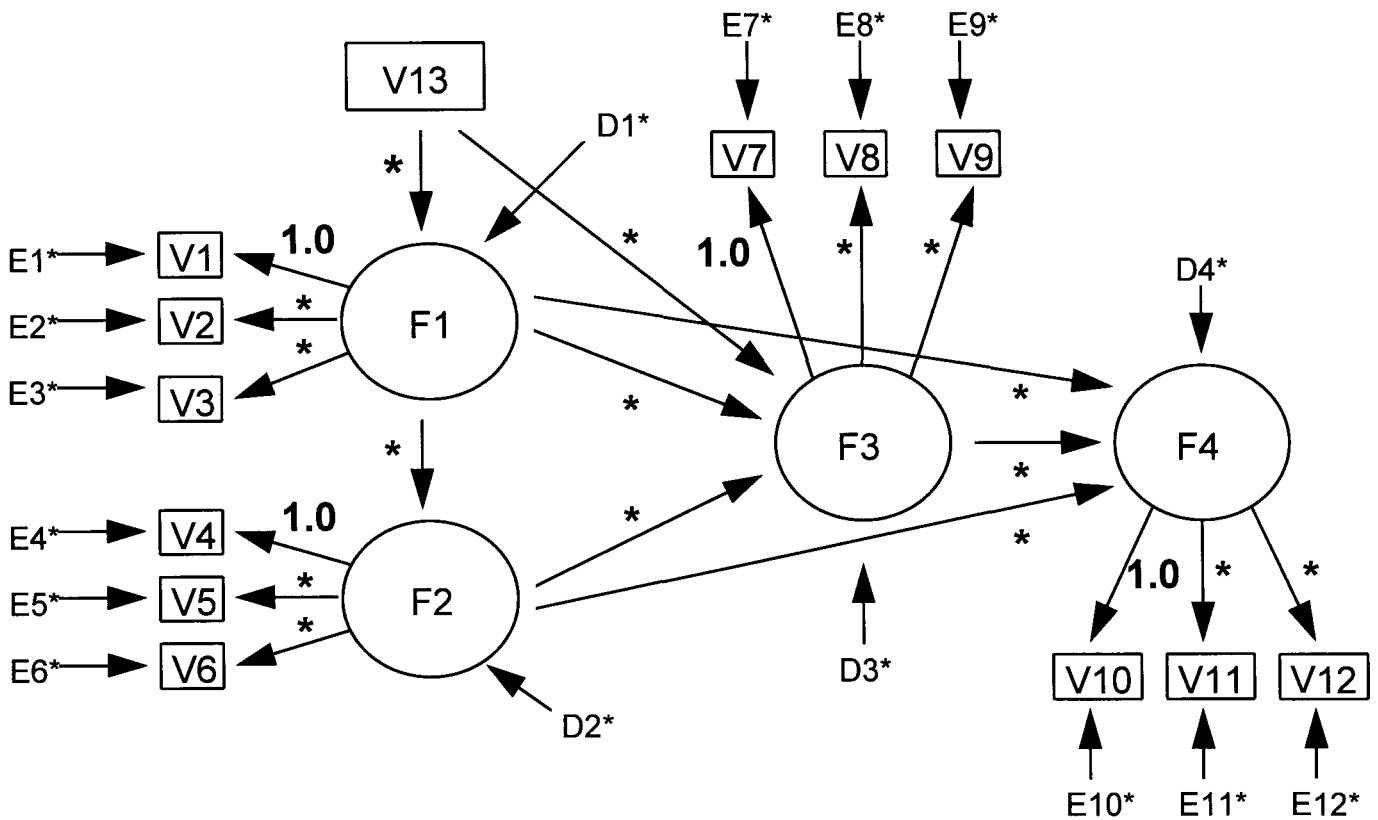


Figure 29. Statistical Representation of Covariance Structural Model 4

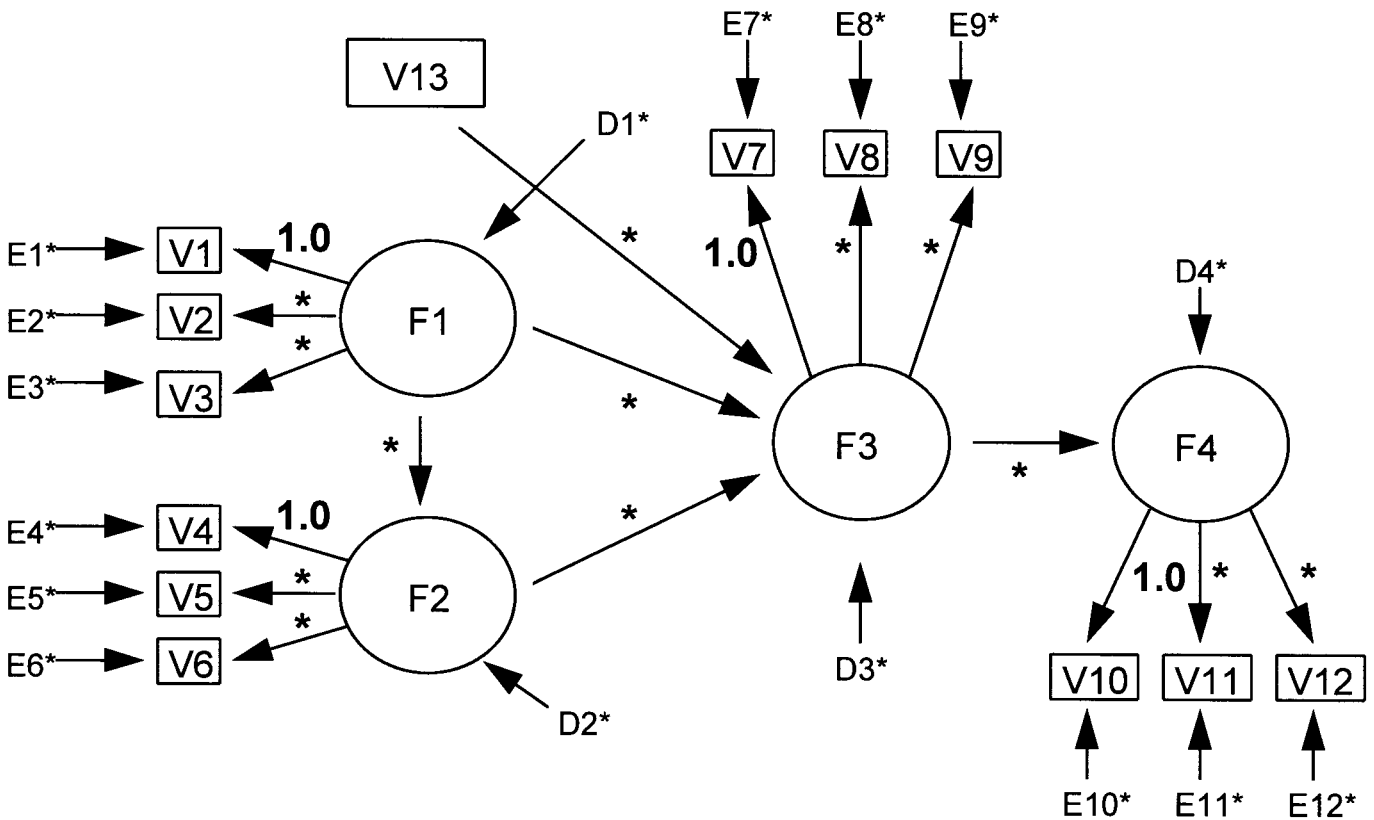


Figure 30. Statistical Representation of Covariance Structural Model 5

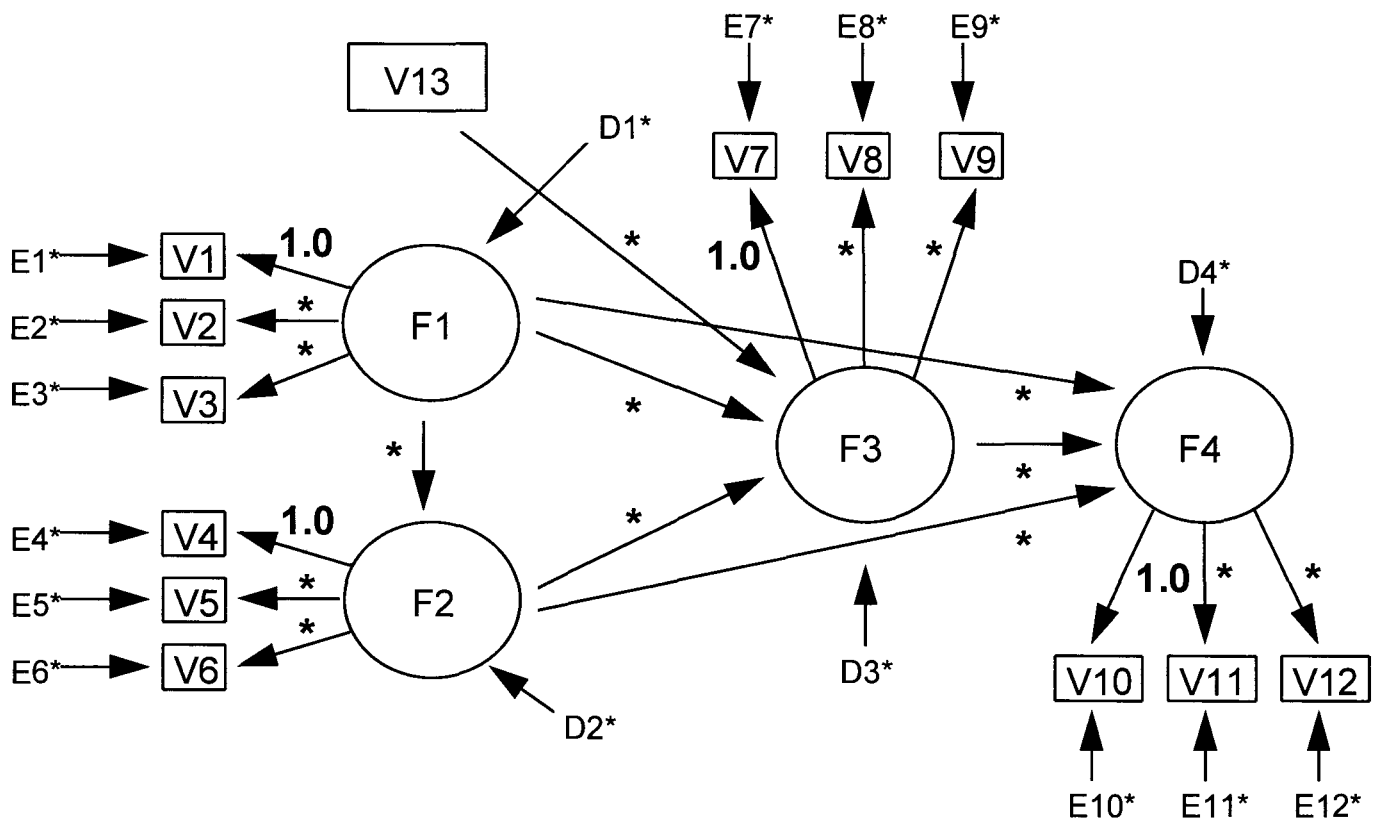


Figure 31. Statistical Representation of Covariance Structural Model 6

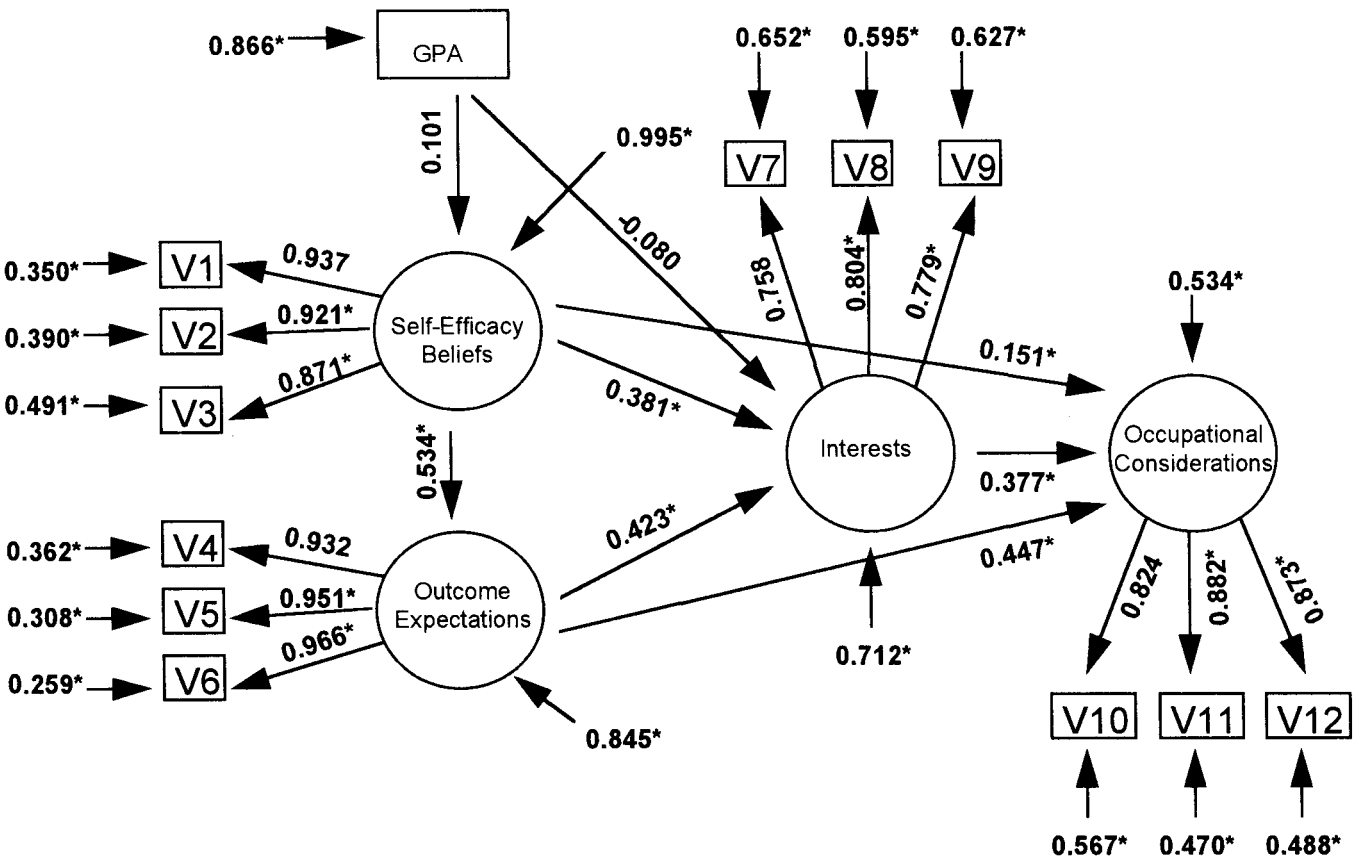


Figure 32. Model 2 Statistical Results: A Representative Example

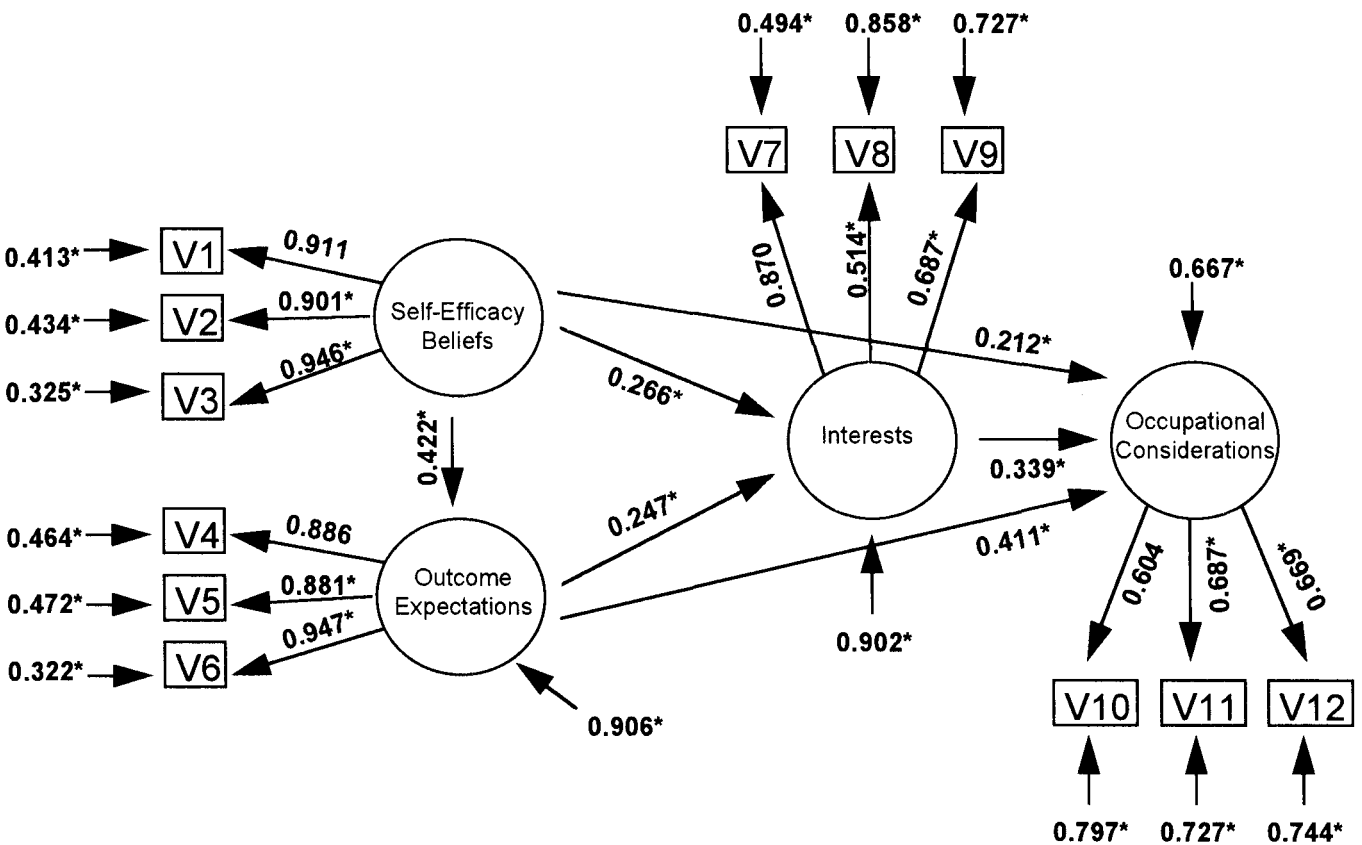


Figure 33. Model 2 Statistical Results: Realistic Dimension

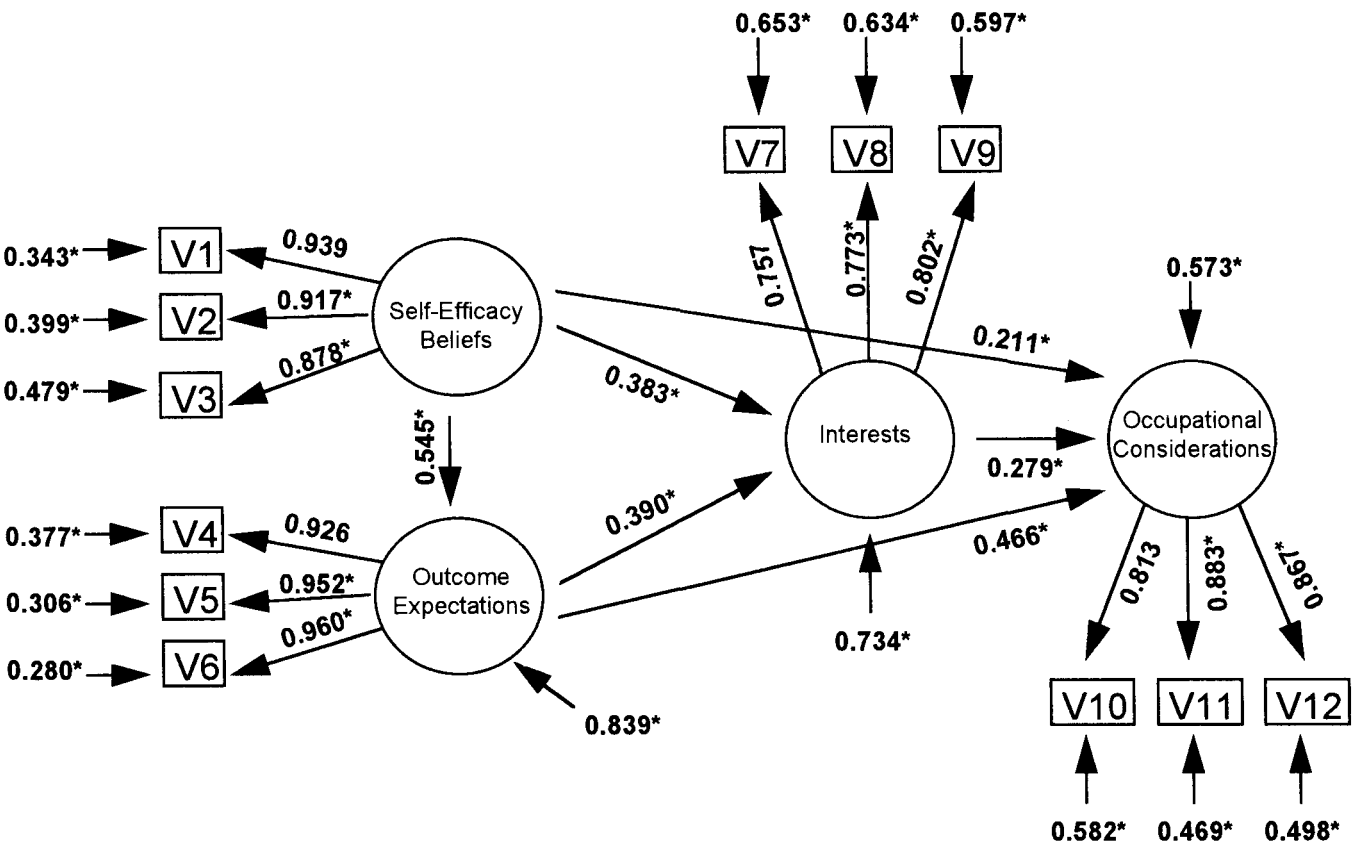


Figure 34. Model 2 Statistical Results: Investigative Dimension

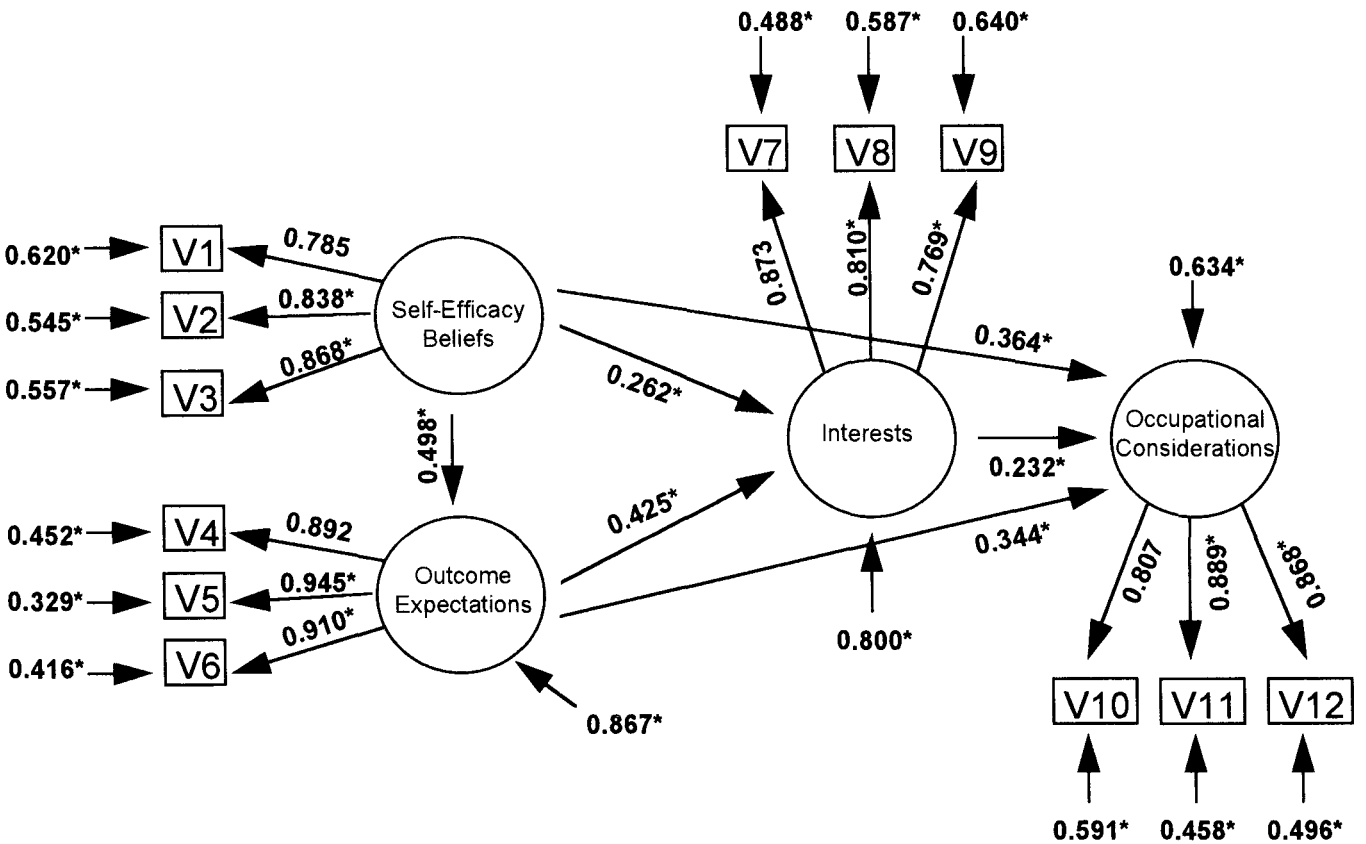


Figure 35. Model 2 Statistical Results: Artistic Dimension

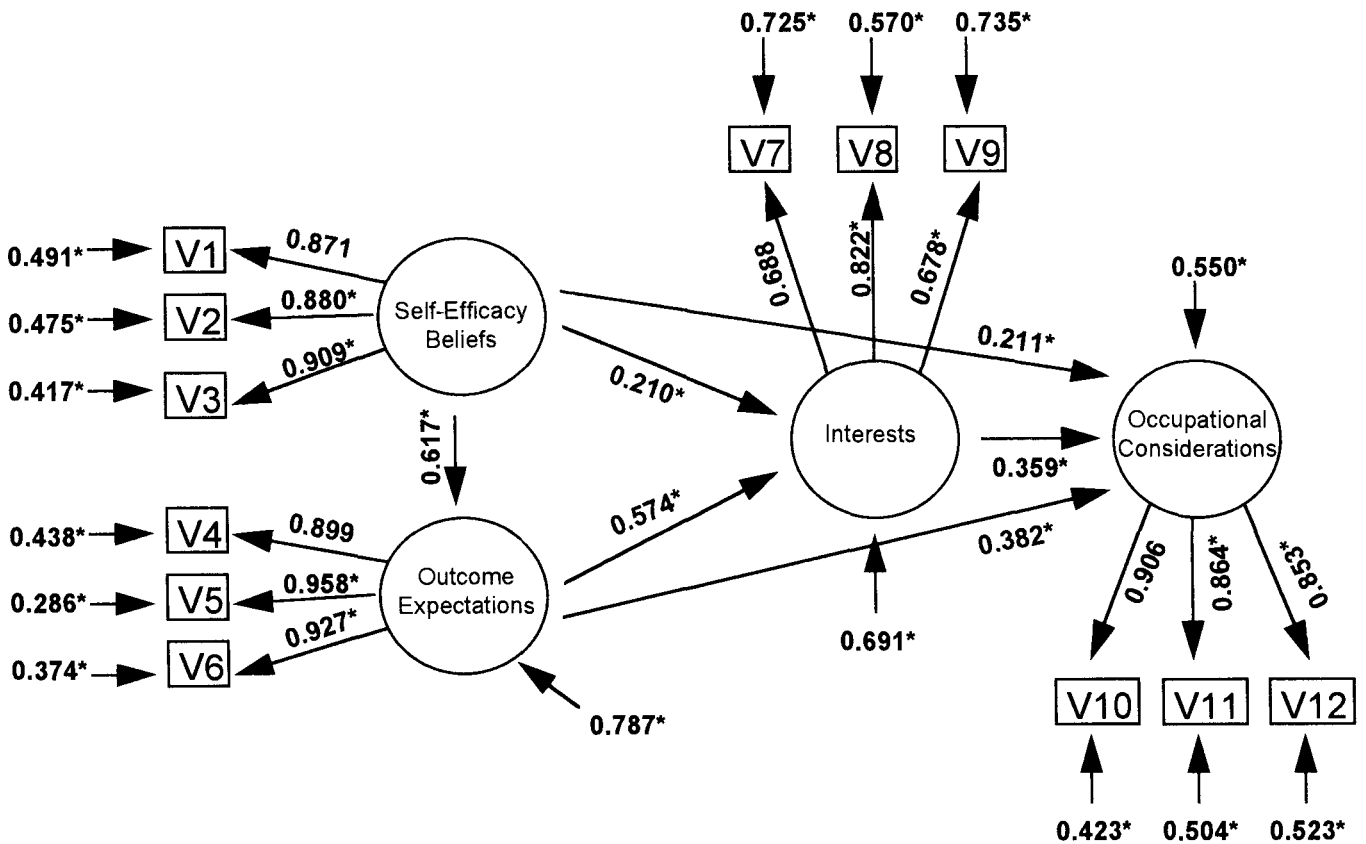


Figure 36. Model 2 Statistical Results: Social Dimension

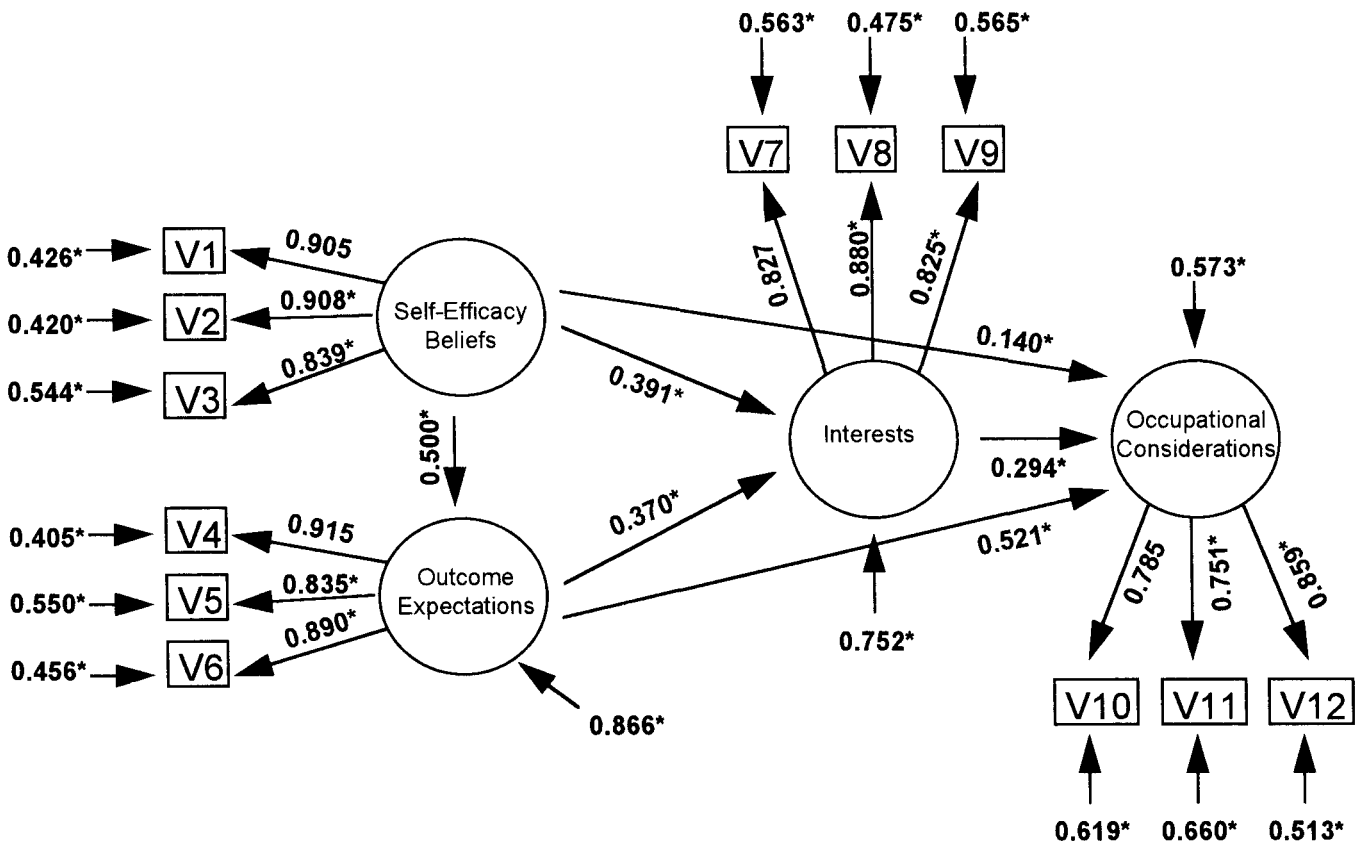


Figure 37. Model 2 Statistical Results: Enterprising Dimension

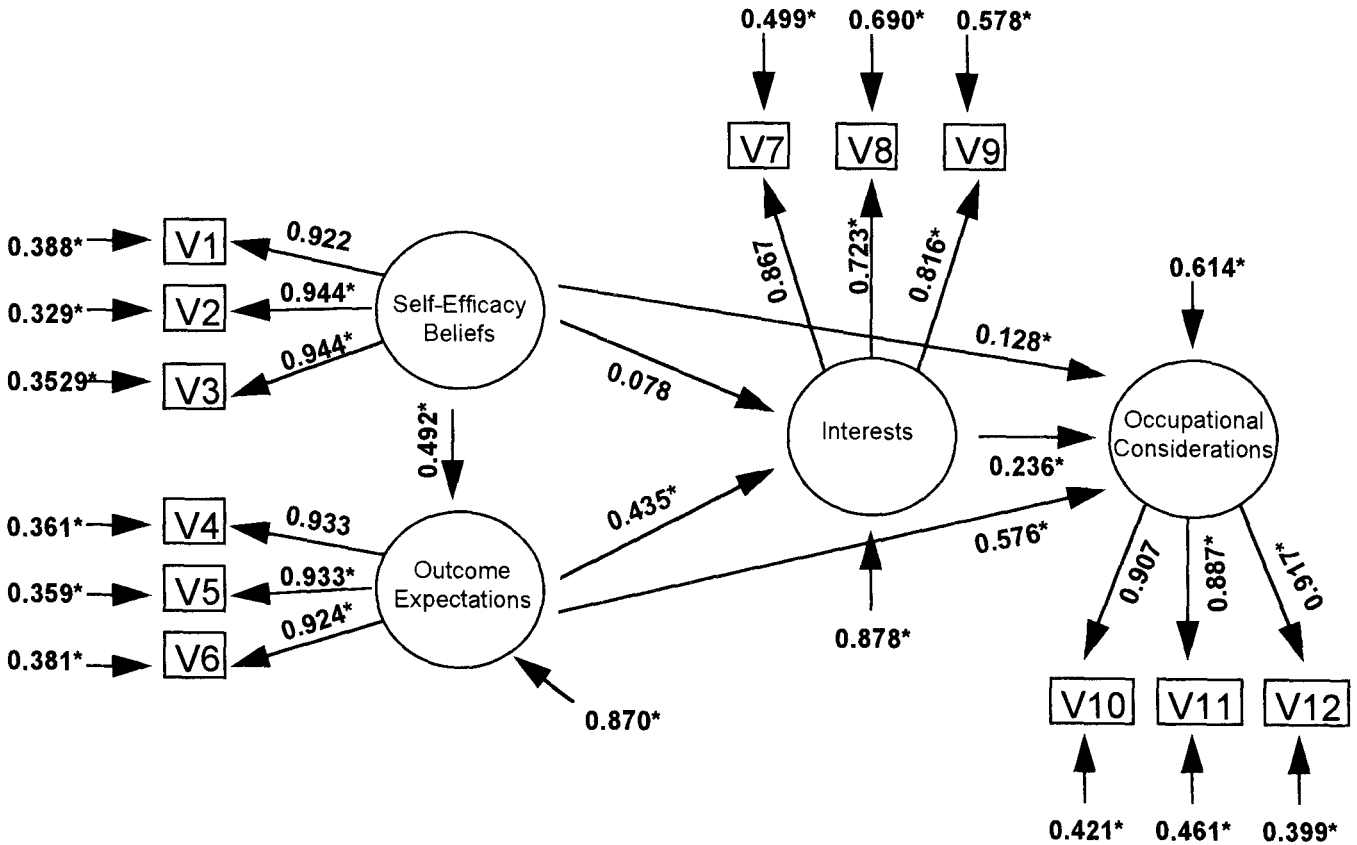


Figure 38. Model 2 Statistical Results: Conventional Dimension

APPENDIX 2

TABLES

TABLE 1

DESCRIPTIVE STATISTICS FOR THE MIDWEST SAMPLE

Sample Size	N=	257
Age	Mean =	18.95
	SD =	3.47
	Range =	18 - 52
Gender	Male =	81
	Female =	176
Ethnicity	African American	15
	Asian Indian	20
	Asian/Pacific Islander	29
	Caucasian	167
	Hispanic	18
	Native American	2
	Other	6
Year in School	Freshman	192
	Sophomore	45
	Junior	14
	Senior	5
	Graduate/Professional	0
	Other	1
Marital Status	Never Married	252
	Separated	0
	Divorced	0
	Widowed	0
	Married	5

TABLE 2

DESCRIPTIVE STATISTICS FOR THE WESTERN SAMPLE BY CLASS

		Learning Skills	Career and Life Planning
Sample Size	N=	66	80
Age	Mean =	20.3	23.1
	SD =	4.53	5.43
	Range =	18 - 44	17 - 43
Gender	Male =	37	35
	Female =	29	45
Ethnicity	African American	1	0
	Asian Indian	0	0
	Asian/Pacific Islander	3	0
	Caucasian	60	76
	Hispanic	1	3
	Native American	0	0
	Other	1	1
Year in School	Freshman	53	21
	Sophomore	6	26
	Junior	7	25
	Senior	0	8
	Graduate/Professional	0	0
	Other	0	0
Marital Status	Never Married	62	60
	Separated	0	0
	Divorced	0	5
	Widowed	0	0
	Married	4	15

TABLE 3

DESCRIPTIVE STATISTICS FOR THE TOTAL SAMPLE

Sample Size	N=	403
Age	Mean =	20
	SD =	4.4
	Range =	17 - 52
Gender	Male =	153
	Female =	250
Ethnicity	African American	16
	Asian Indian	20
	Asian/Pacific Islander	32
	Caucasian	303
	Hispanic	22
	Native American	2
	Other	8
Year in School	Freshman	266
	Sophomore	77
	Junior	46
	Senior	13
	Graduate/Professional	0
	Other	1
Marital Status	Never Married	374
	Separated	0
	Divorced	5
	Widowed	0
	Married	24

TABLE 4

INTERNAL CONSISTENCY RELIABILITY ESTIMATES FOR ALL SCALES BY HOLLAND CODE

Scale	Holland Code R	I	A	S	E	C
Outcome Expectations	0.92	0.95	0.94	0.94	0.93	0.96
Occupational Considerations	0.77	0.89	0.88	0.88	0.85	0.92
Self-Efficacy Beliefs	0.94	0.94	0.91	0.93	0.92	0.95
Strong Interest Inventory	0.79	0.88	0.91	0.85	0.91	0.85
Self-Estimated Ability	0.75	0.66	0.58	0.52	0.61	0.81

TABLE 5

DESCRIPTIVE STATISTICS FOR THE OBJECTIVE ABILITIY MEASURES

Objective Ability Measure	Mean	Standard Deviation	Minimum	Maximum	N
Total GPA	2.98	1.47			
Realistic GPA	3.13	0.95	1.0	4.0	29
Investigative GPA	2.78	0.94	0.0	4.0	303
Artisitc GPA	3.04	0.73	0.0	4.0	346
Social GPA	3.00	0.86	0.0	4.0	387
Enterprising GPA	3.17	0.75	0.43	4.0	54
Conventional GPA	2.65	1.19	0.0	4.0	12

TABLE 6

DESCRIPTIVE STATISTICS FOR THE SELF-EFFICACY BELIEFS MEASURES

Holland Code and Composite Item #	Mean	Standard Deviation	Minimum	Maximum	N
Realistic					
Composite 1	2.29	2.44	0.0	9.0	403
Composite 2	2.34	2.5	0.0	9.0	403
Composite 3	2.28	2.49	0.0	9.0	403
Investigative					
Composite 1	2.83	2.51	0.0	9.0	403
Composite 2	2.71	2.48	0.0	9.0	403
Composite 3	2.49	2.46	0.0	9.0	403
Artisitc					
Composite 1	1.42	1.98	0.0	9.0	403
Composite 2	2.66	2.34	0.0	9.0	403
Composite 3	1.87	2.02	0.0	9.0	403
Social					
Composite 1	3.98	2.74	0.0	9.0	403
Composite 2	4.02	2.69	0.0	9.0	403
Composite 3	3.37	2.64	0.0	9.0	403
Enterprising					
Composite 1	3.32	2.87	0.0	9.0	403
Composite 2	2.62	2.63	0.0	9.0	403
Composite 3	3.21	2.7	0.0	9.0	403
Conventional					
Composite 1	2.31	2.36	0.0	9.0	403
Composite 2	2.21	2.49	0.0	9.0	403
Composite 3	2.21	2.51	0.0	9.0	403

TABLE 7

DESCRIPTIVE STATISTICS FOR THE SELF-RATED ABILITY MEASURE

Holland Code and Item #	Mean	Standard Deviation	Minimum	Maximum	N
Realistic					
Item 1	4.02	1.59	1.0	7.0	403
Item 2	5.00	1.40	1.0	7.0	403
Investigative					
Item 1	4.47	1.63	1.0	7.0	403
Item 2	5.00	1.40	1.0	7.0	403
Artistic					
Item 1	4.09	1.80	1.0	7.0	403
Item 2	3.70	1.88	1.0	7.0	403
Social					
Item 1	5.32	1.40	1.0	7.0	403
Item 2	6.29	0.95	1.0	7.0	403
Enterprising					
Item 1	4.41	1.75	1.0	7.0	403
Item 2	5.27	1.36	1.0	7.0	403
Conventional					
Item 1	4.56	1.54	1.0	7.0	403
Item 2	4.93	1.46	1.0	7.0	403

TABLE 8

DESCRIPTIVE STATISTICS FOR THE INTEREST MEASURE

Holland Code and Composite Item #	Mean	Standard Deviation	Minimum	Maximum	N
Realistic					
Composite 1	0.16	0.25	0.0	1.0	403
Composite 2	0.06	0.17	0.0	1.0	403
Composite 3	0.18	0.23	0.0	1.0	403
Investigative					
Composite 1	0.18	0.21	0.0	1.0	403
Composite 2	0.28	0.23	0.0	0.83	403
Composite 3	0.21	0.21	0.0	0.83	403
Artisitc					
Composite 1	0.37	0.29	0.0	1.0	403
Composite 2	0.37	0.28	0.0	1.0	403
Composite 3	0.37	0.28	0.0	1.0	403
Social					
Composite 1	0.30	0.27	0.0	1.0	403
Composite 2	0.28	0.25	0.0	1.0	403
Composite 3	0.31	0.28	0.0	1.0	403
Enterprising					
Composite 1	0.24	0.21	0.0	0.89	403
Composite 2	0.23	0.20	0.0	1.0	403
Composite 3	0.28	0.25	0.0	1.0	403
Conventional					
Composite 1	0.12	0.23	0.0	1.0	403
Composite 2	0.12	0.20	0.0	1.0	403
Composite 3	0.11	0.21	0.0	1.0	403

TABLE 9

DESCRIPTIVE STATISTICS FOR THE OUTCOME EXPECTATION MEASURE

Holland Code and Composite Item #	Mean	Standard Deviation	Minimum	Maximum	N
Realistic					
Composite 1	2.38	1.44	1.0	9.0	403
Composite 2	2.09	1.27	1.0	9.0	403
Composite 3	2.14	1.37	1.0	8.6	403
Investigative					
Composite 1	3.35	1.94	1.0	9.0	403
Composite 2	3.42	2.02	1.0	9.0	403
Composite 3	3.27	1.90	1.0	8.8	403
Artisitc					
Composite 1	3.69	2.01	1.0	9.0	403
Composite 2	3.33	2.01	1.0	9.0	403
Composite 3	3.47	2.03	1.0	9.0	403
Social					
Composite 1	4.66	2.14	1.0	9.0	403
Composite 2	4.19	1.93	1.0	9.0	403
Composite 3	4.05	2.06	1.0	9.0	403
Enterprising					
Composite 1	3.25	1.93	1.0	8.7	403
Composite 2	3.14	1.87	1.0	9.0	403
Composite 3	3.38	1.84	1.0	8.5	403
Conventional					
Composite 1	2.55	1.74	1.0	8.3	403
Composite 2	2.41	1.68	1.0	8.6	403
Composite 3	2.46	1.74	1.0	8.0	403

TABLE 10

DESCRIPTIVE STATISTICS FOR THE OCCUPATIONAL CONSIDERATIONS MEASURE

Holland Code and Composite Item #	Mean	Standard Deviation	Minimum	Maximum	N
Realistic					
Composite 1	0.34	0.88	0.0	5.7	403
Composite 2	0.39	0.95	0.0	6.3	403
Composite 3	0.96	1.58	0.0	7.5	403
Investigative					
Composite 1	1.27	1.70	0.0	8.0	403
Composite 2	1.71	1.84	0.0	8.2	403
Composite 3	1.42	1.59	0.0	8.0	403
Artisitc					
Composite 1	1.09	1.53	0.0	8.3	403
Composite 2	1.23	1.61	0.0	9.0	403
Composite 3	1.30	1.58	0.0	8.4	403
Social					
Composite 1	2.72	2.19	0.0	8.8	403
Composite 2	2.53	2.25	0.0	9.0	403
Composite 3	1.65	1.87	0.0	8.8	403
Enterprising					
Composite 1	1.18	1.79	0.0	8.0	403
Composite 2	1.20	1.70	0.0	8.0	403
Composite 3	1.42	1.60	0.0	7.8	403
Conventional					
Composite 1	0.76	1.45	0.0	8.3	403
Composite 2	0.79	1.57	0.0	8.3	403
Composite 3	0.70	1.44	0.0	9.0	403

TABLE 11

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: REALISTIC DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 - GPA	1														
2 - Self Rated Abilities (1)	-0.026	1													
3 - Self Rated Abilities (2)	-0.007	0.606	1												
4 - Occupational Considerations (1)	-0.027	0.256	0.209	1											
5 - Occupational Considerations (2)	-0.068	0.336	0.240	0.431	1										
6 - Occupational Considerations (3)	-0.025	0.282	0.237	0.375	0.451	1									
7- Outcome Expectations (1)	-0.004	0.281	0.188	0.322	0.300	0.427	1								
8 - Outcome Expectations (2)	-0.021	0.222	0.158	0.364	0.323	0.317	0.782	1							
9 - Outcome Expectations (3)	-0.018	0.305	0.213	0.346	0.428	0.378	0.839	0.837	1						
10 - Self-Efficacy Beliefs (1)	0.047	0.282	0.290	0.293	0.277	0.241	0.353	0.347	0.367	1					
11 - Self-Efficacy Beliefs (2)	0.029	0.302	0.260	0.300	0.308	0.359	0.406	0.350	0.390	0.822	1				
12 - Self-Efficacy Beliefs (3)	0.032	0.283	0.308	0.279	0.333	0.365	0.370	0.319	0.381	0.863	0.849	1			
13 - Interests (1)	0.036	0.329	0.213	0.248	0.337	0.369	0.248	0.192	0.312	0.269	0.312	0.285	1		
14 - Interests (2)	-0.049	0.253	0.166	0.476	0.384	0.210	0.247	0.223	0.244	0.241	0.232	0.225	0.446	1	
15 - Interests (3)	0.039	0.236	0.193	0.166	0.201	0.331	0.342	0.248	0.314	0.235	0.297	0.265	0.605	0.275	1
Mean	2.92	4.04	5.00	0.33	0.39	0.96	2.38	2.09	2.14	2.31	2.37	2.29	0.16	0.06	0.18
Standard Deviation	0.72	1.57	1.40	0.88	0.95	1.57	1.44	1.26	1.37	2.45	2.51	2.51	0.25	0.17	0.22
Skewness	-1.01	-0.19	-0.44	3.18	2.94	1.86	1.32	1.51	1.55	1.11	1.01	1.03	1.45	3.20	1.10
Kurtosis	1.57	-0.57	-0.28	10.62	9.47	3.22	1.94	2.94	2.68	0.44	0.01	0.03	1.38	11.36	0.35

TABLE 12

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: INVESTIGATIVE DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 - GPA	1															
2 - Investigative GPA	0.846	1														
3 - Self Rated Abilities (1)	0.206	0.170	1													
4 - Self Rated Abilities (2)	0.196	0.264	0.448	1												
5 - Occupational Considerations (1)	0.021	-0.026	0.441	0.252	1											
6 - Occupational Considerations (2)	0.088	0.046	0.449	0.166	0.714	1										
7 - Occupational Considerations (3)	0.026	-0.015	0.423	0.129	0.727	0.774	1									
8- Outcome Expectations (1)	0.094	0.106	0.421	0.209	0.590	0.619	0.636	1								
9 - Outcome Expectations (2)	0.104	0.102	0.403	0.204	0.616	0.671	0.655	0.879	1							
10 - Outcome Expectations (3)	0.170	0.112	0.388	0.188	0.574	0.624	0.637	0.905	0.920	1						
11 - Self-Efficacy Beliefs (1)	0.214	0.109	0.522	0.184	0.492	0.505	0.456	0.489	0.490	0.461	1					
12 - Self-Efficacy Beliefs (2)	0.175	0.102	0.545	0.259	0.534	0.559	0.463	0.499	0.491	0.457	0.861	1				
13 - Self-Efficacy Beliefs (3)	0.118	0.036	0.395	0.158	0.425	0.445	0.468	0.427	0.458	0.413	0.825	0.764	1			
14 - Interests (1)	0.061	0.033	0.372	0.201	0.538	0.477	0.525	0.457	0.490	0.475	0.353	0.430	0.411	1		
15 - Interests (2)	0.030	-0.027	0.422	0.115	0.492	0.535	0.473	0.465	0.466	0.441	0.434	0.512	0.409	0.605	1	
16 - Interests (3)	0.083	0.039	0.453	0.171	0.449	0.561	0.451	0.484	0.458	0.441	0.426	0.476	0.384	0.584	0.634	1
Mean	2.90	2.78	4.70	4.81	1.41	1.79	1.52	3.53	3.55	3.38	3.08	2.92	2.71	0.18	0.28	0.21
Standard Deviation	0.70	0.93	1.57	1.58	1.82	1.89	1.63	1.98	2.08	1.93	2.59	2.52	2.53	0.21	0.23	0.21
Skewness	-1.02	-0.85	-0.37	-0.53	1.34	1.09	1.23	0.51	0.55	0.63	0.40	0.54	0.66	1.33	0.43	0.75
Kurtosis	1.87	0.65	-0.72	-0.42	1.05	0.52	1.19	-0.56	-0.72	-0.53	-0.93	-0.87	-0.67	1.47	-0.79	-0.12

TABLE 13

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: ARTISTIC DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 - GPA	1															
2 - Investigative GPA	0.762	1														
3 - Self Rated Abilities (1)	-0.017	-0.022	1													
4 - Self Rated Abilities (2)	-0.075	-0.063	0.41	1												
5 - Occupational Considerations (1)	-0.108	-0.036	0.419	0.211	1											
6 - Occupational Considerations (2)	-0.094	0.002	0.466	0.469	0.726	1										
7 - Occupational Considerations (3)	-0.129	-0.013	0.369	0.362	0.704	0.800	1									
8- Outcome Expectations (1)	-0.040	0.002	0.258	0.221	0.576	0.462	0.484	1								
9 - Outcome Expectations (2)	-0.008	0.030	0.355	0.285	0.554	0.538	0.478	0.842	1							
10 - Outcome Expectations (3)	-0.038	0.012	0.248	0.379	0.461	0.554	0.551	0.810	0.868	1						
11 - Self-Efficacy Beliefs (1)	-0.025	-0.038	0.477	0.382	0.437	0.466	0.367	0.298	0.398	0.293	1					
12 - Self-Efficacy Beliefs (2)	-0.119	-0.025	0.384	0.421	0.495	0.549	0.605	0.433	0.409	0.474	0.622	1				
13 - Self-Efficacy Beliefs (3)	-0.055	-0.016	0.481	0.393	0.550	0.579	0.539	0.409	0.466	0.442	0.792	0.842	1			
14 - Interests (1)	-0.017	0.010	0.434	0.179	0.481	0.455	0.392	0.383	0.420	0.326	0.335	0.320	0.387	1		
15 - Interests (2)	0.027	0.054	0.392	0.271	0.518	0.481	0.420	0.479	0.528	0.490	0.331	0.394	0.442	0.695	1	
16 - Interests (3)	0.026	0.036	0.298	0.193	0.335	0.334	0.307	0.291	0.339	0.322	0.243	0.236	0.306	0.713	0.6	1
Mean	2.93	3.04	4.13	3.72	1.07	1.24	1.29	3.70	3.35	3.49	1.46	2.71	1.90	0.38	0.38	0.38
Standard Deviation	0.69	0.73	1.79	1.90	1.47	1.63	1.57	2.01	1.99	2.02	1.99	2.34	2.02	0.29	0.28	0.28
Skewness	-0.97	-1.05	-0.021	0.17	1.84	1.64	1.77	0.55	0.66	0.66	1.56	0.76	1.18	0.44	0.39	0.28
Kurtosis	1.73	1.91	-1.06	-1.10	4.01	2.55	3.62	-0.53	-0.39	-0.33	2.00	-0.26	0.91	-0.84	-0.82	-0.88

TABLE 14

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: SOCIAL DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 - GPA	1															
2 - Social GPA	0.832	1														
3 - Self Rated Abilities (1)	0.002	0.007	1													
4 - Self Rated Abilities (2)	-0.004	-0.054	0.385	1												
5 - Occupational Considerations (1)	-0.031	-0.041	0.407	0.359	1											
6 - Occupational Considerations (2)	0.021	0.010	0.320	0.343	0.799	1										
7 - Occupational Considerations (3)	0.062	0.057	0.326	0.309	0.772	0.733	1									
8- Outcome Expectations (1)	0.071	0.042	0.239	0.325	0.631	0.611	0.597	1								
9 - Outcome Expectations (2)	0.094	0.088	0.312	0.288	0.635	0.651	0.655	0.861	1							
10 - Outcome Expectations (3)	0.083	0.076	0.298	0.240	0.606	0.611	0.622	0.825	0.888	1						
11 - Self-Efficacy Beliefs (1)	0.079	0.050	0.263	0.348	0.540	0.582	0.452	0.575	0.547	0.495	1					
12 - Self-Efficacy Beliefs (2)	0.054	0.085	0.390	0.278	0.52	0.604	0.488	0.428	0.539	0.522	0.744	1				
13 - Self-Efficacy Beliefs (3)	0.138	0.155	0.317	0.258	0.443	0.470	0.525	0.452	0.513	0.468	0.792	0.804	1			
14 - Interests (1)	-0.003	0.033	0.250	0.245	0.423	0.381	0.459	0.440	0.412	0.455	0.330	0.397	0.359	1		
15 - Interests (2)	0.019	0.015	0.322	0.292	0.600	0.522	0.568	0.538	0.557	0.551	0.441	0.435	0.409	0.546	1	
16 - Interests (3)	0.044	0.102	0.383	0.229	0.453	0.367	0.378	0.365	0.415	0.466	0.216	0.376	0.266	0.531	0.538	1
Mean	2.92	2.98	5.30	6.28	2.74	2.50	1.66	4.68	4.19	4.04	4.01	4.01	3.37	0.30	0.28	0.31
Standard Deviation	0.72	0.85	1.40	0.92	2.18	2.25	1.87	2.13	1.94	2.03	2.72	2.66	2.63	0.27	0.25	0.27
Skewness	-1.02	-0.92	-0.72	-1.66	0.56	0.77	1.41	-0.01	0.30	0.36	0.09	0.15	0.47	0.53	0.64	0.67
Kurtosis	1.60	0.85	-0.19	3.86	-0.61	-0.36	1.67	-0.91	-0.69	-0.75	-1.17	-1.06	-0.86	-0.71	-0.48	-0.38

TABLE 15

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: ENTERPRISING DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 - GPA	1														
2 - Self Rated Abilities (1)	-0.068	1													
3 - Self Rated Abilities (2)	-0.055	0.458	1												
4 - Occupational Considerations (1)	-0.137	0.426	0.307	1											
5 - Occupational Considerations (2)	-0.077	0.306	0.204	0.587	1										
6 - Occupational Considerations (3)	-0.094	0.357	0.225	0.661	0.658	1									
7 - Outcome Expectations (1)	-0.006	0.369	0.246	0.546	0.443	0.562	1								
8 - Outcome Expectations (2)	-0.029	0.331	0.208	0.535	0.598	0.520	0.764	1							
9 - Outcome Expectations (3)	0.000	0.318	0.241	0.564	0.426	0.603	0.826	0.730	1						
10 - Self-Efficacy Beliefs (1)	-0.030	0.426	0.298	0.430	0.403	0.364	0.345	0.400	0.334	1					
11 - Self-Efficacy Beliefs (2)	0.043	0.363	0.282	0.388	0.358	0.398	0.377	0.405	0.361	0.836	1				
12 - Self-Efficacy Beliefs (3)	-0.030	0.352	0.630	0.470	0.362	0.501	0.425	0.345	0.479	0.757	0.755	1			
13 - Interests (1)	-0.045	0.385	0.332	0.526	0.446	0.534	0.520	0.454	0.459	0.488	0.439	0.501	1		
14 - Interests (2)	-0.042	0.283	0.352	0.407	0.428	0.493	0.391	0.358	0.427	0.428	0.408	0.514	0.725	1	
15 - Interests (3)	-0.049	0.337	0.384	0.351	0.361	0.501	0.430	0.354	0.453	0.395	0.413	0.491	0.659	0.752	1
Mean	2.92	4.37	5.26	1.17	1.17	1.39	3.23	3.12	3.38	3.29	2.61	3.17	0.23	0.22	0.28
Standard Deviation	0.72	1.73	1.35	1.79	1.68	1.59	1.91	1.85	1.84	2.85	2.62	2.69	0.21	0.21	0.24
Skewness	-1.01	-0.19	-0.70	1.63	1.59	1.27	0.58	0.62	0.40	0.47	0.78	0.46	0.88	1.09	0.72
Kurtosis	1.57	-0.86	-0.08	1.90	2.24	1.32	-0.54	-0.54	-0.79	-0.99	-0.45	-0.92	0.10	1.02	-0.27

TABLE 16

BIVARIATE PEARSON CORRELATIONS AMONG COMPOSITE VARIABLES AND DESCRIPTIVE STATISTICS: CONVENTIONAL DIMENSION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 - GPA	1														
2 - Self Rated Abilities (1)	0.052	1													
3 - Self Rated Abilities (2)	0.025	0.683	1												
4 - Occupational Considerations (1)	-0.075	0.194	0.194	1											
5 - Occupational Considerations (2)	-0.101	0.187	0.238	0.806	1										
6 - Occupational Considerations (3)	-0.088	0.205	0.209	0.817	0.811	1									
7 - Outcome Expectations (1)	-0.055	0.181	0.233	0.626	0.640	0.646	1								
8 - Outcome Expectations (2)	-0.018	0.245	0.264	0.625	0.617	0.629	0.871	1							
9 - Outcome Expectations (3)	-0.025	0.225	0.245	0.622	0.605	0.613	0.866	0.865	1						
10 - Self-Efficacy Beliefs (1)	0.072	0.273	0.316	0.362	0.427	0.391	0.390	0.430	0.382	1					
11 - Self-Efficacy Beliefs (2)	0.047	0.268	0.346	0.406	0.441	0.477	0.462	0.491	0.441	0.863	1				
12 - Self-Efficacy Beliefs (3)	0.040	0.239	0.334	0.305	0.390	0.369	0.369	0.393	0..370	0.874	0.889	1			
13 - Interests (1)	-0.066	0.241	0.203	0.496	0.420	0.542	0.435	0.457	0.382	0.298	0.290	0.229	1		
14 - Interests (2)	0.013	0.202	0.159	0.330	0.223	0.341	0.274	0.313	0.291	0.188	0.195	0.150	0.608	1	
15 - Interests (3)	-0.031	0.255	0.211	0.357	0.256	0.379	0.316	0.325	0.243	0.223	0.187	0.138	0.697	0.657	1
Mean	2.92	4.56	4.96	0.75	0.78	0.71	2.53	2.41	2.47	2.29	2.21	2.21	0.12	0.12	0.11
Standard Deviation	0.72	1.54	1.46	1.42	1.54	1.40	1.73	1.67	1.74	2.34	2.47	2.51	0.23	0.21	0.21
Skewness	-1.01	-0.28	-0.55	2.47	2.52	2.55	1.18	1.39	1.16	0.97	0.98	0.99	1.83	1.78	2.29
Kurtosis	1.57	-0.47	-0.05	6.28	6.54	6.59	0.59	1.34	0.48	0.06	-0.14	-0.12	2.58	3.02	5.19

TABLE 17

RESULTS FROM CONFIRMATORY FACTOR ANALYSIS: SELF-EFFICACY BELIEFS VS. SELF-RATED ABILITIES

	Average Standardized Residual	Iterations	df	Chi Square	NNFI	CFI	Chi Square Change	df
Realistic								
1 Factor	0.059	7	5	153.984	0.773	0.886	150.826*	1
2 Factor	0.007	5	4	6.158*	0.996	0.998	---	
Investigative								
1 Factor	0.059	6	5	113.728	0.836	0.918	85.339*	1
2 Factor	0.025	7	4	28.389	0.954	0.982	---	
Artistic								
1 Factor	0.057	9	5	77.434	0.868	0.934	35.263*	1
2 Factor	0.033	6	4	42.171	0.913	0.965	---	
Social								
1 Factor	0.054	7	5	71.863	0.868	0.934	39.886*	1
2 Factor	0.025	5	4	31.977	0.931	0.972	---	
Enterprising								
1 Factor	0.052	6	5	76.150	0.863	0.932	56.449*	1
2 Factor	0.020	6	4	17.701	0.962	0.985	---	
Conventional								
1 Factor	0.067	6	5	236.478	0.709	0.854	229.684*	1
2 Factor	0.007	5	4	6.794*	0.996	0.998	---	

Note: Asterisks indicates values significant ($p<0.05$)

TABLE 18

RESULTS FROM CONFIRMATORY FACTOR ANALYSIS: SELF-EFFICACY BELIEFS, SELF-RATED ABILITIES, OUTCOME EXPECTATIONS, INTERESTS, AND OCCUPATIONAL CONSIDERATIONS

	Average Standardized Residual	Iterations	df	Chi Sqare	NNFI	CFI	Chi Square Change	df
Realistic								
1 Factor	0.1020	>30	77	1789.72	0.395	0.488	1522.8*	10
3 Factor	0.0653	10	74	564.05	0.820	0.854	297.13*	7
4 Factor	0.0398	10	71	374.34	0.884	0.909	107.42*	4
5 Factor	0.0335	6	67	266.92	0.919	0.940		
Investigative								
1 Factor	0.0886	28	77	1792.49	0.566	0.633	1565.66*	10
3 Factor	0.0520	10	74	536.39	0.878	0.901	309.56*	7
4 Factor	0.0388	10	71	430.42	0.901	0.923	203.59*	4
5 Factor	0.0242	6	67	226.83	0.954	0.966		
Artistic								
1 Factor	0.0865	8	77	1954.81	0.502	0.578	1403.98*	10
3 Factor	0.0645	13	74	953.02	0.757	0.803	402.19*	7
4 Factor	0.0530	13	71	883.20	0.766	0.818	332.37*	4
5 Factor	0.0455	7	67	550.83	0.852	0.891		

Note: Asterisks indicates values significant ($p<0.05$)

TABLE 19

RESULTS FROM CONFIRMATORY FACTOR ANALYSIS: SELF-EFFICACY BELIEFS, SELF-RATED ABILITIES, OUTCOME EXPECTATIONS, INTERESTS, AND OCCUPATIONAL CONSIDERATIONS

	Average Standardized Residual	Iterations	df	Chi Sqare	NNFI	CFI	Chi Square Change	df
Social								
1 Factor	0.0695	15	77	1495.83	0.622	0.680	1070.77*	10
3 Factor	0.0591	8	74	628.36	0.846	0.875	203.30*	7
4 Factor	0.0389	8	71	553.31	0.861	0.891	128.25*	4
5 Factor	0.0304	6	67	425.06	0.89	0.919		
Enterprising								
1 Factor	0.0798	12	77	1541.59	0.561	0.629	1147.34*	10
3 Factor	0.0752	14	74	757.89	0.812	0.827	363.64*	7
4 Factor	0.0556	14	71	666.48	0.806	0.849	272.23*	4
5 Factor	0.0396	6	67	394.25	0.887	0.917		
Conventional								
1 Factor	0.0963	20	77	2400.44	0.444	0.530	2182.88*	10
3 Factor	0.0947	10	74	536.39	0.878	0.901	318.33*	7
4 Factor	0.0435	11	71	585.69	0.866	0.896	368.13*	4
5 Factor	0.0296	6	67	217.56	0.959	0.970		

Note: Asterisks indicates values significant ($p<0.05$)

TABLE 20

PEARSON INTERCORRELATIONS AMONG FACTORS: REALISTIC DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.384	1.0			
Interests	0.396	0.37	1.0		
Occupational Considerations	0.517	0.51	0.564	1.0	
Outcome Expectations	0.331	0.422	0.359	0.622	1.0

TABLE 21

PEARSON INTERCORRELATIONS AMONG FACTORS: INVESTIGATIVE DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.562	1.0			
Interests	0.516	0.596	1.0		
Occupational Considerations	0.494	0.631	0.683	1.0	
Outcome Expectations	0.427	0.545	0.599	0.748	1.0

TABLE 22

PEARSON INTERCORRELATIONS AMONG FACTORS: ARTISTIC DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Efficacy Beliefs	0.649	1.0			
Interests	0.584	0.475	1.0		
Occupational Considerations	0.684	0.648	0.594	1.0	
Outcome Expectations	0.517	0.5	0.555	0.652	1.0

TABLE 23

PEARSON INTERCORRELATIONS AMONG FACTORS: SOCIAL DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.531	1.0			
Interests	0.633	0.564	1.0		
Occupational Considerations	0.629	0.648	0.747	1.0	
Outcome Expectations	0.494	0.617	0.704	0.764	1.0

TABLE 24

PEARSON INTERCORRELATIONS AMONG FACTORS: ENTERPRISING DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.559	1.0			
Interests	0.595	0.578	1.0		
Occupational Considerations	0.573	0.571	0.67	1.0	
Outcome Expectations	0.488	0.5	0.567	0.758	1.0

TABLE 25

PEARSON INTERCORRELATIONS AMONG FACTORS: CONVENTIONAL DIMENSION

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.371	1.0			
Interests	0.302	0.292	1.0		
Occupational Considerations	0.269	0.481	0.545	1.0	
Outcome Expectations	0.297	0.492	0.473	0.751	1.0

TABLE 26

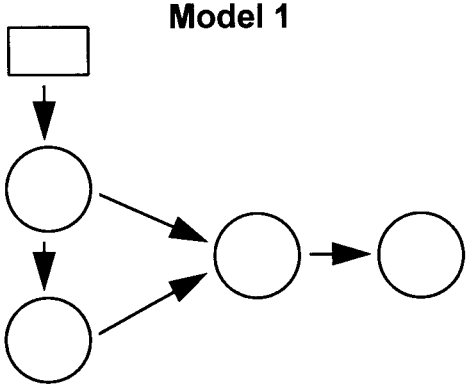
PEARSON INTERCORRELATIONS AMONG FACTORS: AVERAGED ACROSS ALL DIMENSIONS

	Self Estimated Abilities	Self Efficacy Beliefs	Interests	Occupational Considerations	Outcome Expectations
Self-Estimated Abilities	1.0				
Self-Efficacy Beliefs	0.509	1.0			
Interests	0.504	0.479	1.0		
Occupational Considerations	0.527	0.581	0.633	1.0	
Outcome Expectations	0.425	0.512	0.542	0.716	1.0

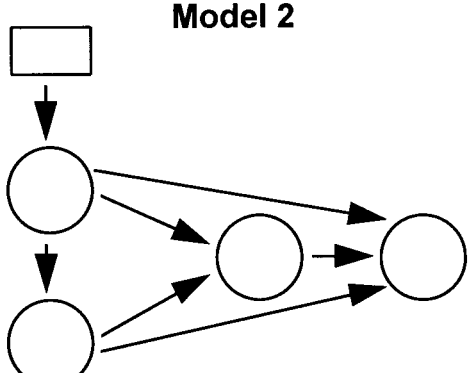
TABLE 27

FIT INDICES FOR MODELS 1 AND 2 ACROSS HOLLAND DIMENSIONS

Model 1



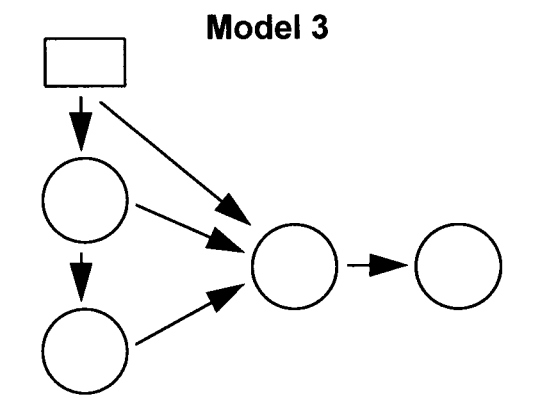
Model 2

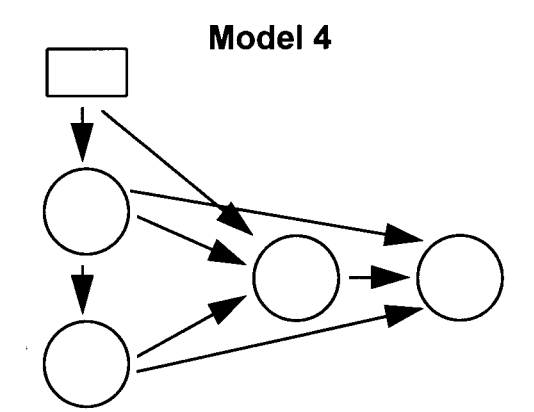


	Average Standardized Residual	Iterations	df	Chi Square	NNFI	CFI	Chi Square Change
Realistic							
Model 1	0.056	12	61	295.22	0.898	0.920	**55.52***
Model 2	0.037	9	59	239.70	0.919	0.939	
Investigative							
Model 1	0.046	14	61	224.46	0.938	0.951	**65.51***
Model 2	0.026	9	59	158.95	0.961	0.970	
Artistic							
Model 1	0.085	11	61	452.51	0.859	0.889	**118.89***
Model 2	0.039	9	59	333.62	0.897	0.922	
Social							
Model 1	0.043	14	61	427.45	0.883	0.908	**58.26***
Model 2	0.032	9	59	369.18	0.897	0.922	
Enterprising							
Model 1	0.067	10	61	432.77	0.865	0.895	**98.54***
Model 2	0.042	9	59	334.23	0.897	0.922	
Conventional							
Model 1	0.102	10	61	371.91	0.909	0.929	**177.05***
Model 2	0.037	8	59	194.86	0.959	0.969	

TABLE 28

FIT INDICES FOR MODELS 3 AND 4 ACROSS HOLLAND DIMENSIONS

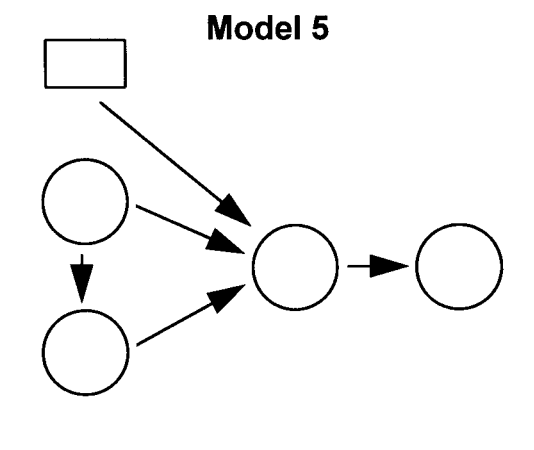


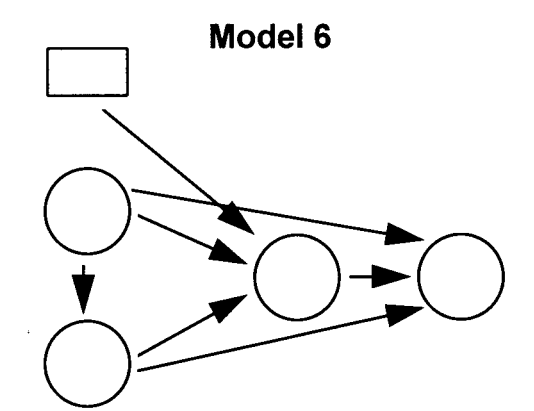


	Average Standardized Residual	Iterations	df	Chi Square	NNFI	CFI	Chi Square Change
Realistic							
Model 3	0.056	14	60	295.22	0.895	0.920	**56.66***
Model 4	0.036	12	58	238.56	0.917	0.938	
Investigative							
Model 3	0.044	13	60	220.66	0.938	0.952	**64.29***
Model 4	0.025	12	58	156.37	0.960	0.971	
Artistic							
Model 3	0.084	10	60	452.07	0.856	0.889	**118.84***
Model 4	0.039	10	58	333.23	0.895	0.922	
Social							
Model 3	0.042	14	60	425.39	0.881	0.909	**56.67***
Model 4	0.032	13	58	368.72	0.895	0.922	
Enterprising							
Model 3	0.064	11	60	430.48	0.864	0.895	**97.71***
Model 4	0.039	12	58	332.77	0.895	0.922	
Conventional							
Model 3	0.101	12	60	370.90	0.907	0.929	**176.66***
Model 4	0.051	11	58	194.24	0.958	0.969	

TABLE 29

FIT INDICES FOR MODELS 5 AND 6 ACROSS HOLLAND DIMENSIONS





	Average Standardized Residual	Iterations	df	Chi Square	NNFI	CFI	Chi Square Change
Realistic							
Model 5	0.057	14	61	295.74	0.897	0.920	**56.70***
Model 6	0.037	13	59	239.04	0.919	0.938	
Investigative							
Model 5	0.051	16	61	223.63	0.938	0.951	**64.37***
Model 6	0.031	11	59	159.26	0.960	0.970	
Artistic							
Model 5	0.085	12	61	452.16	0.859	0.890	**118.84***
Model 6	0.040	9	59	333.32	0.898	0.923	
Social							
Model 5	0.049	16	60	430.31	0.882	0.908	**57.01***
Model 6	0.037	11	58	373.30	0.896	0.921	
Enterprising							
Model 5	0.064	14	60	430.48	0.866	0.895	**97.70***
Model 6	0.040	12	58	332.78	0.898	0.923	
Conventional							
Model 5	0.101	13	60	371.92	0.909	0.929	**176.70***
Model 6	0.035	12	58	195.22	0.959	0.969	

TABLE 30

FIT INDICES FOR MODELS 2, 4, AND 6

	Average Standardized Residual	Iterations	df	Chi Sqare	NNFI	CFI	Chi-Square Change
Realistic							
Model 2	0.037	9	59	239.70	0.919	0.939	1.14
Model 6	0.037	13	59	239.04	0.919	0.938	0.48
Model 4	0.036	12	58	238.56	0.917	0.938	
Investigative							
Model 2	0.026	9	59	158.95	0.961	0.970	2.58
Model 6	0.031	11	59	159.26	0.960	0.970	2.89
Model 4	0.025	12	58	156.37	0.960	0.971	
Artistic							
Model 2	0.040	9	59	333.62	0.897	0.922	0.39
Model 6	0.040	9	59	333.32	0.898	0.923	0.09
Model 4	0.039	10	58	333.23	0.895	0.922	

TABLE 31

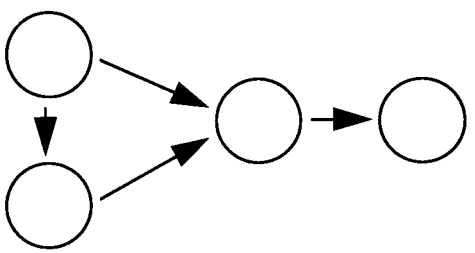
FIT INDICES FOR MODELS 2, 4, AND 6

	Average Standardized Residual	Iterations	df	Chi Sqare	NFI	CFI	Chi-Square Change
Social							
Model 2	0.032	9	59	369.19	0.897	0.922	0.47
Model 6	0.037	11	59	373.30	0.896	0.921	4.58
Model 4	0.032	13	58	368.72	0.895	0.922	
Enterprising							
Model 2	0.042	9	59	334.23	0.897	0.922	1.46
Model 6	0.040	12	59	332.78	0.898	0.923	0.01
Model 4	0.039	12	58	332.77	0.895	0.922	
Conventional							
Model 2	0.036	8	59	194.87	0.959	0.969	0.63
Model 6	0.035	12	59	195.22	0.959	0.969	0.98
Model 4	0.051	11	58	194.24	0.958	0.969	

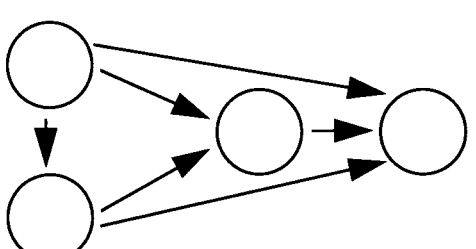
TABLE 32

FIT INDICES FOR MODELS 1 AND 2 ACROSS HOLLAND DIMENSIONS WITH GRADES REMOVED

Model 1



Model 2



	Average Standardized Residual	Iterations	df	Chi Square	NNFI	CFI	Chi Square Change
Realistic							
Model 1	0.068	14	50	324.06	0.897	0.911	**74.13***
Model 2	0.037	15	48	249.93	0.920	0.934	
Investigative							
Model 1	0.055	15	50	276.65	0.937	0.948	**104.96***
Model 2	0.021	12	48	171.69	0.961	0.972	
Artistic							
Model 1	0.090	12	50	530.38	0.872	0.883	**130.04***
Model 2	0.042	12	48	400.34	0.904	0.914	
Social							
Model 1	0.044	15	50	421.32	0.902	0.912	**57.33***
Model 2	0.030	13	48	363.99	0.915	0.925	
Enterprising							
Model 1	0.073	14	50	448.42	0.881	0.892	**111.09***
Model 2	0.041	13	48	337.33	0.910	0.922	
Conventional							
Model 1	0.111	12	50	374.84	0.920	0.930	**186.89***
Model 2	0.033	13	48	187.95	0.960	0.970	

TABLE 33

TOTAL EFFECT ESTIMATES AMONG VARIABLES

Realistic	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.422		
3. Interests	0.370	0.247	
4. Occupational Considerations	0.511	0.495	0.339
Investigative	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.545		
3. Interests	0.596	0.390	
4. Occupational Considerations	0.631	0.575	0.279
Artistic	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.498		
3. Interests	0.474	0.425	
4. Occupational Considerations	0.645	0.443	0.232
Social	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.617		
3. Interests	0.564	0.574	
4. Occupational Considerations	0.649	0.588	0.359
Enterprising	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.500		
3. Interests	0.576	0.370	
4. Occupational Considerations	0.569	0.629	0.294
Conventional	**1**	**2**	**3**
1. Self-Efficacy Beliefs			
2. Outcome Expectations	0.492		
3. Interests	0.292	0.435	
4. Occupational Considerations	0.480	0.678	0.236

TABLE 34

A COMPARISON OF RESULTS ACROSS STUDIES

	Brown, Lent, & Gore (1994)			Present Study		
	Chi-Square	GFI	Chi-Square Difference	Chi-Square	CFI	Chi-Square Difference
Realistic						
1 Factor	76.03	0.87	75.54	153.98	0.88	150.82
2 Factor	0.49	0.99		6.15	0.99	
Investigative						
1 Factor	18.16	0.96	15.54	113.73	0.91	85.33
2 Factor	2.62	0.99		28.38	0.98	
Artistic						
1 Factor	14.53	0.97	13.17	77.43	0.93	35.26
2 Factor	1.36	0.99		42.17	0.96	
Social						
1 Factor	11.67	0.97	10.11	71.86	0.93	39.88
2 Factor	1.56	0.99		31.97	0.97	
Enterprising						
1 Factor	35.66	0.93	34.03	76.15	0.93	56.44
2 Factor	1.63	0.99		17.71	0.98	
Conventional						
1 Factor	73.59	0.86	71.03	236.78	0.85	229.68
2 Factor	2.56	0.99		6.79	0.99	

Note: Brown, Lent, & Gore used LISREL 7.0 yeilding type three Goodness of fit index (GFI) while the present study used EQS 4.0 yeilding type three Comparative Fit Index (CFI).

APPENDIX 3

INSTRUMENTS USED IN THIS STUDY

Study Description and Informed Consent

This study entitled A Structural Model Analysis of a Social-Cognitive Theory of Career Interests is designed to explore the influences of career-related interests and choices. You will be asked to complete 5 questionnaires which measure various career-related variables such as: occupational considerations, interests, ability beliefs, and the desirability of possible careers. You will also be asked to complete a brief demographic background form. Additionally, please understand that the Office of Institutional Research will generate anonymous Loyola transcripts for all students participating in this study. No one involved in this research study will ever be able to link any student with his or her corresponding grades by any means other than a randomly assigned research number. Your rights, including confidentiality and anonymity, are assured at each step in the research process.

It is expected that completion of this study will take no longer than 60 minutes during one session.

There are no foreseen risks involved in completing this study and the benefits of your participation include extra-credit points in General Psychology and the knowledge that you have contributed to the understanding of how people develop career interests and make career decisions.

Prior to filling out each separate questionnaire, please read the instructions very carefully as many of the forms look similar but each asks you to consider different aspects of yourself. If you have any questions about how to complete a form, please raise your hand and the experimenter will assist you.

I acknowledge that I have read the above description of this research study and have been allowed to asks questions regarding my participation. I understand the potential risks of my participation are negligible and that I may withdraw from participation at any time without prejudice. If you have any questions following your participation in this research study, you may contact the Chairperson of the Institutional Review Board for the Protection of Human Subjects for the Lake Shore campus of Loyola University (312-508-2471) or the primary investigator, Paul A. Gore (801-364-1423).

I freely and voluntarily consent to my participation in this research project.

____

(Signature of Investigator or assistant) (Date)

____

(Signature of Research Participant) (Date)

- -

____

(Social Security Number of Research Participant)

Background Questionnaire

1. Age: _____

2. Gender: Male _____ Female _____

3. Race (please check one):

_____ African American
_____ Asian Indian
_____ Asian/Pacific Islander
_____ Caucasian
_____ Hispanic
_____ Native American
_____ Other (Please Specify) _____

4. Year in School (please check one):

_____ Freshman
_____ Sophomore
_____ Junior
_____ Senior
_____ Graduate or Professional School
_____ Other (Please Specify) _____

5. Marital Status (please check one):

_____ Never Married
_____ Separated
_____ Divorced
_____ Widowed
_____ Married

6. Have you declared a college major? No _____ Yes _____

7. If **yes** to question **6**, what is that major?_____

8. If **yes** to question **6**, how certain are you that you have selected the right major for you? (Circle a number on the scale below indicating your level of certainty):

1	2	3	4	5	6	7
Not at all certain						Very certain

9. If **yes** to question **6**, how satisfied are you with your academic major? (Circle a number on the scale below indicating your level of satisfaction):

1	2	3	4	5	6	7
Not at all satisfied						Very satisfied

10. Have you chosen an occupation that you wish to enter?
No _____ Yes _____

11. If **yes** to question **10**, what is that occupation? _____

12. If **yes** to question **10**, how certain are you that you have chosen the right occupation for you? (Circle a number on the scale below indicating your level of certainty):

1	2	3	4	5	6	7
Not at all certain						Very certain

13. If **yes** to question **10**, how satisfied are you with your choice of occupations? (Circle a number on the scale below indicating your level of satisfaction):

1	2	3	4	5	6	7
Not at all satisfied						Very satisfied

Self-Estimations

Instructions: For each of the occupations listed below, please indicate whether or not you **have the ABILITIES TO BECOME** a(n) _____. For **EACH YES ANSWER,** indicate how sure you are on the 9-point scale.

Occupation	Could you become a(n)		If yes, how sure are you Completely Unsure								Completely Sure
Airplane Mechanic	Y	N	1	2	3	4	5	6	7	8	9
Firefighter	Y	N	1	2	3	4	5	6	7	8	9
Auto Mechanic	Y	N	1	2	3	4	5	6	7	8	9
Carpenter	Y	N	1	2	3	4	5	6	7	8	9
Fish and Wildlife Specialist	Y	N	1	2	3	4	5	6	7	8	9
Tree Surgeon	Y	N	1	2	3	4	5	6	7	8	9
Truck Driver	Y	N	1	2	3	4	5	6	7	8	9
Surveyor	Y	N	1	2	3	4	5	6	7	8	9
Construction Inspector	Y	N	1	2	3	4	5	6	7	8	9
Radio Operator	Y	N	1	2	3	4	5	6	7	8	9
Bus Driver	Y	N	1	2	3	4	5	6	7	8	9
Locomotive Engineer	Y	N	1	2	3	4	5	6	7	8	9
Machinist	Y	N	1	2	3	4	5	6	7	8	9
Electrician	Y	N	1	2	3	4	5	6	7	8	9
Meteorologist	Y	N	1	2	3	4	5	6	7	8	9
Biologist	Y	N	1	2	3	4	5	6	7	8	9
Astronomer	Y	N	1	2	3	4	5	6	7	8	9
Medical Laboratory Technician	Y	N	1	2	3	4	5	6	7	8	9
Anthropologist	Y	N	1	2	3	4	5	6	7	8	9
Zoologist	Y	N	1	2	3	4	5	6	7	8	9
Chemist	Y	N	1	2	3	4	5	6	7	8	9
Independent Research Scientist	Y	N	1	2	3	4	5	6	7	8	9
Writer of Scientific Articles	Y	N	1	2	3	4	5	6	7	8	9
Editor of Scientific Journals	Y	N	1	2	3	4	5	6	7	8	9
Geologist	Y	N	1	2	3	4	5	6	7	8	9
Botanist	Y	N	1	2	3	4	5	6	7	8	9
Scientific Research Worker	Y	N	1	2	3	4	5	6	7	8	9
Physicist	Y	N	1	2	3	4	5	6	7	8	9
Poet	Y	N	1	2	3	4	5	6	7	8	9
Symphony Conductor	Y	N	1	2	3	4	5	6	7	8	9
Musician	Y	N	1	2	3	4	5	6	7	8	9
Novelist	Y	N	1	2	3	4	5	6	7	8	9
Actor/Actress	Y	N	1	2	3	4	5	6	7	8	9
Free-Lance Writer	Y	N	1	2	3	4	5	6	7	8	9
Music Arranger	Y	N	1	2	3	4	5	6	7	8	9
Journalist	Y	N	1	2	3	4	5	6	7	8	9
Artist	Y	N	1	2	3	4	5	6	7	8	9
Singer	Y	N	1	2	3	4	5	6	7	8	9
Composer	Y	N	1	2	3	4	5	6	7	8	9
Sculptor/Sculptress	Y	N	1	2	3	4	5	6	7	8	9

Self-Estimations (continued)

Occupation	Could you become a(n)		If yes, how sure are you Completely Unsure								Completely Sure
Playwright	Y	N	1	2	3	4	5	6	7	8	9
Cartoonist	Y	N	1	2	3	4	5	6	7	8	9
Sociologist	Y	N	1	2	3	4	5	6	7	8	9
High School Teacher	Y	N	1	2	3	4	5	6	7	8	9
Juvenile Delinquency Expert	Y	N	1	2	3	4	5	6	7	8	9
Speech Therapist	Y	N	1	2	3	4	5	6	7	8	9
Marriage Counselor	Y	N	1	2	3	4	5	6	7	8	9
School Principal	Y	N	1	2	3	4	5	6	7	8	9
Physical Therapist	Y	N	1	2	3	4	5	6	7	8	9
Clinical Psychologist	Y	N	1	2	3	4	5	6	7	8	9
Social Science Teacher	Y	N	1	2	3	4	5	6	7	8	9
Director of Welfare Agency	Y	N	1	2	3	4	5	6	7	8	9
Youth Camp Director	Y	N	1	2	3	4	5	6	7	8	9
Personal Counselor	Y	N	1	2	3	4	5	6	7	8	9
Social Worker	Y	N	1	2	3	4	5	6	7	8	9
Vocational Counselor	Y	N	1	2	3	4	5	6	7	8	9
Speculator	Y	N	1	2	3	4	5	6	7	8	9
Buyer	Y	N	1	2	3	4	5	6	7	8	9
Advertising Executive	Y	N	1	2	3	4	5	6	7	8	9
Manufacturer's Representative	Y	N	1	2	3	4	5	6	7	8	9
Life Insurance Salesperson	Y	N	1	2	3	4	5	6	7	8	9
Radio-TV Announcer	Y	N	1	2	3	4	5	6	7	8	9
Business Executive	Y	N	1	2	3	4	5	6	7	8	9
Restaurant Manager	Y	N	1	2	3	4	5	6	7	8	9
Master of Ceremonies	Y	N	1	2	3	4	5	6	7	8	9
Sales Person	Y	N	1	2	3	4	5	6	7	8	9
Real Estate Salesperson	Y	N	1	2	3	4	5	6	7	8	9
Travel Guide	Y	N	1	2	3	4	5	6	7	8	9
Department Store Manager	Y	N	1	2	3	4	5	6	7	8	9
Sales Manager	Y	N	1	2	3	4	5	6	7	8	9
Bookkeeper	Y	N	1	2	3	4	5	6	7	8	9
Business Teacher	Y	N	1	2	3	4	5	6	7	8	9
Budget Reviewer	Y	N	1	2	3	4	5	6	7	8	9
Certified Public Accountant	Y	N	1	2	3	4	5	6	7	8	9
Credit Investigator	Y	N	1	2	3	4	5	6	7	8	9
Court Stenographer	Y	N	1	2	3	4	5	6	7	8	9
Bank Teller	Y	N	1	2	3	4	5	6	7	8	9
Tax Expert	Y	N	1	2	3	4	5	6	7	8	9
Inventory Controller	Y	N	1	2	3	4	5	6	7	8	9
IBM Equipment Operator	Y	N	1	2	3	4	5	6	7	8	9
Financial Analyst	Y	N	1	2	3	4	5	6	7	8	9
Cost Estimator	Y	N	1	2	3	4	5	6	7	8	9
Payroll Clerk	Y	N	1	2	3	4	5	6	7	8	9
Bank Examiner	Y	N	1	2	3	4	5	6	7	8	9

Occupational Considerations

Instructions: For each occupation listed below, please indicate whether or not you **WOULD CONSIDER IT AS A POSSIBLE CAREER** for yourself. For **EACH YES ANSWER,** please indicate how seriously you would consider it on the 9-point scale.

Occupation	Would Consider		If YES, how seriously Not Very Seriously								Very Seriously
Airplane Mechanic	Y	N	1	2	3	4	5	6	7	8	9
Firefighter	Y	N	1	2	3	4	5	6	7	8	9
Auto Mechanic	Y	N	1	2	3	4	5	6	7	8	9
Carpenter	Y	N	1	2	3	4	5	6	7	8	9
Fish and Wildlife Specialist	Y	N	1	2	3	4	5	6	7	8	9
Tree Surgeon	Y	N	1	2	3	4	5	6	7	8	9
Truck Driver	Y	N	1	2	3	4	5	6	7	8	9
Surveyor	Y	N	1	2	3	4	5	6	7	8	9
Construction Inspector	Y	N	1	2	3	4	5	6	7	8	9
Radio Operator	Y	N	1	2	3	4	5	6	7	8	9
Bus Driver	Y	N	1	2	3	4	5	6	7	8	9
Locomotive Engineer	Y	N	1	2	3	4	5	6	7	8	9
Machinist	Y	N	1	2	3	4	5	6	7	8	9
Electrician	Y	N	1	2	3	4	5	6	7	8	9
Meteorologist	Y	N	1	2	3	4	5	6	7	8	9
Biologist	Y	N	1	2	3	4	5	6	7	8	9
Astronomer	Y	N	1	2	3	4	5	6	7	8	9
Medical Laboratory Technician	Y	N	1	2	3	4	5	6	7	8	9
Anthropologist	Y	N	1	2	3	4	5	6	7	8	9
Zoologist	Y	N	1	2	3	4	5	6	7	8	9
Chemist	Y	N	1	2	3	4	5	6	7	8	9
Independent Research Scientist	Y	N	1	2	3	4	5	6	7	8	9
Writer of Scientific Articles	Y	N	1	2	3	4	5	6	7	8	9
Editor of Scientific Journals	Y	N	1	2	3	4	5	6	7	8	9
Geologist	Y	N	1	2	3	4	5	6	7	8	9
Botanist	Y	N	1	2	3	4	5	6	7	8	9
Scientific Research Worker	Y	N	1	2	3	4	5	6	7	8	9
Physicist	Y	N	1	2	3	4	5	6	7	8	9
Poet	Y	N	1	2	3	4	5	6	7	8	9
Symphony Conductor	Y	N	1	2	3	4	5	6	7	8	9
Musician	Y	N	1	2	3	4	5	6	7	8	9
Novelist	Y	N	1	2	3	4	5	6	7	8	9
Actor/Actress	Y	N	1	2	3	4	5	6	7	8	9
Free-Lance Writer	Y	N	1	2	3	4	5	6	7	8	9
Music Arranger	Y	N	1	2	3	4	5	6	7	8	9
Journalist	Y	N	1	2	3	4	5	6	7	8	9
Artist	Y	N	1	2	3	4	5	6	7	8	9
Singer	Y	N	1	2	3	4	5	6	7	8	9
Composer	Y	N	1	2	3	4	5	6	7	8	9
Sculptor/Sculptress	Y	N	1	2	3	4	5	6	7	8	9
Playwright	Y	N	1	2	3	4	5	6	7	8	9
Cartoonist	Y	N	1	2	3	4	5	6	7	8	9
Sociologist	Y	N	1	2	3	4	5	6	7	8	9

Occupational Considerations (continued)

Occupation	Would Consider		If yes, how seriously								
			Not Very Seriously								Very Seriously
High School Teacher	Y	N	1	2	3	4	5	6	7	8	9
Juvenile Delinquency Expert	Y	N	1	2	3	4	5	6	7	8	9
Speech Therapist	Y	N	1	2	3	4	5	6	7	8	9
Marriage Counselor	Y	N	1	2	3	4	5	6	7	8	9
School Principal	Y	N	1	2	3	4	5	6	7	8	9
Physical Therapist	Y	N	1	2	3	4	5	6	7	8	9
Clinical Psychologist	Y	N	1	2	3	4	5	6	7	8	9
Social Science Teacher	Y	N	1	2	3	4	5	6	7	8	9
Director of Welfare Agency	Y	N	1	2	3	4	5	6	7	8	9
Youth Camp Director	Y	N	1	2	3	4	5	6	7	8	9
Personal Counselor	Y	N	1	2	3	4	5	6	7	8	9
Social Worker	Y	N	1	2	3	4	5	6	7	8	9
Vocational Counselor	Y	N	1	2	3	4	5	6	7	8	9
Speculator	Y	N	1	2	3	4	5	6	7	8	9
Buyer	Y	N	1	2	3	4	5	6	7	8	9
Advertising Executive	Y	N	1	2	3	4	5	6	7	8	9
Manufacturer's Representativ	Y	N	1	2	3	4	5	6	7	8	9
Life Insurance Salesperson	Y	N	1	2	3	4	5	6	7	8	9
Radio-TV Announcer	Y	N	1	2	3	4	5	6	7	8	9
Business Executive	Y	N	1	2	3	4	5	6	7	8	9
Restaurant Manager	Y	N	1	2	3	4	5	6	7	8	9
Master of Ceremonies	Y	N	1	2	3	4	5	6	7	8	9
Sales Person	Y	N	1	2	3	4	5	6	7	8	9
Real Estate Salesperson	Y	N	1	2	3	4	5	6	7	8	9
Travel Guide	Y	N	1	2	3	4	5	6	7	8	9
Department Store Manager	Y	N	1	2	3	4	5	6	7	8	9
Sales Manager	Y	N	1	2	3	4	5	6	7	8	9
Bookkeeper	Y	N	1	2	3	4	5	6	7	8	9
Business Teacher	Y	N	1	2	3	4	5	6	7	8	9
Budget Reviewer	Y	N	1	2	3	4	5	6	7	8	9
Certified Public Accountant	Y	N	1	2	3	4	5	6	7	8	9
Credit Investigator	Y	N	1	2	3	4	5	6	7	8	9
Court Stenographer	Y	N	1	2	3	4	5	6	7	8	9
Bank Teller	Y	N	1	2	3	4	5	6	7	8	9
Tax Expert	Y	N	1	2	3	4	5	6	7	8	9
Inventory Controller	Y	N	1	2	3	4	5	6	7	8	9
IBM Equipment Operator	Y	N	1	2	3	4	5	6	7	8	9
Financial Analyst	Y	N	1	2	3	4	5	6	7	8	9
Cost Estimator	Y	N	1	2	3	4	5	6	7	8	9
Payroll Clerk	Y	N	1	2	3	4	5	6	7	8	9
Bank Examiner	Y	N	1	2	3	4	5	6	7	8	9

Outcome Expectations

Often people consider various outcomes or payoffs when thinking about possible occupational choices For example, a person might consider how much authority, independence, or creativity would be involved in a given occupation. Another person might consider things such as security, working conditions, pretige, the opporunity to help other people, or the level of interaction with co-workers.

Instructions: For each of the occupations listed below rate the degree to which you would **Get What YOU Wanted** from that occupation on the 9-point scale.

Occupation	Degree to which I would get what I wanted Not Very Much								Very Much
Airplane Mechanic	1	2	3	4	5	6	7	8	9
Firefighter	1	2	3	4	5	6	7	8	9
Auto Mechanic	1	2	3	4	5	6	7	8	9
Carpenter	1	2	3	4	5	6	7	8	9
Fish and Wildlife Specialist	1	2	3	4	5	6	7	8	9
Tree Surgeon	1	2	3	4	5	6	7	8	9
Truck Driver	1	2	3	4	5	6	7	8	9
Surveyor	1	2	3	4	5	6	7	8	9
Construction Inspector	1	2	3	4	5	6	7	8	9
Radio Operator	1	2	3	4	5	6	7	8	9
Bus Driver	1	2	3	4	5	6	7	8	9
Locomotive Engineer	1	2	3	4	5	6	7	8	9
Machinist	1	2	3	4	5	6	7	8	9
Electrician	1	2	3	4	5	6	7	8	9
Meteorologist	1	2	3	4	5	6	7	8	9
Biologist	1	2	3	4	5	6	7	8	9
Astronomer	1	2	3	4	5	6	7	8	9
Medical Laboratory Technician	1	2	3	4	5	6	7	8	9
Anthropologist	1	2	3	4	5	6	7	8	9
Zoologist	1	2	3	4	5	6	7	8	9
Chemist	1	2	3	4	5	6	7	8	9
Independent Research Scientist	1	2	3	4	5	6	7	8	9
Writer of Scientific Articles	1	2	3	4	5	6	7	8	9
Editor of Scientific Journals	1	2	3	4	5	6	7	8	9
Geologist	1	2	3	4	5	6	7	8	9
Botanist	1	2	3	4	5	6	7	8	9
Scientific Research Worker	1	2	3	4	5	6	7	8	9
Physicist	1	2	3	4	5	6	7	8	9
Poet	1	2	3	4	5	6	7	8	9
Symphony Conductor	1	2	3	4	5	6	7	8	9

Outcome Expectations (continued)

Occupation	Degree to which I would get what I wanted Not Very Much								Very Much
Musician	1	2	3	4	5	6	7	8	9
Novelist	1	2	3	4	5	6	7	8	9
Actor/Actress	1	2	3	4	5	6	7	8	9
Free-Lance Writer	1	2	3	4	5	6	7	8	9
Music Arranger	1	2	3	4	5	6	7	8	9
Journalist	1	2	3	4	5	6	7	8	9
Artist	1	2	3	4	5	6	7	8	9
Singer	1	2	3	4	5	6	7	8	9
Composer	1	2	3	4	5	6	7	8	9
Sculptor/Sculptress	1	2	3	4	5	6	7	8	9
Playwright	1	2	3	4	5	6	7	8	9
Cartoonist	1	2	3	4	5	6	7	8	9
Sociologist	1	2	3	4	5	6	7	8	9
High School Teacher	1	2	3	4	5	6	7	8	9
Juvenile Delinquency Expert	1	2	3	4	5	6	7	8	9
Speech Therapist	1	2	3	4	5	6	7	8	9
Marriage Counselor	1	2	3	4	5	6	7	8	9
School Principal	1	2	3	4	5	6	7	8	9
Physical Therapist	1	2	3	4	5	6	7	8	9
Clinical Psychologist	1	2	3	4	5	6	7	8	9
Social Science Teacher	1	2	3	4	5	6	7	8	9
Director of Welfare Agency	1	2	3	4	5	6	7	8	9
Youth Camp Director	1	2	3	4	5	6	7	8	9
Personal Counselor	1	2	3	4	5	6	7	8	9
Social Worker	1	2	3	4	5	6	7	8	9
Vocational Counselor	1	2	3	4	5	6	7	8	9
Speculator	1	2	3	4	5	6	7	8	9
Buyer	1	2	3	4	5	6	7	8	9
Advertising Executive	1	2	3	4	5	6	7	8	9
Manufacturer's Representative	1	2	3	4	5	6	7	8	9
Life Insurance Salesperson	1	2	3	4	5	6	7	8	9
Radio-TV Announcer	1	2	3	4	5	6	7	8	9
Business Executive	1	2	3	4	5	6	7	8	9
Restaurant Manager	1	2	3	4	5	6	7	8	9
Master of Ceremonies	1	2	3	4	5	6	7	8	9
Sales Person	1	2	3	4	5	6	7	8	9
Real Estate Salesperson	1	2	3	4	5	6	7	8	9
Travel Guide	1	2	3	4	5	6	7	8	9
Department Store Manager	1	2	3	4	5	6	7	8	9
Sales Manager	1	2	3	4	5	6	7	8	9

Outcome Expectations (continued)

Occupation	Degree to which I would get what I wanted								
	Not Very Much								Very Much
Bookkeeper	1	2	3	4	5	6	7	8	9
Business Teacher	1	2	3	4	5	6	7	8	9
Budget Reviewer	1	2	3	4	5	6	7	8	9
Certified Public Accountant	1	2	3	4	5	6	7	8	9
Credit Investigator	1	2	3	4	5	6	7	8	9
Court Stenographer	1	2	3	4	5	6	7	8	9
Bank Teller	1	2	3	4	5	6	7	8	9
Tax Expert	1	2	3	4	5	6	7	8	9
Inventory Controller	1	2	3	4	5	6	7	8	9
IBM Equipment Operator	1	2	3	4	5	6	7	8	9
Financial Analyst	1	2	3	4	5	6	7	8	9
Cost Estimator	1	2	3	4	5	6	7	8	9
Payroll Clerk	1	2	3	4	5	6	7	8	9
Bank Examiner	1	2	3	4	5	6	7	8	9

Self-Estimates

Instructions: Rate yourself on each of the following traits as ***you really think you are when compared to other persons your own age***. Give the most accurate estimate of ***how you see yourself***. Circle the appropriate number and avoid rating yourself the same on each ability.

	Mechanical Ability	Scientific Ability	Artistic Ability	Teaching Ability	Sales Ability	Clerical Ability
High	7	7	7	7	7	7
	6	6	6	6	6	6
	5	5	5	5	5	5
Average	4	4	4	4	4	4
	3	3	3	3	3	3
	2	2	2	2	2	2
Low	1	1	1	1	1	1

	Manual Skills	Math Ability	Musical Ability	Under-standing of others	Managerial Skills	Office Skills
High	7	7	7	7	7	7
	6	6	6	6	6	6
	5	5	5	5	5	5
Average	4	4	4	4	4	4
	3	3	3	3	3	3
	2	2	2	2	2	2
Low	1	1	1	1	1	1

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VITA

Paul Anthony Gore, Jr. was born on May 23, 1964 in Saint Louis Missouri to Paul Anthony Gore, Sr. and Colleen Gore. After graduating from Coral Springs High School in Coral Springs Florida, Paul enlisted in the United States Marine Corps Reserve. He attended the University of South Florida for one and a half years and then transferred to Saint Louis University where he received a Bachelor of Science degree in Biology and Psychology in May of 1986. Paul received a Master of Science degree in 1988 from the University of New Orleans in Psychology where he specialized in applied biopsychology and conducted research on the stimulus properties of drugs of abuse. He then accepted a position as an Assistant Biologist at Abbott Laboratories in Chicago Illinois. While at Abbott Laboratories, Paul completed a Master of Arts degree in Guidance and Counseling with an emphasis in Community and Family Counseling at Northeastern Illinois University. He then enrolled at Loyola University of Chicago in the doctoral Counseling Psychology program where he conducted research in the areas of career choice and development and applied psychological measurement.

DISSERTATION APPROVAL SHEET

The dissertation submitted by Paul A. Gore, Jr. has been read and approved by the following committee:

Steven D. Brown, Ph.D., Director
Professor, Counseling Psychology
Loyola University Chicago

Jack A. Kavanagh, Ph.D.
Professor, Counseling Psychology
Loyola University Chicago

Scott Azuma, Ph.D.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the committee with reference to content and form.

The dissertation is, therefore, accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

8/25/95
Date


Director's Signature