SOCIAL COGNITIVE CAREER THEORY (SCCT) AND MEXICAN/MEXICAN-AMERICAN YOUTH CAREER DEVELOPMENT, WITH A SPECIAL FOCUS ON STEM FIELDS

By

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The purpose of this study was to test core aspects of the Social Cognitive Career Theory (SCCT) in an investigation of self-efficacy, outcome expectations, interests, and choice goals for STEM fields (specifically math and science) with Mexican/Mexican-American high school students.

Participants were 259 Mexican/Mexican-American freshmen and sophomore high school students in a mid-sized city in eastern Washington state. Students completed a demographic questionnaire, Math/Science Supports and Barriers measure (Lent et al., 2005), Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992), Expanded Skills Confidence Inventory for High School Students (ESCI-HS; Betz & Wolfe, 2005), 10-item math/science outcome expectations scale (Lent et al., 1993), Math/Science Interest Scale (MSIS; Smith & Fouad, 1999), and Math/Science Intentions and Goals Scale (MSIGs; Fouad & Smith, 1996). For hypothesis 1, a path model was tested based on SCCT that also incorporated ethnic identity as a person input variable. In Hypothesis 2, it was predicted that the relationship between math/science interests and choice goals would be stronger for participants who perceive greater
support (vs. barriers) in pursuing math/science fields (i.e., support is a moderator variable). In Hypothesis 3, it was predicted that males, as compared to females, would have higher average self-efficacy, outcome expectations, interests, and intentions/goals related to STEM (i.e., math/science) fields.

Overall, the results for the final path model for Hypothesis 1 provided strong support for the predicted direct and indirect relationships among self-efficacy, interests, and choice goals predicted by SCCT, but weaker and only partial support for the role of outcome expectations. In addition, the results indicated that ethnic identity is an important factor to include in SCCT models, as it showed both direct and indirect relationships with the SCCT constructs. Hypothesis 2 was not supported, as perceived support did not moderate the relationship between math/science interests and intentions/goals. Results for Hypothesis 3 indicated that females, as compared to males, reported stronger ethnic identity and math/science interests, but did not differ in the other SCCT variables. Overall, the results indicated that SCCT provides a valid and useful theoretical framework for understanding and predicting the career choice goals of Mexican American high school students in STEM fields.
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Dedication

This dissertation is dedicated to my son, Andres Madrigal. It definitely was not easy being a PhD student, single parent, and working full-time. However, I would not have it any other way.

Andres, this journey would not have been the same without you.
CHAPTER 1

Introduction

One of the main goals of higher education in the United States is to educate and train the next generation of citizens who will help maintain the country’s competitiveness in an increasingly global marketplace (National Science Board [NSB], 2006). Careers in the science, technology, engineering, and math (STEM) fields are associated with social mobility and cited as important to national economic stability and security (National Science Board [NSB], 2007). Yet, presently the United States has one of the lowest ratios of STEM to non-STEM bachelor’s degree production worldwide, with STEM degrees accounting for only 17% of the total awarded in the United States in 2002 compared with the international average of 26% (Kuenzi, 2008). Dr. Shirley Ann Jackson, the president of Rensselaer Polytechnic Institute (RPI), describes this phenomenon as a “quiet crisis” – one resulting in an inexorable erosion of our scientific and technological capacity. According to the President’s Council of Advisors on Science and Technology (2012), the United States needs to produce approximately one million more STEM professionals over the next ten years, which equates to increasing the number of students earning STEM degrees by nearly 35% per year. In order to achieve this goal and avert America’s competitiveness crisis, the National Action Council for Minorities in Engineering (NACME) advocates activating the hidden workforce of historically underrepresented students in the STEM careers (NACME, 2008).

In fact, meeting the demand for skilled workers in STEM fields will prove difficult, if not impossible, unless the nation’s future mathematicians, scientists, engineers, information technologists, computer programmers, and health care workers better reflect the increasing
diversity of the population (Institute for Higher Education Policy [IHEP], 2010). Achieving this goal will require significant changes. Today, national data indicate that, compared to their White peers, students of Hispanic, African American, and Native American family origin are less prepared, express less interest in STEM majors, experience lower persistence rates, and achieve fewer degrees in STEM fields (Cassell & Slaughter, 2006). Given the disproportionately low numbers of minorities represented in the STEM workforce (National Science Board, 2007), promoting minority student interest in STEM careers as well as recruiting, retaining, and graduating these students within STEM degree programs is essential to diversifying the STEM workforce.

Among those underrepresented in the STEM fields are Hispanics, who represent the fastest growing subgroup of the U.S. labor market. With a median age of 27, compared with 31 for African Americans, 36 for Asians, and 41 for Whites, they also constitute the youngest group. Demographically, Hispanics comprise the largest minority group in the United States. One in five school children and one-quarter of all newborns in the United States are Hispanic (Pew Hispanic Center, 2009), with more than two-thirds (68%) of young Hispanics being of Mexican heritage.

Of great concern is the fact that levels of educational and occupational attainment achieved by this group remain consistently below those of non-Hispanic Whites (U.S. Census Bureau, 2010). Of young Hispanics of Mexican origin, more than 40% report that their mothers (42%) and fathers (44%) are without a high school diploma, compared with about 25% of non-Mexican-heritage young Hispanics. The high school dropout rate among Hispanic youth (17%) is nearly double the rate among African Americans (9%) and nearly three times that for Whites (6%). Furthermore, Hispanics are underrepresented in postsecondary education settings (Ginorio
Although more Hispanics are attending college than ever before, currently only 10% of Hispanics receive a college degree, as compared to 18% of African Americans and 34% of Whites (NCES, 2003). The benefits of a college degree are well known: college graduates earn an average of 77% more than high school graduates, enjoy greater job benefits, suffer less unemployment, and find faster re-employment after job loss than do high school graduates (Stuart, 2001; National Center for Educational Statistics [NCES], 2003).

STEM careers are characteristically stable, high-paying, widely available, and known to broaden opportunities across occupational disciplines for those entering the workforce (National Science Foundation, 2010). However, Hispanics are less likely to enter such science and math-related career fields and more likely to enter “lower skilled” occupations than are their White, African American, and Asian peers (Council of Economic Advisors for the President's Initiative on Race, 1998). Generation status differences exist amongst Hispanic occupational achievements. For example, foreign-born Hispanic youths are more likely to be working or looking for work than are native born (64% versus 56%) and to have lower rates of unemployment (17% versus 23%). In addition, foreign-born Hispanic youths are much more likely than their native-born counterparts to be employed in lower-skill occupations. More than half (52%) of all employed foreign-born youths work in food preparation and serving; construction and extraction; building, grounds cleaning, and maintenance; and production occupations, compared with 27% of native-born Hispanic youths. The native born are more dispersed across occupations, including high-skill occupations (Pew Hispanic Center, 2009; Telles & Ortiz, 2009).

The above-mentioned factors carry implications for lifelong consequences with respect to
wages. Therefore, it is not surprising that household incomes of young Hispanics lag well behind those of young Whites and slightly ahead of young African Americans. According to the Pew Hispanic Center 2009 National Survey of Latinos, poverty rates follow the same pattern: 23% of young Hispanics live in poverty, compared with 13% of young Whites and 28% of young African Americans. The poverty rate among young Hispanics declines significantly from the first generation (29%) to the second (19%). For third and higher generations, the rate is 21%. All these factors are important to consider because the economic stature that Mexican-American youths attain as adults will significantly contribute to shaping the United States’ society in the 21st century.

Early academic experience is one of the most important factors underlying the predilection to choose and pursue STEM careers. Fouad and Smith (1996) as well as Turner and Lapan (2005) found middle school to present a critical period during which students begin to make academic course decisions that will strongly influence their future academic and career outcomes. These findings suggest a need for greater attention to early academic and career planning. In addition, Betz (1994) has argued that high school students who avoid math and science-related courses and do not engage in specific preparatory behaviors limit their options for high paying and stable careers, specifically in the STEM fields. High school grades and SAT/ACT test scores serve as one of the strongest predictors of college academic achievement and persistence in STEM fields (Astin, 1993; Crisp, Nora, & Taggart, 2009). Underrepresented students tend to have less access to precollege experiences that would better prepare them for college STEM majors, such as advanced math and science coursework (Solorzano & Ornelas, 2004). In turn, the National Action Council for Minorities in Engineering (NACME) has revealed “the 4% problem,” which refers to the fact that only 4% of underrepresented minorities
are “engineering eligible” upon graduating high school. Specifically, 690,000 minority students graduated from high school in 2002, but of these only about 28,000 had taken the requisite math and science courses needed to qualify for admission to engineering programs.

In addition, during the high school years, students make important career decisions regarding whether to graduate, attend college, and/or seek employment (Seligman, 1994). All these decisions occur within the context of adolescence – a turbulent developmental period that confronts both young people and their families with new conflicts, issues, and events (Paikoff & Brooks Gunn, 1991). Further, these important developmental choices are negotiated within social, economic, and cultural conditions that impose profound pressures upon an adolescent's mental health (Ladany et al., 1997).

In sum, consensus in the field points to a need to better understand the career development of Hispanics (Blustein, Phillips, Jobin-Davis, Finkelberg, & Roarke, 1997; Flores & O'Brien, 2002; Ladany, Melincoff, Constantine, & Love, 1997; McWhirter, Hackett, & Bandalos, 1998). As mentioned, adolescence presents a critical period during which youth make multiple academic and career-related decisions that carry long-term consequences for their future vocational opportunities. Additionally, contextual factors, such as parental involvement and instrumental support for a given career choice, have been identified as critical to adolescents’ academic and career development (Bratcher, 1982; Gottfried, 1985; Lent, Brown, & Hackett, 1994; Lent et al., 2001; Otto, 2000; Roe, 1956). Although many traditional theories of career development assume that career decisions are made under neutral conditions, many Hispanic high school students experience significant challenges and stressors during this already difficult time. These include lower school funding, lower socioeconomic status, lack of exposure to a broad range of possible career options, and limited access to working role models (Kenny,
Blustein, Chaves, Grossman, & Gallagher, 2003; Ladany et al., 1997). Hispanic youth may also experience institutional barriers such as racial and ethnic discrimination, racial micro-aggressions, and other systemic influences that can discourage access to employment opportunities (Yosso & Solorzano, 2009).

Other sources suggest that, in addition to the socio-cultural and cognitive factors described thus far, a lack of culturally appropriate guidance (Chaves et al., 2004) contributes to Hispanic students’ academic under-performance. The confluence of these factors has created a problematic picture for Hispanic youth and placed them at an elevated risk for unsuccessful transitions into the workforce (Gushue & Whitson, 2006). Thus, it is imperative that researchers focus on finding ways to improve conditions for the career development of Hispanic youth.

To address these issues, a growing body of research has developed on K-12 academic experiences, cognitive factors, and socio-cultural factors that influence undergraduate students’ decisions to major in STEM fields (United States Government Accountability Office, 2005). In light of the large numbers of underrepresented students not fully participating in science and engineering (Sevo, 2009), an increasing number of researchers have begun to more closely examine the distinctive needs of students of color, recognizing how disenfranchised many of them are from traditional career development models. As a result, these researchers have modified their theories in the interest of providing a more contextual and culturally relevant career development framework that will better describe and address the factors affecting academic achievement for students of color (Gushue & Whitson, 2006).

One such theory is the social cognitive career theory (SCCT). SCCT researchers have examined how social factors such as ethnic identity, culture, and gender affect career self-efficacy beliefs and outcome expectations, which in turn are hypothesized to determine career
interests, goals, and ultimately career behavior. Most relevant for the present study, such research has highlighted the concept of self-efficacy—that is, individuals’ beliefs or expectations that they can perform specific behaviors, course curricula, or careers (Lent et al., 2005) – as a means of understanding the role that math and science-related experiences play in the underrepresentation of culturally diverse groups in STEM-related academic majors and careers (Fouad & Smith, 1996; Hackett, Betz, Casas, & Roch-Singh, 1992; Lent et al., 2005).

Ethnic identity comprises another important variable in the career development process of Mexican-Americans. Identity development, which is critical for individuals as they discover who they are and who they hope to become (Umaña-Taylor & Fine, 2004), is fundamentally influenced by the social factor of ethnic group membership (Markstrom-Adams, 1992). Ethnic identity is understood as an aspect of an individual's general identity, described as “a multidimensional construct that pertains to how individuals interpret and understand their ethnicity and, specifically, the degree to which they identify with their ethnic group” (Phinney, 1996). According to Phinney (1990), ethnic identity development is a process that takes place over time as individuals explore and make decisions concerning the meaning of their ethnicity in their lives.

According to Rosenthal (1987), the impact of ethnic identity becomes especially relevant in heterogeneous societies such as the United States, where minority groups coexist alongside a dominant social group. According to Erikson (1963), one of the central tasks of adolescence is identity development. During adolescence, individuals begin to distance themselves from their parents and construct a peer group that is distinct from the adult world (Brown, 1990). According to Markstrom-Adams (1992), because ethnic group membership is thought to be one of the primary factors that influence identity formation, the ethnic identity development that takes place
It is thought that ethnic identity might buffer the effects of racism on career development (Arbona, 1995). Davis, Aronson, and Salinas (2006) found that negative racial/ethnic encounters have implications for ethnic minority adolescents' racial/ethnic identity development and their academic engagement. In addition, Zimmerman and Arunkumar (1994) stated that in order to promote academic achievement and psychological adjustment in youth, it is important to ameliorate risk factors, as well as foster protective processes within individuals and their environments.

The influence of gender is another important variable influencing career development, particularly in the STEM fields. Research has hypothesized that women and men differ not only in subjects they take in school, but also in performance in the subjects. Ernest (1976), Fennema (1974), and Meece et al. (1982) found that not only do female students take significantly fewer mathematics courses than male students; they also choose classes that are less rigorous. Betz and Hackett (1983) found that math self-efficacy expectations of college females were lower than those of college males. Zeldin et al. (2007) considered the notion that derogatory statements about one's competence in a particular area have detrimental effects on those who already lack confidence in their capabilities. Lau and Roeser (2002) found that among high school students, science self-efficacy predicted science-related career interest. Gender is most often added to a regression analysis as explanatory influences on relationships between major variables, as opposed to being a major variable. However, Reyes, Kobus, and Gillock (1999) did use gender as a major variable in a study of the career goals of 10th grade Latinas in a Chicago high school with a predominantly low income, Latino enrollment. Despite Latino cultural values that typically include patriarchal family structures and an emphasis on loyalty to the family, which
would seem to predict career choices for Latinas that emphasize "pink collar" fields, an overwhelming majority of these Latinas (87%) indicated interest in traditionally male-dominated careers, such as law and medicine. A second study also examined gender as a major variable (Muller, Stage, & Kinzie, 2001). The study used hierarchical linear modeling techniques and longitudinal data from 1988, 1990, and 1992 waves of the National Education Longitudinal Study to examine ethnicity and gender in relation to growth rates in science achievement. It was determined that Latino males' initial science achievement was greater than for Latinas, and males' growth rates in science achievement over their high school careers was also greater, by a factor of 1.6, than for the females. It was additionally found that taking more course work in science increased science achievement growth rates for Latinas but not for Latinos.

In summary, advancing STEM achievement and career preparation is a priority among institutions and policy-makers within the United States. Although $3.12 billion was allocated to STEM education in 2006, less than half of funded programs were shown to have any meaningful positive impact (U.S. Department of Education, 2007). Further research is needed to examine specific factors influencing underrepresented students’ participation and retention in STEM careers. Further theory-based model testing could inform efforts for improving the effectiveness of career counseling interventions for math and science education. In the present study, I tested a SCCT model of self-efficacy, outcome expectations, interest, and choice goals for STEM fields—that also incorporated ethnic identity and perceived supports and barriers—in a sample of Mexican-American high school students. The study has theoretical significance as a test of SCCT theory in this unique population, as well as potential applied implications for interventions aimed at increasing the numbers of Hispanic youth who pursue STEM fields.
CHAPTER 2

Literature Review

In this chapter, I first review the limited number of studies that have utilized primarily samples of Hispanic participants to investigate career interests and choice behaviors, including in STEM fields, as well as ethnic identity within the SCCT framework. Studies in which a combination of Hispanics, other ethnic minorities, and European-Americans were sampled are also included in order to achieve the most comprehensive examination of the topic.

Social Cognitive Career Theory (SCCT)

General Overview

Lent et al. (1994) applied and extended Bandura's (1986) social cognitive theory to the domain of academic and career development in order to create Social Cognitive Career Theory (SCCT). SCCT attempts to explain the dynamic processes associated with academic and career development by highlighting three interrelated models that address interest development, career choice, and performance. Also, SCCT examines how the cognitive-personal variables (e.g., self-efficacy, outcome expectations, and goals), external environmental factors (e.g., oppression and socialization), and overt behaviors (e.g., career decisions) interact via feedback loops that can either promote or impede career development processes (i.e., interests, choice, and performance).

According to Lent and Brown (2006), efforts to test hypotheses derived from SCCT require sound measures of the theory's constructs. The theory is concerned with domain-specific aspects of human functioning and thus raises unique measurement challenges. SCCT research calls for measures that are tailored to specific domains and dependent variables of interest as opposed to traits, which can be assessed with general measures. Therefore, to facilitate social cognitive research on career development, Lent and Brown provided a guide for conceptualizing
and assessing the core constructs of SCCT: self-efficacy expectations, outcome expectations, interests, goals, and contextual supports and barriers. Important to note is that SCCT researchers often have to design new measures, rather than rely on general measures, depending on the unique features of the behavioral domain of interest and the level of detail they wish to study. Thus, SCCT research often requires a measurement development phase prior to, or in conjunction with, hypothesis testing (Lent & Brown, 2006).

**SCCT Core Constructs**

**Self-efficacy expectations.** The most central concept in SCCT is self-efficacy expectations, which represent a dynamic set of beliefs that will change over time. Self-efficacy refers to an individual’s perception of his or her own ability to organize and execute a plan of action. An individual’s self-efficacy interacts with performance as well as person, behavior, and contextual factors and will shift along with the successes and failures he or she experiences across time (Lent et al., 1994). Furthermore, an individual’s self-efficacy expectations directly impact his or her outcome expectations, choice goals, choice actions, and performance attainments, all important factors in career-related behavior (Lapan, 2003). Self-efficacy is not a unitary trait and is further described as a set of self-beliefs that are connected to particular performance domains and activities (Lent et al., 2005). The most common ways to conceptualize and measure self-efficacy in SCCT research include (a) content or task-specific self-efficacy, which refers to beliefs in one's ability to perform the specific tasks required to succeed within a given domain under normative conditions, and (b) coping efficacy, which refers to beliefs in one's ability to negotiate particular domain-specific obstacles (Lent & Brown, 2006).

According to Gore (2006), by the year 2005, more than 3,000 articles included the concept of self-efficacy. Multiple scholars from diverse research areas have found self-efficacy
to be an important determinant of behavior in such fields as business, athletics, medicine, health, media studies, social change, political change, moral development, psychology, psychiatry, psychopathology, and international affairs. Since the introduction of Bandura’s social learning theory, the construct of self-efficacy has occupied a central role in psychologists’ attempts to understand and predict human behavior. According to Gore (2006), more than 11% of all articles published between 2001 and 2006 in the Journal of Counseling Psychology, Journal of Vocational Behavior, and Journal of Career Assessment included a reference to self-efficacy in their titles or abstracts. The self-efficacy concept has been especially prominent in educational research, where scholars have reported that—regardless of previous achievement or ability—self-efficacious students work harder, persist longer, persevere in the face of adversity, have greater optimism and lower anxiety, and achieve more (Parejas, 2005). Furthermore, students who believe they are capable of performing academic tasks also use more cognitive and meta-cognitive strategies than those who do not.

Self-efficacy beliefs are assumed to be acquired and revised through four primary informational sources: (a) personal performance accomplishments, (b) vicarious learning, (c) social persuasion, and (d) physiological and affective states. Personal accomplishments have the potential to exert the greatest influence on self-efficacy. Success experiences tend to raise (and failure experiences to lower) self-efficacy in relation to a given task. Observing successful models, being exposed to supportive messages and experiencing facilitative affective states can also promote growth of self-efficacy in a particular domain. The degree to which these informational sources actually affect self-efficacy depends on such factors as how the individual attends to, remembers, and interprets them (Bandura, 1997).

Self-efficacy for career decision making has also been investigated and refers to an
individual's belief that she or he can complete specific tasks related to making a career decision. Many studies have examined career decision self-efficacy using predominately white students (Germeijs & Verscherren, 2007) and very few researchers have studied this same variable with minority students (O’Brien et al. 2000). Career decision-making self-efficacy has been found to be related to career exploration behavior (Blustein, 1989), academic integration (Peterson, 1993), and career maturity (Creed & Patton, 2003; Luzzo, 1995). Research reveals conflicting results regarding ethnic differences in career decision self-efficacy, with some findings indicating higher levels for African Americans in comparison to Whites (Chung, 2002) and other results suggesting higher levels for White students than for ethnic minorities (Gloria & Hird, 1999).

**Outcome expectations.** Another important concept in SCCT is outcome expectations, which refer to beliefs about the consequences or outcomes of performing particular behaviors. Lent et al. (1994) proposed that career-related outcome expectations may map fairly neatly onto, and incorporate traditional categories of work values (e.g., altruism, compensation, autonomy). Several types of outcome expectations have been identified, such as anticipated social (e.g., benefits to one's family), material (e.g., financial gain), and self-evaluative (e.g., self-approval) outcomes (Bandura, 1986). Outcome expectations also differ in evaluative direction and strength. People are prone to attempt behaviors they see likely to gain them highly valued outcomes and to avoid behaviors that may result in particularly adverse consequences. Although both positive (Lent et al., 2001) and negative outcome expectations (e.g., Hackett, Betz, Casas, & Rocha-Singh, 1992) have been studied in relation to career-related interest, choice, and performance criteria, positive outcomes have received more focus thus far in SCCT research.

**Goals.** The concept of goals is also important in SCCT. Specifically, SCCT is concerned with two primary types of goals: (a) choice-content goals, referring to the type of activity domain
one wishes to pursue, and (b) performance goals, that is, the level or quality of performance toward which one aspires within a given domain. Choice goals (e.g., intention to select a given college major) motivate students and workers to pursue their preferred educational and vocational options (Lapan, Shaughnessy, & Boggs, 1996; Lent, Brown, Schmidt, et al., 2003), whereas performance goals help determine the level of success (e.g., grades) that individuals achieve at chosen tasks (Phillips & Gully, 1997; Wood & Locke, 1987).

**Interests.** The concept of interests, which refers to people's patterns of likes, dislikes, and indifferences regarding different activities, is also central in SCCT (Lent et al., 1994). Self-efficacy and interest formation are related because as individuals mature, they are likely to maintain interest only in those activities for which they perceive positive outcomes and feel efficacious (Lent et al., 1994). An individual’s sense of self-efficacy, strengthened by interests, in turn may help an individual to determine his or her future goals.

**Proximal contextual variables.** SCCT is also concerned with proximal contextual variables, in particular, environmental supports (facilitative influences) and barriers (obstacles) that people anticipate will accompany their goal pursuits. Beneficial environmental conditions (i.e., the presence of strong supports and low barriers) are assumed to strengthen goals and their likelihood of being enacted. Contextual supports and barriers can be characterized as either documented (e.g., parental income) or perceived aspects of the environment (e.g., availability of career role models, the presence of gender bias). An SCCT approach with objective or perceived environmental features would require examining more specific types of supports and barriers (e.g., social, financial, discriminatory) that may promote or deter career behavior (Lent et al., 2005). Proximal influences can also be seen as intermediate outcomes in that they reflect the effects of more distal background outcomes that include person inputs and learning experiences.
Proximal and distal factors represent active constructions or processes that can, by themselves, affect key career outcomes, choice actions and performance attainments. Thus, the core SCCT variables can be viewed as both dependent and independent variables. In summary, environmental variables are divided into two basic categories according to their relative proximity to the career choice-making process.

Figure 1 depicts the relationships between the previously described SCCT constructs as they relate to career choice behavior. The first category (shown in the lower left part of Figure 1) contains distal background contextual affordances that affect the learning experiences through which career-relevant self-efficacy and outcome expectations develop. These background factors and person inputs such as gender, race/ethnicity, and health status impact each other and also impact the learning experiences that directly affect self-efficacy and outcome expectations. In turn, learning experiences directly influence self-efficacy expectations and outcome expectations. Self-efficacy and outcome expectations also influence each other. The second, proximal category of contextual influences is particularly important during active phases of educational or career decision making (see the upper right part of Figure 1). According to SCCT, proximal environmental variables can moderate (dotted lines in Figure 1) and directly affect (solid lines in Figure 1) the processes by which people make and implement career-relevant choices. Specifically, proximal (and anticipated) contextual factors may moderate the relations of (a) interests to choice goals, and (b) goals to actions. Also shown in Figure 1, one's primary interests, which are directly influenced by one's self-efficacy and outcome expectations are likely to prompt corresponding goals (e.g., social interests lead to intentions to pursue a social-type career), which, in turn, promote choice-relevant actions (e.g., applying for a training program related to one's goal). However, proximal contextual influences help determine how these
processes unfold. As illustrated in Figure 1, outcome expectations directly influence interests, goals, and actions.


In the following sections, I first review the limited number of studies that investigate Hispanic career interests and choice behaviors, including the domain of STEM fields, and ethnic identity within the SCCT framework. Studies in which a combination of Hispanics, other ethnic minorities, and European-Americans were sampled are also included in order to achieve the most comprehensive examination of the topic.
SCCT Research with Hispanics

Very few published vocational psychology studies have examined the validity of established career development theories for Hispanics (Navarro, Flores, & Worthington, 2007). These studies are critical in providing a greater base of knowledge about factors influencing the educational and career development among Hispanics (U.S. Census Bureau, 2000). In an early study by Bores-Rangel, Church, Szendre, and Reeves (1990), the authors extended previous studies by conducting most analyses at the level of the individual occupation and school subject (i.e., within-individual analyses), supplementing the usual aggregate-level (i.e., between-individuals) analyses. The authors investigated relationships between self-efficacy and other SCCT variables across a fairly large and representative set of occupations, as well as several academic programs. The sample was disadvantaged students from migrant or seasonal farm worker backgrounds attending a High School Equivalency Program (HEP).

Using 69 occupational activities selected from the United States Employment Service (USES) Interest Inventory (U.S. Department of Labor, 1981), separate ratings of self-efficacy (i.e. confidence in their ability to perform or learn to perform the occupational activities), interest (i.e., whether they would like, dislike, or be indifferent to the activities), and extent of consideration (i.e., the extent to which they would consider doing the activities for their career) of the occupational activities were obtained. In addition, participants rated how much each occupational activity would satisfy their most important occupational incentive or value, using a list of incentives (e.g., benefit society, good pay, doing things for people, active and busy) adapted from Wheeler (1983). Students also rated their self-efficacy and extent of consideration for six educational programs (e.g., an apprenticeship, job training, vocational school, business college, community college, four-year college). Measures of academic effort and performance
included teacher ratings of effort in their HEP classes, the GED test, and the General Aptitude Test Battery (GATB).

Consistent with SCCT, the researchers found moderate to strong relationships between participants’ extent of consideration of occupational activities and their self-efficacy, interest, and perceived incentive satisfaction for the activities. Self-efficacy for the academic programs was moderately related to GED achievement but not to GATB aptitude or teacher rated effort in each area. Strengths of the study included the test of Bandura's theory at the level of specific occupations using within-individual, in addition to aggregate-level, analyses; the use of a larger and more representative collection of occupations than in previous studies; the inclusion of additional variables such as incentives and abilities that provided a more complete test of the self-efficacy model; and the extension of the self-efficacy model to a more economically disadvantaged population.

Regarding limitations, the teachers' ratings of effort and progress may not have been sufficiently reliable and valid to enable significant correlations with self-efficacy expectations. Also, only a small number of students (N = 35), particularly women (N = 9), were available for the research, although this was less of an issue for the within-individual analyses. Suggestions for future research include examination of self-efficacy in relation to actual occupational choice rather than the proxy extent of consideration variable; studies of perceived barriers to occupational attainment (e.g., discrimination, lack of money) as moderators of the self-efficacy versus extent of consideration relationship; longitudinal and path analytic studies designed to disentangle the causal relationships among self-efficacy, interest, occupational consideration, and other relevant variables (e.g., see Lapan et al., 1989); and intervention studies that draw on Bandura's (1977) proposed sources of efficacy information to increase the self-efficacy for
occupations of disadvantaged and other individuals.

In another early study by Church, Teresa, Rosebrook, and Szendre (1992), the authors sought to replicate and extend the findings of Bores-Rangel et al. (1990), again sampling High School Equivalency students (N = 85) from migrant farmworker backgrounds. The authors extended the previous study (a) by investigating gender differences in self-efficacy and extent of consideration of male-dominated, gender-balanced, and female-dominated occupations in this population, and (b) by examining the relationship between individuals' actual aptitude and their generality of self-efficacy (i.e., their self-efficacy across a range of occupations). In within-individual analyses, participants' extent of consideration of 31 representative occupations was significantly predicted by their self-efficacy, interest, and perceived incentive satisfaction for the occupations. In addition, participants' generality of self-efficacy (i.e., the range of occupations for which they felt self-efficacious) was correlated with the range of occupations they were willing to consider but not with their GATB aptitude scores. Finally, both men and women showed greater self-efficacy and willingness to consider occupations dominated by their own gender. As in the Bores-Rangel et al. (1990) study, the results were largely supportive of SCCT and suggested that the theory has value in understanding the career choices of this special population (i.e., largely Hispanic high school equivalency students from migrant farmworker backgrounds).

A study by Flores and O’Brien (2002) examined the influence of contextual and social cognitive variables on career aspirations, career choice prestige, and traditionality of occupational choice. The authors explored the influence of background contextual variables, such as acculturation level, feminist attitudes, mother's educational level, and mother's occupational traditionality on nontraditional career self-efficacy. In addition, they investigated
the contributions of nontraditional career self-efficacy, nontraditional career interests, parental support, and perceived barriers to career choice prestige, career choice traditionality, and career aspirations. Participants were Mexican American adolescent females and males enrolled in their senior year of high school. Mexican American adolescent males were surveyed for a later study. A total of 931 surveys were distributed to students and 831 were returned (450 female, 381 male), resulting in an 89% return rate. Only females who were in their senior year of high school and who identified as Mexican American were included in this study \((n = 377)\). Of these females, 13 were dropped from the study because of incomplete data, resulting in a total female sample of 364. Instruments included the Acculturation Rating Scale for Mexican Americans (ARSMA-II; Cuellar, Arnold, & Maldonado, 1995), Attitudes Toward Feminism and the Women's Movement Scale (FWM; Fassinger, 1994), a short form of the occupational self-efficacy questionnaire used by Church et al. (1992), Career Support Scale (CSS; Binen, Franta, & Thye, 1995), Perceptions of Barriers scale (POB; McWhirter, 1997), and Career Aspiration Scale (CAS; O'Brien, 1992).

The sample of 364 Mexican American young women was randomly split into two samples. A sample consisting of 262 women was used to test the original models, and a validation sample consisting of 102 women was set aside for confirmation purposes in the case that any of the models were revised. Path analyses were conducted to determine the influence of contextual and social cognitive variables on career choice prestige, traditionality of occupational choice, and career aspirations. Each of the original models tested exhibited poor fit in the initial sample until additional paths were introduced based on modification indices. After the modifications, each of the models showed acceptable fit and replicated well in the validation samples.

The hypothesized model predicting career choice prestige tested the paths from
acculturation level, feminist attitudes, mothers' educational level, and mothers' occupational traditionality to nontraditional career self-efficacy; nontraditional career self-efficacy to nontraditional career interests; and nontraditional career self-efficacy, nontraditional career interests, parental support, and perceived future barriers to career choice prestige. The exogenous variables, which included the background and proximal contextual variables in the model, were allowed to covary. The model predicting career choice prestige was improved by adding paths from acculturation level and feminist attitudes to career choice prestige. When rerun in the total sample, the \( R^2 \) for the model indicated that 8% of the variance in career choice prestige was accounted for by the model, although not all hypothesized paths were statistically significant (see below). The hypothesized model predicting career choice traditionality tested the same paths identified in the career prestige model, except that career choice traditionality was used as the criterion variable. Paths were added from acculturation level and feminist attitudes to career choice traditionality. The revised model was run in the total sample and the squared multiple correlation indicated that 11% of the variance in career choice traditionality was accounted for by the model, although not all of the hypothesized predictors were statistically significant.

Finally, the third hypothesized model tested the same paths identified in the previous models, except that career aspiration was used as the criterion variable. An additional path from feminist attitudes to career aspirations was included. After rerunning the revised model in the total sample, the squared multiple correlation for the model indicated that 13% of the variance in career aspirations was accounted for by the model, although not all hypothesized paths were statistically significant.

Considering the three models together, there were no significant paths relating the background contextual variables of acculturation level, feminist attitudes, mothers’ educational level,
level, mothers’ occupational traditionality, and nontraditional career self-efficacy. Significant predictors of greater career choice prestige were the following: greater acculturation, greater nontraditional career self-efficacy, greater parental support, and less perceived barriers. Acculturation level and feminist attitudes were significant positive predictors of traditionality of career choice, while nontraditional career self-efficacy was negatively related to the traditionality of career choice. Finally, significant predictors of higher career choice aspirations were the following: higher parental support and higher levels of feminist attitudes.

The findings highlight the salience of addressing cultural and familial expectations when providing career counseling to Mexican American women. Also, counseling psychologists should be encouraged to develop innovative career intervention programs for Mexican American adolescents that involve parents and other family members. Researching the effectiveness of parental involvement in vocational intervention programs in students’ educational and career planning is strongly recommended. Also, students reported that proximity of the college/university to their home was one of the most important factors in choosing a college/university. Thus, in future studies, researchers can examine how attending college in the same hometown facilitates or hinders attrition and graduation rates as well as the career orientation of Mexican American women.

Future researchers should also consider incorporating additional variables not included in the SCCT model of career choice (Lent et al., 1994), given that the hypothesized models only accounted for 8%, 11%, and 13% of the variance in the prediction of prestige, traditionality, and career aspirations, respectively. Since the proximal contextual variable of parental support contributed to Mexican American women’s career choice prestige and career aspirations, consideration of other contextual variables that may contribute to their career goals is warranted.
In addition, environmental factors related to school (i.e., vocational guidance programs in the school), which are not included in Lent et al.’s model, should be investigated. Future studies should also attempt to improve on the psychometric properties of the measures used in this study and to develop new instruments for use in research with this population. Additional testing of the revised model with several samples of Mexican American women is necessary to determine if these results can be generalized. Research is also needed to evaluate the validity of Lent et al.’s (1994) model with Mexican American boys and men. Furthermore, additional research is needed to investigate the ways in which the social environment limits the educational and occupational opportunities of Mexican American women.

A longitudinal study that assesses the career orientation of Mexican American women at periodic intervals following high school graduation is recommended. In addition, future studies could investigate the barriers encountered by students who do not complete college and explore the characteristics shared by those who successfully complete college. Counseling psychologists could then develop empirically based interventions to optimize success in college. Lastly, the study highlights that it may be beneficial to assess level of acculturation when sampling Mexican American participants due to the possible salience of cultural influences. The study advanced knowledge regarding the explanatory power and limitations of SCCT (Lent et al., 1994) in describing the career development of Mexican American adolescent women. Since Mexican American women are largely underrepresented in higher education and in nontraditional, high-prestige occupations, investigating their educational and career aspirations at a critical decision-making time of their lives (e.g., during their senior year in high school) seems critically important. Such information could inform counseling interventions aimed at this population to enable Mexican American women to pursue academic and career opportunities that correspond
with their ability and maximize their potential for educational and vocational success. Furthermore, in future research it is recommended that researchers investigate the contributions of related academic and social experiences, persuasion, and familial expectations in future models to account for the role of learning experiences in the development of Mexican American women's nontraditional career self-efficacy. In addition, studies should examine the impact of both acculturation, enculturation, and their combination on the career choice behavior of Mexican American individuals. Lastly, future research studies should assess the quality of mother-daughter relationships as a predictor of daughters' career self-efficacy.

In another study, Flores, Ojeda, Huang, Gee, and Lee (2006) examined the impact of acculturation, problem-solving appraisal, and career decision-making self-efficacy on the educational goals of 105 Mexican American high school students within a SCCT framework. After completing a demographic survey, the revised version of the Acculturation Rating Scale for Mexican Americans (ARSMRA-II; Cuellar, Arnold, & Maldonado, 1995) was administered to assess individuals' orientation to Mexican and Anglo cultures. A 25-item abbreviated version of the 50-item CDMSE-Short Form (Betz, Klein, & Taylor, 1996) was used to assess confidence in abilities to engage in career decision-making tasks. Also, the 35-item Problem Solving Inventory (PSI; Heppner, 1988), which measures perceived problem-solving abilities, was used. Educational expectations and educational aspirations were each assessed by an item that asked students to indicate the highest level of education they expected and hoped to complete, respectively. These two items were averaged to obtain a single indicator of students' ambitions for their educational training. Indices of educational goals were derived from the work of Farmer et al. (1981; see also Farmer, 1985) and have also been used in other studies (McWhirter et al., 1998; McWhirter, Larson, & Daniels, 1996).
Two separate analyses of variance were performed to examine gender and age differences, and the results indicated no significant gender differences, $F(1, 103) = 0.36, p = .55,$ or age differences, $F(3, 101) = 1.60, p = .19.$ Therefore, the main analysis was run on the entire sample. A standard multiple regression analysis was conducted to determine whether Anglo-orientation, Mexican-oriented enculturation, problem-solving appraisal, and career decision-making self-efficacy contributed significant variance in the prediction of educational goals. The findings suggested that Mexican American students who were more acculturated to the Anglo or dominant culture set higher educational goals than did their less Anglo-acculturated peers.

Interestingly, the authors found that Mexican-oriented enculturation was not related to educational goals. The authors noted that the findings need to be understood in the context in which the sample was drawn. The participants lived in a rural community near the Texas-Mexican border. The socialization experiences these students encountered may be different from those of their Mexican American counterparts living in other areas of the country. Furthermore, the authors found that positive perceptions of problem-solving appraisal contributed significantly to Mexican American students' educational goals. The regression results failed to establish a relationship between career decision-making self-efficacy and educational goals. Yet, considering concerns of collinearity between the career decision-making efficacy variable and other predictor variables, structure coefficients were also examined, and these results suggested that career decision-making self-efficacy is as important a predictor as problem solving appraisal. Therefore, these findings also suggested that improving Mexican American students' career decision-making skills increases their educational goals. This study additionally highlighted the benefit of linking acculturation and career-related variables. It is important to note that only $19.5\%$ of the variance in educational goals was accounted for by the regression
The authors stated that future research should investigate the influence of other psychosocial and sociocultural variables consistent with SCCT in the prediction of educational goals with Mexican American students. In addition, research should examine potential intervening variables that may mediate the relation between Anglo-oriented acculturation and educational goals, such as role models and access to resources. Future research should also consider examining Mexican American youth from urban and suburban areas across the country to better understand their career development processes. Researchers are encouraged to consider conducting longitudinal studies with Mexican American students throughout high school to better understand the relations of these variables over time. Future researchers may consider using alternative measures to explore the link between these variables and educational goals.

The authors stated that given the rise of Latino/as in the United States, and the striking academic achievement gap between Latino/as and other racial-ethnic groups, it is critical that vocational researchers continue to investigate the factors that may positively influence the educational decision making and goals of Mexican American youth.

Flores, Navarro, Smith, and Ploszaj (2006) examined whether background contextual variables such as acculturation level, parental support, and perceived gender barriers would predict self-efficacy for nontraditional career choice goals of 302 Mexican-American adolescent men. This study tested an extended version of Lent, Brown, and Hackett's (1994) career choice model with contextual variables. Nontraditional career self-efficacy was hypothesized to predict nontraditional career interests, and both nontraditional career self-efficacy and nontraditional career interests were expected to predict nontraditional career choice goals. The primary investigator collected data in every section of the senior-level English courses at both high
schools in the district. Participating students received packets containing a demographic data form and research instruments including the ARSMA-II (Cuellar, Arnold, & Maldonado, 1995), the Perceptions of Barriers Scale (McWhirter, 1997), a modified version of the Career Support Scale (Binen, Franta, & Thye, 1995), and a modified version of the occupational questionnaire employed by Church, Teresa, Rosebrook, and Szendre (1992).

The total sample of 302 Mexican American adolescent men was randomly split into two equal groups of 151 in case a second group was needed for validity testing. A multiple group analysis was performed to compare the models for Groups 1 and 2 simultaneously. The researchers conducted a path analysis using the EQS (version 5.7) statistical package (Bentler & Wu, 1995) to test the adequacy of the hypothesized model of nontraditional career choice for Mexican American adolescent men. Model fit was determined by using a variety of goodness-of-fit measures including the chi-square test, comparative fit index (CFI), goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMR). The model was revised in order to improve the fit indices. A chi-square difference test indicated that the revised model was a significant improvement over the hypothesized model.

The results supported a modified path model in which Mexican American adolescent men's nontraditional career self-efficacy was predicted by acculturation level and parental support. The findings suggested that Mexican American boys who were more acculturated into the dominant culture were more likely to develop stronger beliefs about their ability to perform nontraditional careers for men. Perceived occupational barriers related to sex discrimination did not predict nontraditional career self-efficacy. Other findings supported the generalizability of several of the hypothesized relationships between the contextual and social cognitive variables.
and nontraditional career choices in Mexican American adolescents. The results also provided evidence for the significance of parental support as a background contextual variable in the career choice process. Furthermore, this study expanded previous research about how different levels of acculturation can influence career-related variables.

Future research of this type is needed to examine whether perceived sex-related barriers—as well as actual experiences of sex discrimination among adult Mexican American men employed in nontraditional careers—are directly related to career choice selection. Also, future research could determine if the relationship between career interests and nontraditional career choice is replicated in other samples of Mexican American boys. Moreover, additional research is needed that examines the selection of occupations that are traditional and nontraditional for Mexican Americans in the United States. Such information will fill a gap in the vocational literature and could provide important information regarding the career choice behaviors and patterns of this group.

The next study was unique in that the authors conducted a program evaluation on an intervention program. Perry, DeWine, Duffy, and Vance (2007) evaluated the effect of a school-based psycho-educational intervention program, called Tools for Tomorrow (TFT), on the academic self-efficacy of mostly minority urban youth. The Tools for Tomorrow program was designed to facilitate career exploration and career decision-making skills of urban adolescents. The sample consisted of 64 students enrolled in the ninth grade (51% male, 49% female) from diverse racial and ethnic backgrounds (approximately 45% African American, 41% Hispanic, 7% Asian, and 9% White). All of the participants attended an urban public high school located in a large Northeastern city. Packets containing a variety of measures assessing career development, school engagement, and social support as part of a larger study were distributed to participants 1
week before and 1 week after the Tools for Tomorrow program was delivered with parental consent and student assent. Pre-intervention and post-intervention interviews were conducted among eight individuals (4 boys and 4 girls) who were randomly selected from the sample of 64 participants. Using a mixed-methods design, data were collected using the Academic Self-Efficacy Scale (ASES; Hemond-Reuman & Moilanen, 1992) and eight semi-structured interviews over the course of an academic school semester.

In the data analyses, academic self-efficacy was selected as the quantitative outcome to be contrasted with qualitative data. A mixed-methods design was thus employed. The authors expected that the validity of the quantitative scores would be challenged through comparison with the qualitative results. The following two hypotheses were tested: (1) pretest scores on the quantitative measure of academic self-efficacy (Time 1) would not be significantly different from scores collected at the end of the intervention (Time 2), and (2) interview assessments of developmental specificity (i.e., level of sophistication and concreteness) of variables associated with academic self-efficacy (i.e., use of academic skills and formation of goals) would be greater at Time 2 than at Time 1.

The findings confirmed the first hypothesis and provided support for the second hypothesis. No statistically significant difference in the academic self-efficacy scores was revealed between Time 1 and Time 2. However, differences were revealed in developmental specificity between Time 1 and Time 2 among the interviewed students. Although the quantitative results cannot be discounted based on the qualitative results, the qualitative results do lead credence to the notion that subjectively constructed attitudes, procedural knowledge, and goals that are reflective of increases in academic self-efficacy may not be accessible vis-à-vis self-report measures. Indeed, an alternative method for assessing such change may involve data
constructed from the voices of the participants themselves. As illustrated in this study, it was useful to incorporate a mixed-methods approach to understand and measure change in key psychological outcomes (e.g., academic self-efficacy) instead of quantitative methods alone.

The study had several limitations. First, a pretest–posttest design was conducted without a control group, leading to internal threats to validity (e.g., normal maturation and history effects). Second, the authors did not administer a measure of career development to assess whether other aspects of career development such as increased vocational identity, career self-efficacy, or career exploration was facilitated by the intervention. This might have provided indirect support that academic self-efficacy was also enhanced. Third, other quantitative measures of academic self-efficacy may have led to different results. The quantitative measure that was used had a comparably lower internal consistency reliability estimate at Time 2. Future program development projects should examine whether they go beyond the components of career exploration and career assessment that already take place in traditional school-based career activities. Also, future research should replicate the researchers’ findings using multiple indexes of academic self-efficacy (or related outcomes) and multiple sources of qualitative data. For example, several domains of academic self-efficacy (e.g., math, reading) could be assessed in concert with the students’ and the teachers’ views about how confident they are in their academic skills and goals and how specified or well-defined such skills and goals have been over time. In addition, future research could confirm the utility of developmental specificity ratings in a larger sample of informants. As noted by Hill et al. (2005), a sample size of only eight participants falls towards the low end of the size advisable for conducting consensual qualitative research (CQR; Hill, Thompson, & Williams, 1997). Nonetheless, Perry et al. stated that subscribing to a mixed-methods approach as a normal standard for research in the field will lead to a more complex (and
accurate) knowledge base to better guide and inform public policy.

**SCCT and Gender Differences**

Some SCCT research with ethnic minorities has focused specifically on gender differences and women's career development (Flores & O'Brien, 2002; Gianakos, 2001; Rollins & Valdez, 2006). Other studies have included gender as an additional variable within the SCCT model. Regarding gender differences, women of color may have particularly low self-efficacy and outcome expectations due to experiences with oppression and racial bias (Byars & Hackett, 1998). The gender distribution of jobs remains vastly disproportionate, especially among minority groups (Reyes, Kobus, & Gillock, 1999). Women continue to be overrepresented in jobs that are traditionally occupied by females and underrepresented in many high-status, high-paying occupations (U.S. Bureau of Census, 1994). Although there is evidence that barriers exist that impede women's access to more male-dominated jobs, researchers have also found that many women are simply continuing to choose female-dominated occupations (Church, Teresa, Rosebrook, & Szendre, 1992; Eccles, 1994; Gerstein, Lichtman, & Barokas, 1988).

Given these issues, researchers have considered the factors that may underlie women's choice of occupations. SCCT provides one viable framework for understanding these factors. For example, Perrone, Sedlacek, and Alexander (2001) examined barriers to, and facilitators of, career goals among college students within the framework of SCCT with a particular focus on gender and ethnicity. Staff of the university counseling center designed a questionnaire to assess the academic and career-related goals, perceived barriers to goals, and potential facilitators of goals for incoming college freshmen. The coefficient alpha reliability estimate for the overall questionnaire was .83. Questionnaires were completed by 2,743 college freshmen (1,426 males, 1,317 females). The ethnic composition of the sample was 64% White, 13% African American,
13% Asian American, 4% Latino/a American, 1% Native American, and 5% other. Participants were given a list of factors to choose from and asked which were important in their long-term career goals. The following hypotheses were investigated: (1) Gender differences exist among factors influencing career choice goals, (2) Ethnic differences exist among factors influencing career choice goals, (3) There are gender differences in perceived barriers to attaining career goals, (4) There are ethnic differences in perceived barriers to attaining career goals, (5) There are gender differences in academic resilience and career related help-seeking behaviors, and (6) There are ethnic differences in academic resilience and career related help-seeking behaviors.

In support of the first hypothesis, gender differences in career choice goals were found. When asked which variable was most important in their long-term career choice, the most frequent answer given by both men (25%) and women (29%) was an intrinsic interest in the field. However, the second most frequently endorsed item was high anticipated earnings for men (25%) and a well-respected or prestigious occupation for women (16%). Consistent with hypothesis 2, ethnic differences in career choice goals were also observed. Intrinsic interest in the field was the most frequently chosen variable influencing career choice goals among Caucasians (31%). In contrast, high anticipated earnings were the most frequently chosen variable influencing career choice goals among African Americans (24%), Asian Americans (24%), and Native Americans (43%). The third hypothesis was supported because there were significant gender differences in perceived barriers to attaining career goals. Men most frequently cited time management barriers (33%) and women most frequently cited personal finances barriers (25%). Consistent with the fourth hypothesis, there were significant ethnicity differences in perceived barriers to attaining career goals. Time management was the most frequently cited barrier by Caucasians (30%) and Asian Americans (31%). In contrast, personal
finances was the most frequently cited barrier by African Americans (30%), Latino/a Americans (31%), and Native Americans (43%). Contrary to their fifth hypothesis, men and women did not differ in their academic resilience and career-related help-seeking behavior. However, ethnic differences in these variables were observed, supporting hypothesis six. The order of the ethnic group means on the academic resilience scale (from highest to lowest) was Native Americans, Asian Americans, Latino/a Americans, Caucasians, and African Americans. The difference between African Americans and Native Americans was statistically significantly, indicating that the African Americans reported less academic resilience than the Native Americans.

Furthermore, Caucasians, Asian Americans, and Native Americans were more likely to exhibit help-seeking behaviors than were African Americans or Latino/a Americans.

A limitation of the study was that only freshmen entering college were included in the sample. Therefore, some caution must be exercised in generalizing the findings to college students at more advanced stages of their studies or to non-college educated individuals who may have more diverse career experiences. Second, the majority of the participants were Caucasian. Efforts to obtain larger ethnic minority samples would be helpful in future investigations. Third, weaknesses in the measurement of academic resilience and help-seeking behavior may account for the lack of gender differences found in the facilitating variables. In any case, this SCCT study lends support to the view that gender and ethnicity are important factors to include when examining the process of career development. Further research is needed to explore the effects of academic resilience, career-related help-seeking behavior, and other potential facilitating variables for achieving career goals. More sophisticated measures could be developed to assess facilitators. A deeper understanding of the process of career goal setting within the framework of the SCCT (Lent et al., 1996) would be useful. A longitudinal study that examines the variables
that influence career choice goals, barriers, and facilitators and looks at the outcomes (i.e., whether participants achieve career goals and to what variables they attribute their success or failure) over the years would be particularly helpful in increasing knowledge of this important topic.

In summary, the salient variables that were assessed in the studies with Hispanic samples and found to influence career development included acculturation, parental support, problem solving appraisal, perceived barriers (i.e., gender, discrimination), and career decision making self-efficacy, in addition to the core SCCT variables such as self-efficacy. Yet, there were limitations such as the small number of Hispanic participants in some studies. In the next section I turn to SCCT studies that have specifically addressed STEM disciplines, some of which have included ethnic minorities.

SCCT and STEM Research

Within the academic and career development literature, self-efficacy and SCCT have been studied in a wide variety of domains. Most relevant in the current section are studies that have examined possible predictors of students’ academic success and persistence in science and engineering fields (Brown, Lent, & Larkin, 1989; Lent, Brown, & Larkin, 1986, 1987; Siegal, Galassi, & Ware, 1985). In an early study by Lopez, Brown, Lent, and Gore (1997), the first goal was to extend prior research on mathematics self-efficacy by testing path models of academic interest and performance derived from SCCT. Prior investigations have tended to study mathematics self-efficacy in isolation from other theoretically important social-cognitive mechanisms. Therefore, secondly the authors explored hypothesized interrelations among self-efficacy, past performance and other efficacy source variables, and outcome expectations. Third,
they assessed mathematics self-efficacy using measures linked to specific course content rather than global course titles or common math problems. Lastly, although the majority of studies in this area have involved college students, they focused on high school students. This focus enabled an investigation of mathematics outcomes at a particularly important developmental juncture, when students are typically deciding whether to pursue additional mathematics instruction, a decision that may, in turn, affect their later range of career options (Betz, 1992). The authors used two separate samples of high school students, one enrolled in geometry classes and the other enrolled in advanced algebra classes, which enabled exploration of whether the models functioned similarly across two student cohorts representing somewhat different levels of math skill content and development. Participants were 296 students at a Midwestern high school and the racial—ethnic composition of the students in the geometry and algebra classes, respectively, was as follows: White, 93% and 91%; Black, 2% and 1%; Hispanic, 2% and 3%; Asian-Pacific Islander, 0% and 4%; and Native American, 2% and 1%. Measures of objective math ability, perceived sources of efficacy information, outcome expectations, course-specific self-efficacy, interest in math and science activities, and math course grades were obtained.

In the first model of mathematics interest, the authors hypothesized that mathematics interest is directly affected by mathematics self-efficacy and outcome expectations. In addition to its direct effect on interests, self-efficacy was expected to affect interests indirectly via its relation to outcome expectations. The authors tested the assumption that activity is derived largely from people’s perceptions of their capabilities rather than from objectively measured ability. In turn, they examined two alternative representations of the ability—interest link: a fully mediated model in which ability affects self-efficacy, which in turn gives rise to interests (i.e., the effect of ability on interest is fully mediated by self-efficacy), and a partially mediated
alternative model in which ability affects interest both directly and indirectly through self-efficacy (i.e., the effect of ability on interests is only partly mediated by self-efficacy). In the second model of academic performance, academic achievement as represented by end-of-term mathematics course grades was conceived as being influenced by both objective ability and self-efficacy beliefs. In turn, ability was assumed to exert a direct effect on grade performance as well as an indirect effect via self-efficacy. Self-efficacy was seen as partially mediating the effect of ability on performance. This target model was also compared with a fully mediated alternative model in which the effect of ability on grades operates exclusively via self-efficacy. In testing both the interest and performance models, the authors examined the effects that past performance accomplishments, vicarious learning, social persuasion, and physiological reactions have on self-efficacy.

Regarding results, the path analyses for mathematics-scientific interest provided good support for a model in which ability helps determine self-efficacy, which, in turn, nurtures outcome expectations and subject matter interest. The fully mediated interest model offered adequate fit to the data. Although ability did not produce a significant independent path to interests in either sample, direct model comparisons indicated that the fully mediated model did not fit the data significantly better than the partially mediated alternative model. Furthermore, in both the geometry and advanced algebra samples the effect of objective ability on self-efficacy was subsumed by the other sources of efficacy information and perceived past performance produced the largest path to self-efficacy. A significant path from social persuasion to self-efficacy was observed in advanced algebra sample but not in the geometry sample.

In the path analyses for academic performance, results were consistent with a partially mediated model of the effects of ability on course grades. Objective ability and self-efficacy each
produced significant direct paths to course grades. In addition, the partially mediated model, in which self-efficacy partially mediated the relationship between objective ability and course grades, fit the data significantly better than an alternative, fully mediated, model in both samples. Regarding gender, there were no significant gender differences found over the set of theoretical variables in the geometry sample; nor did gender interact significantly with the social-cognitive variables in predicting interests or grades in either sample. However, female students in the advanced algebra sample did earn higher course grades and reported experiencing more math-related social persuasion and vicarious influence than did their male peers. Goals were not included in the study and therefore the performance model tested was a simplified version of Lent et al.’s (1994) performance model. That is the tested model did not assess the conjoint effects of outcome expectations and goals on performance.

Further research is needed to determine whether such findings replicate across other samples and settings. Also, future research on the SCCT interest and performance models would do well to use alternative measures of ability and outcome expectations and to ensure proper correspondence between predictor and criterion variables in terms of task content and degree of domain specificity. It may be valuable to explore further the sources of outcome expectations. It would also be useful to devote further study to the interplay between outcome expectations and goals in relation to academic performance. In summary, the findings generally supported the models of interest and performance that were derived from Bandura's (1986) social-cognitive theory and its academic-career-specific-elaboration (Lent et al., 1994). The findings also suggested that SCCT helps explain the academic behavior of high school students at a developmental point that can be critical to their later career options (Betz, 1992). Although the results were fairly consistent across the algebra and geometry samples, somewhat higher fit
indexes were observed in the advanced algebra sample for both the interest and performance models. In addition, some sample-specific findings emerged (e.g., the presence of a gender effect on algebra grades that was not fully explained by the theoretical variables). Overall, the findings suggested the value of cross-validating path-analytic findings with independent samples (in this case the geometry and advanced algebra samples). The findings also support further efforts to apply social-cognitive theory to career and academic research and practice.

Both McWhirter (1997) and Richie, Fassinger, Prosser, and Robinson (1997) suggested the potential importance of social support in buffering the pervasive effects of racism on career development. These authors have observed that positive feedback from significant people in a student's life can help to counteract the influence of racially or culturally based occupational stereotypes. They also suggest that perceptions of support from others may be important in overcoming such environmental barriers to career choices and goals. To address this, Ferry, Fouad, and Smith (2000) examined the impact of family context on career choice behavior in math and science within the SCCT framework. The authors applied causal modeling techniques to test the Lent, Brown, and Hackett (1994) model of person, contextual, and experiential factors affecting career-related choice behavior. The hypotheses addressed the idea that biological attributes of a person (gender, race/ethnicity) are related to the structure of opportunity and the type of reinforcement individuals receive from the social and cultural environment. Participants were 791 undergraduate students who were 85% White/European American, 5% African American, 4% Asian American, 2% Hispanic/Latino, and 4% other. Familial variables included parental involvement, parenting style, socioeconomic status, parental math/science proficiency, and family relationships. These variables were construed as background contextual affordance variables in the SCCT framework.
This study utilized a combination of researcher-constructed and existing instruments. Items assessing interests, years and grades in math and science, parental role-modeling, parental expectations, parental encouragement, parental math/science proficiency, parental educational level, and parental occupational status were developed, pretested, evaluated, and modified by a research team that included experts in vocational psychology and measurement. A pilot study was conducted to determine the internal consistency reliability, clarity, and efficiency of wording of the questions for each scale. Items were eliminated or modified based on the pilot data according to accepted psychometric practice: Items with low item-total correlations and/or with severely skewed distributions were discarded or modified. The self-efficacy, outcome expectancies, and goals scales were based on previously developed instruments (Bieschke, 1993; Fouad, Smith, & Enochs, 1995) that were appropriately modified after pretesting with an age- and SES-appropriate sample. The Math Self-Efficacy Subscale was used to assess tasks that college students may encounter in both the math and science domains. The Math/Science Outcome Expectancies Subscale was based on an outcome expectancy scale developed for middle school students (Fouad et al., 1995) and was modified for college students. The Math/Science Interest Subscale was developed through the group iterative process and consisted of 17 6-point Likert items designed to assess interest in mathematics- and science-related activities. The Math/Science goals measure (MSG; Fouad et al., 1995) contained seven 6-point Likert items indicating levels of agreement or disagreement. Learning experiences were indicated by number of years in math and science classes and by grades in math and science classes. Four latent and one observed variable were used to assess Family Context. The first latent variable, Parental Involvement, was indicated by role-modeling, expectations, and encouragement. Items for these scales were also developed and evaluated through the group
iterative process. For the second latent variable, Parenting Style, measures of organization and control were taken from the Family Environment Scale (Moos & Moos, 1994). The third latent variable, Socioeconomic Status, was indicated by parental educational level, ranging from some high school to doctoral or professional degree, and parental occupational status as classified by Stevens and Cho (1985). The fourth latent variable relating to Family context, Relationships, included two subscales from the Family Environment Scale: Cohesion and Conflict. Lastly, the observed variable Parental Math/Science Proficiency was measured with four 6-point Likert scale items indicating amount of agreement or disagreement. Prior to an overall evaluation of the structural model, factor analyses and analyses of the raw data using Prelis2 were conducted to evaluate and clarify the constructs and scales and to detect psychometric problems. Following these analyses, the plausibility of the hypothesized causal system among certain person input variables, family context, learning experiences, math/science self-efficacy, math/science interests, and math/science goals was evaluated in a structural equation modeling analysis using the LISREL 8 computer program (Joreskog & Sorbom, 1993). Analysis provided estimates of the parameters in the model and several indexes assessing the fit of the model to the sample data.

A revised path model provided empirical validation of the SCCT model for this college student population. Parental encouragement, a family background context variable, was found to have significant direct effects on learning experiences (grades in math and science) and outcome expectancies. Significant direct effects were also found between gender and learning experiences and between age and learning experiences. Learning experiences were found to directly and positively influence self-efficacy and outcome expectations, which, in turn, increased interests and goals. Greater self-efficacy predicted greater outcome expectations and interests directly and positively influenced goals.
While the large sample size was a strength of the study, the study was conducted on a fairly homogeneous group of college students. Therefore, caution is needed in generalizing these findings to groups other than predominantly white freshmen and sophomores in college. The use of modeling processes may be a potential weakness in this research. Specifically, the complications that emerged during the confirmatory factor analysis conducted on the initially proposed measurement model may have resulted because the model was too broad and comprehensive and encompassed too much.

In addition to the complications arising from the confirmatory factor analysis, another limitation of the study was the psychometric properties of the measures. While it is important to construct and validate new instruments that effectively measure social cognitive variables, the inclusion of preexisting measures with established psychometric adequacy could have prevented some of the difficulties that were encountered in testing the measurement model. In order to test the path model with a measurement model that includes reliable indicators and minimal measurement error, further research should focus empirical attention on the measurement of family context variables, such as parental involvement, parenting style, and family relationships. Future studies might include more comprehensive factor analytic work on the measures prior to their inclusion in the model. Despite these limitations, the study provided a more comprehensive and thorough assessment of the multidimensional family context construct and enabled the researchers to empirically assess whether there are non-domain-specific aspects of family contextual affordance that are related to math and science career outcomes.

Lent, Brown, Brenner, Chopra, Davis, Talleyrand, and Suthakaran (2001) incorporated earlier qualitative findings to construct measures of the contextual supports and barriers individuals may perceive in the pursuit of math- and science-related educational options. In
addition, the researchers assessed the psychometric properties and correlates of these measures. Participants were 111 students (66 women, 45 men) in introductory psychology classes at a large eastern university. Fifty-one percent of the participants were European American, 22% were African American, 5% were Hispanic Americans, 17% were Asian Americans; and 5% reported other racial or ethnic identifications. Participants completed a battery of measures in group testing sessions. Measures included mathematics-related self-efficacy, outcome expectations, interests, course enrollment intentions, and perceived contextual supports and barriers, as well as barrier-coping self-efficacy, global (non-domain-specific) career barriers, and dispositional positive and negative affect. In addition, participants provided demographic and academic status information (e.g., intended major choice, year in college, math SAT scores) on a background questionnaire.

The study was part of a research program that involved a qualitative study of university students' perceptions of factors affecting their choice behavior. Findings suggested that students saw several classes of environmental factors (e.g., financial status, family influences, social support, role models, and mentors) as influential in their efforts to implement their career goals. Consistent with SCCT, the authors predicted that (a) perceived domain-specific (i.e., math/science) supports and barriers would be inversely related to one another; (b) perceived domain-specific barriers would produce no more than moderate, positive relations with measures of global career barriers and trait-negative affect, and negative relations with math/science outcome expectations; and (c) perceived domain-specific supports would produce no more than moderate, positive relations with measures of math/science outcome expectations and trait-positive affect. In sum, the authors sought to replicate and extend earlier findings on person variables in SCCT models of interest development and academic choice by examining the role of
The authors first assessed the extent to which math/science-specific support and barrier percepts related to a variety of conceptually relevant variables, such as global barriers, dispositional affect, coping efficacy, and outcome experiences. Next, the incremental utility of support and barrier percepts (beyond interests, task self-efficacy, and outcome expectations) was examined in predicting choice of math/science educational options. The predictive contribution of coping efficacy vis-à-vis task self-efficacy was also explored. Then, two competing models by which contextual support and barrier percepts might affect choice options were tested. One model specified that support and barrier percepts are linked directly to goals; the other hypothesized that their linkage to goals is partly mediated by self-efficacy beliefs. Finally, they tested SCCT's predictions that supports and barriers moderate interest-choice relations (Lent et al., 1994).

The researchers found that perceptions of domain-specific (i.e., math/science) supports and barriers were related to, yet relatively distinct from, dispositional negative affect and global barriers. Second, perceived math/science supports were found to correlate moderately with dispositional positive effect, suggesting that domain-specific support perceptions covary with, but are not reducible to, a general tendency to focus on the positive aspects of one's environment. Third, barriers were minimally related to outcome expectations, whereas support perceptions were moderately associated with outcome expectations. Fourth, supports and barriers were inversely related; that is, the perception of greater supports was associated with fewer perceived barriers. Fifth, coping efficacy was found to relate to math course self-efficacy, barriers, and supports in ways that largely conformed to predictions. Specifically, higher coping efficacy was associated with the perception of lesser barriers, greater supports, and higher content (math
course) self-efficacy. Findings were also consonant with SCCT's choice model in that interests served as strong predictors of the choice criterion. Outcome expectations were linked to choices both directly and indirectly, via their relations to interests. The self-efficacy-choice link, meanwhile, was fully mediated by interests and outcome expectations.

There were several weaknesses of the study. First, barrier perception scores tended to be fairly low, whereas supports were experienced as relatively high. It may, therefore, be valuable in future studies to include samples that are likely to display wider ranges of support and perceived barriers (e.g., greater barriers and less support). Also, this study employed overall environmental perception scores, rather than examining the effects of specific types of barriers (e.g., social discouragement) or supports (e.g., availability of mentors). It is possible that certain kinds of barriers and supports are more influential than others and that such differential potency is masked by the use of aggregate scale scores. Thus, it would be valuable to examine the factor structure of the present measures of supports and barriers as well as the predictive utility of specific categories of supports and barriers. It should also be noted that math SAT scores were self-reported scores and that the scores were not verified. Future research recommendations include further study of the role of contextual factors in the academic and career choices of students representing diverse cultures and differing levels of acculturation. A strength of this study was that it contributed to the limited body of research on SCCT contextual variables. Most SCCT studies have focused on cognitive-person variables.

In a cross-cultural study by Mau (2003), the SCCT model was utilized to investigate the persistence of students’ career aspirations in science and engineering (SE) as a function of race and sex. The authors expanded upon the limited research concerning factors associated with persistence of women and minorities in aspiring to SE-related careers. The authors used data
from the National Educational Longitudinal Survey of 1988 (NELS: 99; see National Center for
Educational Statistics [NCES], 1990), which consisted of base year, first follow-up, second
follow-up, and third follow-up assessments. Specifically, the sample included participants who
indicated in the eighth grade that they aspired to SE careers and persisted for 6 years in the same
career aspirations. Differences in race and sex, as well as the variables previously identified as
important in predicting occupational attainment, were examined. Persistent racial minority and
female students were compared with nonpersistent racial minority and male students with regard
to their self-concepts, parental expectations and educational involvement, socioeconomic status,
and academic achievement. A logistic regression model was used to determine the relative
importance of the variables in explaining persistence in SE aspirations. The following
hypotheses were investigated: (1) sex differences exist in persistence in SE aspirations; (2) racial
differences exist in persistence in SE aspirations; (3) differences between persisters and
switchers exist in self-efficacy, academic achievement, socioeconomic status, and parental
expectations; and (4) there are unique contributions of sex and race in predicting persistence in
SE aspirations.

Regarding dependent variables, persistence in SE career aspirations was measured by the
following survey question, which was first administered to eighth graders: "Which occupation do
you expect or plan to have when you are 30 years old?" Responses involving SE professional
careers were identified and compared with the responses by the same individuals at three
different times during a 6-year period. Four clusters of independent variables were included: (1)
psychological variables: self-esteem (seven items, e.g., "I feel good about myself"), locus of
control (six items, e.g., "I don’t have enough control over the direction of my life is taking"), and
academic self-efficacy (four items, e.g., "Math is one of my best subjects" "English is one of my
best subjects”); (2) family variables: perceived parental expectations, socioeconomic status (i.e., a composite score of parent's education, occupation, and family income), parental school involvement (seven items, e.g., how often students have discussed selecting school courses or programs with parents), parental academic involvement (four items, e.g., how often parents attend school meetings), and number of siblings; (3) school variables: academic proficiency, measured by a composite of reading (21 items) and math (40 items) proficiency tests developed by the Educational Testing Service, academic program (general, academic, vocational, technical), school setting (urban, suburban, rural), school size, and school type (public or private/parochial schools); with the exception of academic proficiency, all school variables were coded as dummy variables; and (4) sex and race, both entered as dummy variables.

Of the initial 24,599 eighth-grade students, 827 students indicated an interest in SE occupations. 176 continued with the same aspirations in SE 6 years after they had been identified (persisters). In contrast, 583 changed their aspirations to non-SE careers (switchers). Sixty-eight students dropped out of school. Chi-square analyses were conducted to test Hypotheses 1 and 2.

Consistent with Hypothesis 1, the results showed significant differences in SE persistence as a function of sex ($X^2 = 17.01, p < .000$). Male participants (26.5%) were more likely than female participants (12.1%) to persist in their SE career aspirations. For Hypothesis 2, holding other factors constant, Hispanic students were less likely than White students to retain their SE aspirations. For Hypothesis 3, a multivariate analysis of variance revealed significant differences between persisters and switchers on several variables, $F(9, 413) = 4.22, p < .000$. The main effect for sex and the persistence × sex interaction were not statistically significant. Follow-up analyses indicated significant differences between persisters and switchers in academic proficiency, socioeconomic status, parental expectations, math self-efficacy, and reading self-
efficacy. On all of these variables, persisters scored significantly higher than switchers.

Lastly, a logistic regression analysis was conducted to examine Hypothesis 4. Results showed significant improvement in the fit of a model in which the school and psychological variables were added. Sex and race were entered in the model last and also revealed a significant improvement in the model after their addition ($R^2 = .227$). Two school variables, academic proficiency and math self-efficacy, were better predictors of SE persistence than sex was. Overall, less than one fourth of the students who aspired to SE careers maintained SE aspirations 6 years later.

A limitation of the study was that the researcher utilized existing general survey data and was thus limited to the survey questions available in the questionnaire. For example, because an appropriate measure of self-efficacy was not available, the author used locus of control and self-esteem to represent the self-efficacy construct. In addition, some data analyses were based on one-item responses so caution is needed in interpreting the results. The authors recommended more future research on factors influencing women's and racial minorities' persistence in the SE aspirations. Further studies could also include more rigorous measures. Since this study used logistic regression, a possible next step could be to use structural equation modeling to examine specific models within a SCCT framework. This study was unique in that it included the variable of gender and how it is related to race and STEM career aspirations.

An implication of the study is that achievement and confidence are key factors regarding persistence in SE career aspirations. Parents, teachers, and counselors must be aware of how their expectations and attitudes affect the math and science achievement of their students and, in turn, affect their students' vocational interests. A career development program developed by O’Brien, Heppner, Flores, and Bikos (1997), based on SCCT, has been shown to be promising in
enhancing students' confidence in performing tasks that are related to investigating, selecting, and implementing a career choice. Counselors could use SCCT to design similar intervention programs that address school, family, and psychological issues. Recognition of the relationships among these factors can aid counselors as they develop programs and plan interventions for their students. Given the unique contribution of sex and race factors in predicting SE persistence, counselors should take a proactive approach in tailoring developmentally-appropriate and culturally-sensitive career interventions for individuals from diverse cultural backgrounds.

Recently, Lent et al. (2000) called for consideration of environmental supports as well as barriers in models exploring career formation. The authors suggest that although research on the SCCT model has correctly highlighted the impact of contextual barriers in the development (or hindrance) of career interests, it has not adequately addressed the potential influence of contextual supports. Accordingly, these authors call for research that examines contextual supports (and individuals’ perceptions of them) that have the potential to influence interests, goals, and choices. Navarro, Flores, and Worthington (2007) were the first researchers to examine whether sociocontextual and sociocognitive variables explained the math/science goals of Mexican American middle school students \(N = 409\) within an SCCT framework. On the basis of work by Lent and colleagues (2001, 2003, 2005) and Flores, Ojeda, et al. (2006), the researchers altered the model to test direct paths from the perceived social support variables to math/science self-efficacy and from Anglo orientation to math/science goals. Also, in an attempt to enhance the model's cultural validity, culturally and socially relevant variables for Mexican Americans were examined, including generation status; Anglo orientation; Mexican orientation; social class; and perceived social support from parents, teachers, classmates, and a close friend. The potential for gender to moderate the relations among variables in the SCCT model was
tested.

In the model of SCCT tested, generation status was included as a person input factor that was hypothesized to influence learning experiences. Social class and acculturation were included as background contextual affordances. The relations of Anglo and Mexican orientation to learning experiences (i.e., past performance accomplishments in math and science) and Anglo orientation to math/science goals was tested. In accordance with SCCT, generation status (i.e., a person input factor) along with social class, Mexican orientation, and Anglo orientation (i.e., background contextual affordances) were hypothesized to indirectly influence self-efficacy and outcome expectations via their help in shaping learning experiences. Together, self-efficacy and outcome expectations were then hypothesized to shape career interests and to influence career goals, choice, and performance both directly and indirectly via their relationship with career interests (Lent et al., 1994). Perceptions of social support from parents, teachers, classmates, and a close friend were included as proximal contextual affordances in the model tested. The present study also explored the relationship between perceptions of social support from specific sources (e.g., parents, teachers, classmates, and close friends) and self-efficacy. The researchers sought to include variables in the SCCT model that have been shown to influence the academic achievement of Mexican Americans and Hispanics in general and that are culturally and socially relevant to Mexican Americans.

Generational status was assessed using a single item developed by Cuellar et al. (1995) that has been used in conjunction with the Acculturation Rating Scale for Mexican-Americans-II (ARSMA-II; Cuellar et al., 1995). The ARSMA-II (Cuellar et al., 1995) was also included. Social class was assessed via a latent variable designated by several economic and social indicators. The Child and Adolescent Social Support Scale (CASSS; Malecki, Demaray, &
Elliott, 2000) was used to assess perceptions of the frequency of general socially supportive behaviors from others, including parents, teachers, classmates, and a close friend. Past math and science performance accomplishments were assessed via two questions that asked participants to indicate grades they had received in their seventh-grade math and science courses. The 12-item Math/Science Self-Efficacy Scale (MSSES; Fouad, Smith, & Enochs, 1997) was used to assess middle school students' confidence in their abilities to successfully perform mathematics and science-related tasks. Also, the Math/Science Outcome Expectations Scale (MSOES; Fouad et al., 1997) was utilized to assess middle school students' beliefs regarding the outcomes or consequences of their potential mathematics and science-related course activities and achievements. The Math/Science Interest Scale (MSIS; Fouad & Smith, 1996) was used to assess math/science interests. Finally, the 6-item Math/Science Intentions and Goals Scale (MSIGS; Fouad et al., 1997) was used to assess middle school students' intent to pursue and persist in mathematics and science-related courses in high school and future careers.

The present study's findings suggested that Mexican American adolescent girls, as compared to their male peers: (a) are more Mexican oriented; (b) have parents who have achieved less education; (c) perceive more teacher, classmate, and close friend support; and (d) express less confidence in their math/science skills. Using multiple group analysis, the researchers found no gender differences for the hypothesized relations in the SCCT model tested. The findings suggested that the hypothesized SCCT model fit the data well for both genders and that the variables explained a substantial amount of variance in math/science goal intentions for both Mexican American girls (38%) and boys (42%). Also, the findings suggested that higher social class standing is associated with greater past math/science performance accomplishments and is indirectly related to higher levels of math/science self-efficacy. The findings provide
further support for the assertion that access to learning experiences is greater for those with higher social class standing, resulting in educational inequities across social class groups.

Some of the more important paths that were supported in the model were as follows. Past math/science performance accomplishments were positively associated with math/science self-efficacy, explaining 9% of the variance in math/science self-efficacy. The findings also supported the SCCT propositions that math/science self-efficacy positively predicts math/science outcome expectations and that both of these variables positively predict math/science interests and goals. In addition, math/science interests were positively associated with math/science goals. Only partial support was found for Bandura's (1999, 2000) hypothesis that contextual influences such as social support have a more proximal than distal relationship with self-efficacy. Although not all SCCT predictions in the model were supported, the findings overall support the development of SCCT-based math and science-related interventions for Mexican American middle school students, as a means to increase aspirations to pursue STEM occupations.

Regarding limitations of the study, only a modest amount of variance in math/science self-efficacy (9%) and outcome expectations (11%) was explained by the hypothesized relations in the model. Future research would be best served by investigating the combined influence of all four learning experiences on math/science self-efficacy and outcome expectations to provide a more in-depth understanding of the impact of learning experiences on self-efficacy and outcome expectations within SCCT. The inclusion of perceived social support from parents, teachers, classmates, and a close friend was an attempt to focus on the positive facilitators for Mexican American middle school students. However, the researchers measured general perceived social support from parents, teachers, classmates, and close friends, rather than specific supportive behaviors in the domains of mathematics and science. Furthermore, the study did not test the
bidirectional relationships between cognitive-personal variables (e.g., self-efficacy, outcome expectations, and goals), external environmental factors (e.g., oppression and socialization), and overt behaviors (e.g., career decisions). The inclusion of such relationships and additional variables may have helped explain more of the variance in math/science self-efficacy and outcome expectations for this group of Mexican American middle school students. Along with the failure to test alternative models, the use of single measures for several of the theoretical constructs (e.g., self-efficacy, outcome expectations, and goals) may have led to mono-operational basis. Such bias is a methodological problem that may result in inadequate construct validity and small effect sizes. Future studies would be best served to use multiple measures to define SCCT constructs. Lastly, the present study's cross-sectional design limits the authors' ability to determine the direction of causal relationships among the variables in the SCCT model.

Regarding other future research suggestions, a stronger focus on the role of outcome expectations in academic and career development is needed, particularly with students from culturally diverse backgrounds that may place more weight on the potential consequences of their actions than on their confidence to perform given tasks. In addition, future studies might examine the direct effects of person inputs and background contextual variables on choice goals and actions given that previous research has demonstrated the relations between these variables. Future SCCT theory-building efforts with students from this age group are necessary in enhancing researchers’ understanding of these students' academic and career development, in particular factors influencing outcome expectations. The researchers also suggested that future studies should test SCCT models to determine if the relations among variables are consistent across other academic domains with Mexican American middle school student samples.

Byars-Winston, Estrada, Howard, Davis, and Zalapa (2010) used SCCT to relate social
cognitive variables (math/science academic self-efficacy, math/science outcome expectations), ethnic variables (ethnic identity, other-group orientation), and perceptions of campus climate to students' math/science interests and goal commitment to earn a degree in biological science (BIO) or engineering (ENG). The participants were 223 African American, Latino/a, Southeast Asian, and Native American undergraduate students in these two majors. The survey packet included an informed consent sheet, a demographic form (including information on participants' gender, race/ethnicity, age, year in school, and selected major), and measures of science-, math-, and engineering-related constructs. Lent and colleagues’ Self-Efficacy for Academic Milestones Scale (Lent et al., 1986) was used to measure students' confidence in their ability to complete specific tasks relevant to success in science and engineering majors. The original 11-item scale was adapted by Byars-Winston to be applicable to both biological science and engineering majors, because Lent et al.’s (1986) original scale targeted only engineering majors. Outcome expectations were assessed by an 18-item measure of participants' expectations about the consequences of obtaining a college degree. The scale, adapted from Lent et al.'s (2001) outcome expectations measure, assessed the extent to which the students’ value math/science educational attainment for their future career and life plans, and included outcomes that were both positive and negative. Participants’ STEM interests were assessed with a seven-item scale developed by Lent et al. (2003) that measures participants’ degree of interest in participating in seven math science activities. Perceptions of campus climate were measured with three subscales totaling 15 items developed by Cabrera, Nora, Terenzini, Pascarella, and Hagedorn (1999). Participants' goals to complete a STEM degree were assessed with a single item about goal commitment. Roberts et al.'s (1999) revised version of the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992) was used to assess ethnic identity and other-group orientation.
The researchers tested several hypotheses based on SCCT propositions and extant research with diverse ethnic groups (Gloria & Hird, 1999; Gushue & Whitson, 2006; O'Brien et al., 1999). First, it was hypothesized that the person input variables of ethnic identity and other-group orientation would have direct, positive relationships with math/science academic self-efficacy and math/science outcome expectations. Second, a positive relationship between academic self-efficacy and outcome expectations was hypothesized. Third, both academic self-efficacy and outcome expectations were posited to directly relate to interests, as well as to goals with partial mediation through interests. Finally, they hypothesized that the proximal contextual factor of perceived campus climate would indirectly relate to goals through three paths: (a) through academic self-efficacy, consistent with prior research supporting this indirect path (Lent, et al., 2001, 2003, 2005), (b) through ethnic identity, and (c) through other-group orientation, on the basis of SCCT's assertion of a direct relationship between person and contextual factors. The fit of the hypothesized path model across the engineering and biological science samples was also investigated.

Results of the study were largely consistent with SCCT propositions, indicating that math/science-related academic self-efficacy and outcome expectations were associated with academic goals. Additionally, this study provided preliminary evidence regarding the relevance of cultural and contextual factors to the academic goals of underrepresented students in STEM. Direct relationships were found between academic self-efficacy and outcome expectations as they each relate to interests and to goals, although at times this varied by group. The path coefficients from outcome expectations to interests and goals were the same for both engineering and biological science students. The path coefficient relating academic self-efficacy to goals was significant for only the biological sciences group. There was a significant efficacy—goals
relationship, which had the largest coefficient (in absolute value) in the model. For engineering students, the contribution of academic self-efficacy to goals was only indirect, mediated through outcome expectations and interests. The hypothesis that ethnic factors would be associated with math/science-related academic self-efficacy and outcome expectations was partially supported. Contrary to results in previous research, ethnic identity was not significantly associated with perceived campus climate, self-efficacy, or outcome expectations. Only other-group orientation contributed unique variance to self-efficacy in the path model tested. Finally, this study supported the hypothesized efficacy-mediated effects of perceived campus climate on academic goals.

There were several limitations to the study. First, this was a preliminary study, and therefore cautious interpretation of the results is recommended. Second, the sample was drawn from a selective research intensive institution. Thus, the underrepresented student population of STEM majors from which this sample was drawn included academically high-achieving students with high persistence rates in STEM. Third, this study employed a cross-sectional research design using self-report data, and thus the predictive direction of the relationships observed could not be established. Finally, methodological limitations included the use of a single item to assess goal outcomes and modified instruments for which psychometric data are unavailable from other samples. Regarding future research recommendations, researchers may investigate factors that inform other-group orientation and its relationship to other SCCT variables, such as math/science coping efficacy (i.e., perceived ability to cope with challenges in pursuing a STEM major). This would further clarify the contribution of other-group orientation to STEM-related academic and career outcomes. Also, future studies that consider potential academic year or racial/ethnic group differences will help validate the current findings and uncover nuances in the relevance of
cultural, cognitive, and contextual factors to their STEM pursuits. Studies employing a longitudinal research design are needed to identify when and how cognitive, cultural, and contextual variables predict eventual academic and career outcomes.

In summary, the studies in this section support the importance of considering several factors such as family context, perceived barriers, presence of support, gender, acculturation, and mathematics self-efficacy when examining the pursuit of math- and science-related educational options. To date, limited research has examined the development of math and science goals for Mexican Americans or the potential gender differences in factors influencing math- and science-related goals for this specific cultural group. Previous SCCT research has focused mostly on college students and only a few studies have been conducted with Mexican American middle and high school students (O’Brien et al., 1999). However, research demonstrates that middle school and high school are critical periods when students begin to form and make academic course decisions that will have a strong influence on later academic and career outcomes (Turner & Lapan, 2005). With more research in this area, the educational field will be able to gain a better understanding of how to enhance preparatory efforts of Hispanics for critical careers such as those in the STEM domains. In addition, knowledge about potential motivational factors may be clarified based upon what student’s view as their perceived needs in order to prepare for careers in these fields. Lastly, if the factors that influence engineering career decisions are identified, educators will better understand how to foster and develop a culturally responsive environment for Hispanic students. In such environments, students may be more inclined to engage in the study of STEM fields. Knowing the variables that enhance career decision efficacy and STEM goal intentions among Hispanic students can lead to interventions that enhance their choices of STEM careers.
SCCT and Ethnic Identity in Minority Career Development

Hispanic adolescents in the United States have membership in both an ethnic group and in the mainstream culture. Thus, Hispanic adolescents may feel caught between their parents’ ethnic beliefs and values and those of the mainstream society. This may cause increased stress, which adds to the already existing challenge of developing an adolescent self-identity. Ethnic identity models help inform mental health counselors about the sociopolitical influences and minority experiences that impact the identity development and psychological adjustment of members of visible racial and ethnic groups (VREG). Indeed, racial, cultural, and political contexts need to be taken into account by mental health professionals in the assessment and diagnostic process (Romero & Roberts, 2003).

Arbona and colleagues (1995, 1996; Fouad & Arbona, 1994) have noted that the process of ethnic identity formation also has critical implications for the development of a vocational identity in Hispanic adolescents. Indeed, an integral component in the process of identity formation is the establishment of a vocational identity, including a clearer and more stable sense of one’s interests, abilities, and talents, as well as the ability to establish goals and make career-related decisions (Holland, Daiger, & Power, 1980). Super, Savickas, and Super (1996) observed the establishment of a vocational identity—the assessment and knowledge of a person’s objective vocational traits—serves as the basis for making occupational choices that are a good fit, consequently facilitating optimal adjustment outcomes.

According to the SCCT model, ethnicity and culture may affect career development at a number of different points. For example, they may influence the kinds of learning experiences a young person is exposed to (or is encouraged to seek). In turn, these learning experiences affect the development of career self-efficacy beliefs and outcome expectancies. SCCT authors have
emphasized the importance of considering sources of strength in career development (Lent, Brown, & Hackett, 2000). From an SCCT perspective, ethnic identity can be viewed as the result of the interaction of personal factors (i.e., person-inputs) with one's social context (i.e., contextual affordances). Understood in this way, ethnic identity may be considered a potential source of strength, influencing self-efficacy directly and outcome expectancies both directly and indirectly though self-efficacy.

To address this, Gloria and Hird (1999) examined the ability of ethnic identity to predict career decision-making self-efficacy and trait anxiety in a sample of 687 undergraduates (589 Whites, 98 racial and ethnic minorities). Instruments included the MEIM (Phinney, 1992), the Career Decision-Making Self-Efficacy-Short Form (CDMSE-SE), and the State-Trait Anxiety Inventory (STAI). In preliminary analyses, the researchers ensured adequate internal consistency of the study's measures and demonstrated that the data met the assumptions of multivariate normality. A MANOVA examined between-group differences (i.e., race, major) for each of the study's variables. In addition, this study examined the degree to which ethnic variables (i.e., ethnic identity, other-group orientation) and non-ethnic variables (i.e., trait anxiety, major) accounted for career decision-making self-efficacy. Results revealed that ethnic variables predicted career decision-making self-efficacy and trait anxiety for both racial/ethnic minorities and Whites. However, ethnic variables explained a larger proportion of the variance in career decision-making self-efficacy and trait anxiety for racial/ethnic minorities. Furthermore, the ability of trait anxiety, ethnic identity, and other-group orientation to predict career decision-making self-efficacy was significantly stronger for racial/ethnic minorities than for White students.

Regarding limitations, although racial/ethnic minority students were more highly
represented in this study relative to their university demographics, a larger sample size would be needed to confidently examine between- and within-group differences (e.g., Latino/as versus other ethnic minority subgroups). In addition, a larger sample size would allow for more precise assessment of the unique and total variance contributions of the ethnic and non-ethnic variables in predicting career decision-making self-efficacy and trait anxiety for racial/ethnic minority and White students. Furthermore, examining the mechanisms by which ethnic identity and other-group orientation affect career self-efficacy and decision making would be warranted. Findings from this study support the importance of including ethnic identity when examining the career development process of ethnic minorities.

In another study, Gushue (2006) related ethnic identity to two determinants of career interests identified by SCCT—career decision-making self-efficacy and outcome expectations--in a sample of 128 Latino/a ninth graders. During their weekly freshmen seminar, students were invited to fill out a packet of surveys in English on "career choices and influences on their career development." The packet included a demographic sheet, the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992), the Career Decision-making Self-Efficacy Scale-Short Form (CDMSES-SF; Betz, Klein, & Taylor, 1996), and the Outcome expectation measure (McWhirter, Rasheed, & Crothers, 2000). It was expected that higher levels of the person input variable of ethnic identity would be related directly to both higher career decision-making self-efficacy and higher levels of career outcome expectations. Furthermore, it was expected that, career decision-making self-efficacy would be related positively to outcome expectations, consequently mediating the relationship between ethnic identity and outcome expectations. Alternative models were also considered.

For the main analyses, the potential relationships among ethnic identity, career decision-
making self-efficacy and career outcome expectations were examined. Paths representing the relationships among different variables were tested using the AMOS 5/SPSS statistical package. The first model tested contained one exogenous variable (ethnic identity) and two endogenous variables (self-efficacy and outcome expectations). The model tested included direct paths from ethnic identity to self-efficacy and outcome expectations. A direct effect from self-efficacy to outcome expectations was also included in the model. Thus configured, the model also included an indirect effect from ethnic identity to outcome expectations mediated by self-efficacy. Since the path between ethnic identity and outcome expectations was not statistically significant in the model just described, a second model omitting that path was also tested. The model contained the same exogenous and endogenous variables as the previous model, minus one path, and was both recursive and identified. The results indicated that this simplified model provided excellent fit for these data. Finally, a third model was constructed to test the hypothesized directionality of the paths. In this model, the roles of self-efficacy and ethnic identity were reversed: self-efficacy was modeled as an exogenous variable and ethnic identity as an endogenous variable mediating between self-efficacy and outcome expectations. The results indicated that this third model provided a poor fit to the data.

In the preferred model, the researchers found that students' identification with their ethnic group directly influenced their beliefs in their ability to engage in career exploration (i.e., career decision-making self-efficacy). However, a direct effect from ethnic identity to outcome expectations was not supported. As predicted by the SCCT model, these data suggested that self-efficacy fully mediated the influence of ethnic identity on outcome expectations. This was an initial investigation of the role of ethnic identity in the career development of Latino/a adolescents and one limitation was that the model was kept simple. Also, since the study utilized
a cross-sectional design with self-report instruments, common method variance cannot be ruled out as a potential influence on the results. Furthermore, the sample size was small. Nonetheless, the study offered support that ethnic identification is a source of strength rather than a barrier in the career development of Latino/a adolescents (Lent et al, 2000).

In a preliminary study, Gushue and Whitson (2006) examined how individual differences in ethnic identity and gender role attitudes relate to career decision self-efficacy and the gender traditionality of career choice goals. The sample was 102 9th-grade Black and Latina girls. Based on SCCT, the authors examined two path models in which career decision self-efficacy mediated the effects of gender role attitudes and ethnic identity on the traditionality of the participants' career choice goals. The Ethnic Identity (EI) subscale from the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992) was used to measure ethnic identity. The 15-item short form of the original Attitudes toward Women Scale (ATWS; Spence, Helmreich, & Stapp, 1973) was administered to measure gender role attitudes. The 25-item short form of the original 50-item Career Decision Self-Efficacy Scale (CDSES-SF; Betz, Klein, & Taylor, 1996; Betz & Taylor, 1994) was administered. Lastly, a demographic questionnaire was included to obtain age, gender, race/ethnicity, and grade level.

To quantify the traditionality of the occupations listed by participants, the researchers used the percentage of women in the chosen occupation as reported in the Bureau of Labor Statistics (2003) report on women's earnings in 2002. Scores ranged from 2 to 99, with higher percentages of women in an occupation representing more traditional careers for women. A preliminary multivariate analysis of variance was conducted to test for significant differences between the different racial/ethnic groups on the variables of interest. The results were not significant and therefore the data for Black and Latina women were combined in the main
analyses. The authors conducted a structural equations modeling (SEM) analysis to test paths representing the relationships among gender role attitudes, ethnic identity, career decision self-efficacy (CDSE), and gender traditionality of career goals. They first tested a completely mediated model (Model 1) with direct paths from both ethnic identity and gender role attitudes to self-efficacy, and a path from self-efficacy to gender traditionality of career goals. The results indicated that the hypothesized model should not be rejected. A second model (Model 2) tested the possibility that the effects of gender role attitudes and ethnic identity were only partially mediated by self-efficacy. This model included direct paths from gender role attitudes and ethnic identity to traditionality in addition to the mediated paths specified in Model 1.

Results indicated that consistent with SCCT, the effect of the background variables of ethnic identity and gender role attitudes on gender traditionality of career choice goals was fully mediated by Career Decision Self-Efficacy for this sample. The results suggest that to the extent that a girl of color is successfully integrating race, ethnicity, and egalitarian gender role attitudes as part of her self-understanding, she may also demonstrate a stronger belief in her ability to negotiate the tasks associated with career decision making (e.g., accurately appraising her skills and abilities, gathering information, selecting goals, planning problem solving; Betz & Taylor, 1994). In addition, increased career decision self-efficacy was found to be related to occupational goals in nontraditional fields with greater percentages of male incumbents. The results of the path analyses provided confirmation for an extension of the SCCT model, indicating that for this sample, career decision self-efficacy fully mediated the influence of egalitarian gender role attitudes and ethnic identity on gender traditionality in career choice goals. A limitation of the study was the potential underspecification of the models tested. The results might be better explained by some higher-order variable not included in the model. The
study suggested that higher levels of ethnic identity and egalitarian gender role attitudes may serve as sources of resilience for Black and Latina girls in their career development. Furthermore, consistent with SCCT, the results indicated that ethnic identity and gender role attitudes both play an important role in the career decision self-efficacy of girls of color.

In another test of SCCT by the same authors, Gushue and Whitson (2006) examined the impact of two distal contextual influences (i.e., ethnic identity and parent/teacher support) on the cognitive variables of career decision self-efficacy and career outcome expectations in a sample of 104 African American ninth-grade students. Although, the study examined African American youth, not Mexican-Americans, I reviewed this study because of the SCCT constructs utilized. The authors hypothesized that higher levels of ethnic identity and higher levels of perceived support would be related to greater career decision self-efficacy and greater outcome expectations. The researchers administered the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). The Parent Support Scale (Farmer et al., 1981) was used to assess students’ perceptions of the degree to which their parents have supported their academic careers in the past and presently. Other instruments included the Teacher Support scale (McWhirter, 1997), the Career Decision Self-Efficacy Scale (CDMSE), the 25-item short form of the original 50-item Outcome Expectations scale (Betz & Taylor, 1994), and a six-item measure of demographic information (McWhirter, Rasheed, & Crothers, 2000).

The results indicated that parental support is positively related to career decision self-efficacy and that teacher support is positively related to career decision self-efficacy and career outcome expectations. No relationship was found between ethnic identity and either self-efficacy or outcome expectations. A limitation of the study was that the direction of causality could not be ascertained. In addition, the measures assessed only a few of the possible cognitive-person,
environmental, and outcome variables represented in the SCCT model. Future research should examine additional SCCT variables with this population to examine how they are influenced by and interact with the variables examined in this study. In particular, future research should also include interests and goals, which, according the SCCT, are influenced by self-efficacy and outcome expectations. A strength of the study was the inclusion of both contextual factors and ethnic identity, providing a more complete picture of the variables that enhance personal agency in the process of career development.

In summary, these studies indicate that it is important to include ethnic identity when investigating the career development process of minorities. The studies showed that students’ identification with their ethnic group directly influenced their beliefs in their ability to engage in career exploration. In addition, self-efficacy may mediate the influence of ethnic identity on outcome expectations. Only one of the four studies revealed no relationship between ethnic identity and either self-efficacy or outcome expectations. The exceptional study sampled African American high school students. Limitations of these studies include small sample sizes in three of the four studies, mixed samples with a small number of Hispanic participants (one study did not include Hispanics), and potential under-specification of the models tested. Arbona (1995) suggested that one way that career development theories might better illuminate the experience of Latino/a adolescents would be to "examine to what extent the process of ethnic identity formation becomes a developmental task in itself that affects the process of resolving more directly vocational tasks" (p. 49).

General Summary and Future Research Needs

Research indicates that increased efforts to understand the career development of Hispanics is critical. Such research can address and improve the conditions that impact
Hispanics’ educational and occupational attainment. Historically, career theories have been criticized for not addressing relevant factors important for understanding the career development of ethnic minorities. In particular, very few published vocational psychology studies have examined the validity of established career development theories for Hispanics (Navarro, Flores, & Worthington, 2007). However, more recently there has been a growing body of research to address this gap in the literature. An increasing amount of research indicates that Social Cognitive Career Theory is an appropriate framework for understanding Hispanic career development and that it addresses several variables that are salient for ethnic minorities.

There is considerable variety across the studies reviewed because researchers vary in the SCCT constructs they include (e.g., self-efficacy, outcome expectations, person variables, context variables, learning experiences, etc.) and whether they treat the constructs as independent, dependent, or mediating variables. However, the central construct of self-efficacy is never absent in these studies. Most SCCT studies have focused on cognitive-person variables, with less attention thus far to the theory's contextual variables. Lent, Brown, and Hackett (2000) have suggested that future research on SCCT's environmental hypotheses would be aided by the development of contextual measures that (a) are linked to theory, (b) are domain specific, and (c) reflect both supportive and hindering environmental conditions. These contextual variables may enhance or constrain personal agency in the career development process of ethnic minorities and females in particular.

Reviews of this literature have examined the conceptual and measurement status of the barriers construct, and have discussed ways in which SCCT may also be used as a framework for studying and modifying barrier effects (Albert & Luzzo, 1999). This implies that there can be substantial gains by including this SCCT variable in future research. A better understanding of
contextual factors can also contribute to a better understanding of how to improve career development interventions. Swanson et al. (1996) documented the evolution of research on career-related barriers, noting that this construct emerged largely from the literature on women's career development. In particular, barriers were seen as a mechanism for explaining the restriction of women's career aspirations and the frequent gap between their abilities and achievements. The barrier construct has subsequently been extended to the study of men's and racial/ethnic minority group member's career development.

To a lesser extent, SCCT has been applied to understanding minority career behavior specifically in the STEM fields. STEM careers are known to be high paying and stable. Yet, there continues to be low numbers of minorities earning STEM degrees. According to Byars-Winston, Estrada, Howard, Davis, and Zalapa (2010), contextual, cultural, and cognitive factors influence this outcome. The research on contextual factors indicates that ability is not necessarily a primary contributor to attrition: capable students also leave the sciences. Seymour and Hewitt (1997) found that underrepresented men and women in college, as well as White female students, leave the STEM fields despite their good academic standing, often due to uncomfortable classroom experiences. The accumulation of daily verbal, behavioral, or environmental microaggressions (Sue et al., 2007) commonly experienced by underrepresented students directly affects their perceptions of campus climate and their academic performance, which can lead to dropping a class, changing majors, or even leaving the university (Solorzano, Ceja, & Yosso, 2000). This assumes that a minority adolescent has successfully navigated high school and been accepted to a university. Research has shown that ethnic identity can promote academic confidence (cf. Oyserman, Harrison, & Bybee, 2001). This further supports the salience of including an ethnic identity measure when sampling minority populations with the SCCT
construct. My review of research regarding the career development of ethnic minorities in the STEM fields provides compelling evidence that there continues to be gaps in the literature. Additional research regarding the possible mechanisms underlying the career development of ethnic minorities in the STEM fields is warranted.

Regarding the quality of measurement in the SCCT area with minority populations, some instruments were utilized in multiple studies, many existing measures were modified, or the researchers created new ones for a particular study. Reliability estimates for the commonly used measures (e.g., the Career Decision Self-Efficacy Scale, ARSMA-II, Occupational Self-Efficacy Questionnaire, Career Support Scale, Perceptions of Barriers scale, Career Aspirations scale, Math/Science Intentions and Goals Scale, Math/Science Self-Efficacy Scale, Math/Science Outcome Expectations Scale, Math/Science Interest Scale) and the measures developed specifically to assess self-efficacy and outcome expectations for STEM fields, are generally acceptable (e.g., greater than .70). The studies that included newly created instruments or used modified versions often provided little insight in regards to why existing measures were not utilized. For example, Perrone, Sedlacek, and Alexander (2001) utilized an instrument that was designed by the staff of the university counseling center. The rationale for why a new instrument was created was not always discussed. Nonetheless, it was noted that the coefficient alpha reliability estimate of .83 for the overall questionnaire was sufficient. Some studies continue to apply single-item measures such as the single item assessing generational status by Cuellar et al. (1995) and this is not ideal. The MEIM (Phinney, 1992) was included in all studies addressing the ethnic identity variable. Much early psychological research on ethnic identity focused on particular ethnic groups, and group-specific measures were used (e.g., Felix-Ortiz et al., 1994; Suinn, Ahuna, & Khoo, 1992). In contrast, the MEIM (Phinney, 1992) was designed to meet the
need for a general measure that could assess ethnic identity across diverse ethnic groups. Hence, content specific to particular groups, such as cultural values and beliefs, was not included. According to Phinney and Ong (2007), ethnic identity is a multidimensional construct and no single measure can assess its full complexity. Therefore, they recommended that additional measures be used in research with particular groups to provide understanding of group-specific values, attitudes, and behaviors. In addition, since ethnic identity changes with time and context, it is essential to take a process approach to understanding the construct. Overall, a significant question in designing research on SCCT is whether available measures will be applicable or whether new measures will be needed in order to better target the specific domain of interest.

The populations most often investigated in SCCT research are European American Whites and college students. When ethnic minorities are included, the studies generally combine all ethnic minority participants into a single group for analysis and do not examine specific ethnic groups individually. Even within the Hispanic subgroup, several subgroups are represented, each of which have their own cultural norms, customs, and educational and occupational achievements. Adolescence has been proven to be a critical developmental stage of an individual's life and lack of preparatory behaviors can limit any individual's future career options. For example, due to the amount of math and science coursework taken before high school graduation, the amount of coursework taken in these areas can have a critical impact on students' subsequent range of STEM career options (Betz, 1992). Adolescents from disadvantaged communities are at elevated risk for exposure to multiple stressors, including high rates of crime and victimization, family poverty, family conflict, increased prevalence of deviant peers, and schools with inadequate resources (Gonzales, Tein, Sandler, & Friedman, 2001).

Minority youth face more challenges than non-minority youth and in turn may adopt
negative compensatory beliefs that negatively impact their career development. Adolescent vocational expectations—the occupations youth expect to attain in adulthood—have an important role in organizing vocational behavior (Super, 1980) and are predictive of occupational attainment in adulthood (Sewell & Hauser, 1975). The literature suggests that Hispanic students' school performance is influenced by a number of psychosocial factors. However, there is a lack of understanding within scholarly efforts regarding how these variables work together to influence the educational outcomes of Hispanics, especially adolescents. Thus, it is important to identify factors that can affect the selection or avoidance of such coursework. Additional research with high school samples would also partially remediate another limitation in the SCCT literature, which is the over-emphasis on samples of college students.

In summary, Social Cognitive Career Theory (SCCT) is a comprehensive theoretical framework that takes into account many salient factors such as learning experiences, perceived barriers, and the presence or lack of contextual supports for further investigating the educational and career development of Hispanic high school students. As reviewed in the aforementioned research studies, several relevant SCCT constructs have been identified and tested with racial and ethnic minorities. This includes career decision self-efficacy, ethnic identity, barriers, family context and support, and gender. It seems that including salient SCCT mechanisms may contribute to providing a greater base of knowledge about factors influencing the educational and career development process of Hispanics. As such, additional studies of this phenomenon would be worthwhile.

Considering the significant academic disparities that exist amongst Hispanics, the limited research regarding their career development process is surprising. Although the previously described studies greatly contribute to the research in this area, more needs to be done. It would
be beneficial to replicate and extend studies regarding the link between salient SCCT constructs in order to determine whether findings are generalizable and robust across samples. Also, as suggested by my review, the ethnic identity construct can be profitably integrated as a person variable in these studies. Finally, the limitations of SCCT studies with Hispanics should be examined and addressed in future research.

Overview of Study

In the present study, I tested core aspects of SCCT in an investigation of self-efficacy, outcome expectations, interests, and choice goals for STEM fields (specifically math and science) with Mexican/Mexican-American high school students. For Hypothesis 1, I also incorporated ethnic identity as a person input variable in the proposed integrated model, as depicted in Figure 2. In Hypothesis 2, I treated perceived support (versus barriers) as a proximal contextual influence that may impact (i.e., moderate) the relationship between STEM interest and choice goals. In Hypothesis 3, gender is treated as a person input variable that can impact self-efficacy, outcome expectations, interests, and goals related to STEM fields. Figure 2 represents the proposed structural model tested in Hypothesis 1. Hypothesized paths are based on SCCT (Lent et al., 1994) and prior research (Lent et al., 2008). SCCT asserts that self-efficacy predicts outcome expectations and, together with outcome expectations, predicts increased interest and goal setting in a specific career domain. Interest in a particular career is also hypothesized to directly predict enhanced goal setting for that career. Finally, the relationships between self-efficacy and goals, and between outcome expectations and goals, are both hypothesized to be partially mediated by interests (Lent et al., 1994). Prior research investigating the math/science interests and goals of students at various developmental stages has supported these hypotheses (Byars-Winston & Fouad, 2008; Lent, Brown, Schmidt, et al., 2003; Navarro et
al., 2007). Also from an SCCT perspective, ethnic identity can be viewed as the result of the interaction of personal factors (i.e., person-inputs) with one's social context (i.e., contextual affordances). Understood this way, ethnic identity may be considered a potential source of strength, influencing both self-efficacy (directly) and outcome expectancies (directly, and indirectly through self-efficacy). A study by Gushue (2006) explored how ethnic identity may influence self-efficacy and outcome expectations in ways consistent with the SCCT model of interest development. The results indicated that ethnic identity had a direct and positive relationship to career decision making self-efficacy, while its association with career planning outcome expectations was mediated by self-efficacy.

As proximal contextual influences (see Figure 1 in Chapter 2), supports (versus barriers) are hypothesized to moderate the relations between interests and choice goals (Lent et al., 2000). This prediction will be tested in Hypothesis 2. Finally, there is some evidence that men have higher average self-efficacy than women for STEM fields (Betz & Hackett, 1983; Byars & Hackett, 1998), which, in turn, could lead to higher scores in outcome expectations, interests, and goals for STEM fields as well. This will be tested in Hypothesis 3. Thus, the following three hypotheses will be tested.

**Hypothesis 1**: The model depicted in Figure 2 will fit the data well and all hypothesized positive paths depicted in the model will be statistically significant.

**Hypothesis 2**: The relationship between STEM (i.e., math/science) interests and choice goals will be stronger for participants who perceive greater support (vs. barriers) in pursuing math/science fields (i.e., support is a moderator variable).
Hypothesis 3: Male participants, as compared to female participants, will have higher average self-efficacy, outcome expectations, interests, and goals related to STEM (i.e., math/science) fields.

Figure 2. Proposed structural model tested in Hypothesis 1.
CHAPTER 3

Method

This chapter presents the research methodology for this study. Areas to be described include participants, instruments, and data collection procedures. Descriptions of the statistical analyses are incorporated at the relevant points in the Results chapter.

Participants

The sample consisted of 259 self-identified Mexican/Mexican-American freshmen and sophomore high school students in a mid-sized metropolitan area in the Pacific Northwest. Characteristics of the sample for the present study are presented in Table 1. As seen in the table, the majority of the sample was female, and although they varied in age from 14 to 18, all were freshmen and sophomores, as intended. Most of the sample self-identified as Mexican-American (79.9%), followed by Mexican (19.7%), and Bi-racial/Multi-racial (.4%). The majority of participants were second generation (56%), followed by first generation (22.4%), and third generation (18.1%). Only small percentages of participants’ mothers and fathers had been educated beyond high school. Table 1 also shows the most recent math and science class taken by the participants. For the majority of students, the most recent math class was basic math/pre-algebra and the most recent science class was biology, although a minority of students had taken more advanced math and science classes.
Table 1

*Sample Demographics*

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<tr>
<th>Characteristic</th>
<th>Frequency</th>
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<tr>
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<tr>
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<td><strong>Age</strong></td>
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<td>--------</td>
<td>------------</td>
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<tr>
<td>Third</td>
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**Mother Education**

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**Father Education**

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<td>Partial High School</td>
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<td>4.1</td>
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**Math Course**

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</tbody>
</table>
To recruit participants, the researcher first met with both the principal of the high school and a member of the Migrant Student Advocate staff to discuss the aims and scope of the study, eligibility criteria for participation, potential risks and benefits, and information concerning privacy and confidentiality. IRB approval for research with human subjects was also obtained before collecting any data. The researcher solicited participants in homeroom classes using scripted announcements that informed students about the nature and purpose of the study. Parental consent and student assent to participate in the research was obtained through written permission forms. The researcher explained and distributed the parental consent letters for students to take home and return the following day. English and Spanish versions of the parental consent forms (as selected by the respective students) were made available. Participation was voluntary and participants were able to withdraw at any point if they chose.
Instruments

In addition to a demographic form, the instruments measured self-efficacy, outcome expectations, interests, and intentions/goals for math/science careers; perceived barriers and supports; and ethnic identity.

Demographic information form. This form was used to obtain information on age, gender, current grade level, self-identified ethnicity, self-reported grades in their most recent math and science classes, generational status, parental education level(s), and highest level of education they plan to complete. The demographic information form is shown in Appendix A. The generational status question was a single item from the ARSMA-II (Cuellar et al., 1995) that is often used in research with Hispanics.

Perceived supports and barriers measure. To assess perceived supports (versus barriers) the Math/Science Supports and Barriers measure developed by Lent et al. (2005) was administered. The instrument includes 14 items, which are rated on a five-point Likert-type scale ranging from 1 (not at all likely) to 5 (extremely likely). The items assess perceived social supports and barriers for students' decision to pursue math/science careers. Items were generated to assess several categories reported by participants in prior research, including: a) social support and encouragement, b) instrumental assistance, c) access to role models or mentors, d) and financial resources (Lent et al., 2001). A sample item is, "feel support for this decision from important people in my life." Items were averaged after reverse-scoring the last five items, which assess barriers or lack of support. Higher total scores thus indicate greater perceived supports (vs. barriers) for math/science pursuits. Prior research in undergraduate samples has demonstrated adequate scale score reliability estimates (Cronbach alpha = .88; Lent et al., 2003). Validity for the scale has been established through observed correlations with math science self-efficacy,
outcome expectations, interests, and goals among college students (Lent et al., 2001, 2003; Lent, Brown, Nota, & Soresi, 2003; Lent, Paixao, da Silva, & Leitao, 2010). The scale has been successfully used with American college students and with Italian and Portuguese high school students, with Cronbach alphas ranging from .81 to .88 in the high school samples. Alpha reliability in the present sample was .92.

Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). The original MEIM (Phinney, 1992) was designed for adolescents and young adults to measure ethnic identity, or the feelings of belonging and pride, a secure sense of group membership, and positive attitudes for one's ethnic group. It has been used in dozens of studies and has consistently shown good reliability, typically with alphas above .80 across a wide range of ethnic groups and ages. The original 20-item MEIM is comprised of an Ethnic Identity (EI) subscale containing 14 items and an Other-group Orientation subscale containing 6 items. Responses are made on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with 3 as a neutral position. The item scores were averaged to obtain a total score, with higher scores indicating a stronger ethnic identity. Validity data for the MEIM was reviewed in Chapter 2. In the present sample, alpha reliability was .86.

Math/science self-efficacy measure. For the purpose of the present study, two subscales—the eight-item Math subscale and the eight-item Science subscale—from the Expanded Skills Confidence Inventory for High School Students (ESCI-HS; Betz & Wolfe, 2005) was administered to measure participants' self-reported levels of math/science self-efficacy. The complete instrument is a 112-item revised version of the original ESCI (Betz, Borgen, Rottinghaus, Paulsen, Halper, & Harmon, 2003), which has been adapted for high school students. These two subscales assess self-reported confidence in one's ability to perform
an activity, task, or school subject associated with math or science. Items are rated on a 5-point Likert-type scale ranging from 1 (no confidence) to 5 (complete confidence), with higher scores indicative of greater self-efficacy. Sample items include, "calculate a shooting percentage in basketball" for the Math subscale and, "study the way the human mind works" for the Science subscale. Total scores are computed by averaging the items in the respective subscales.

The Math and Science subscales of the ESCI-HS have exhibited adequate internal consistency (alpha) estimates ranging from .80 to .88 for the Math subscale and .79 to .90 for the Science subscale. Concurrent validity for the ESCI-HS scores has been demonstrated through convergent correlations with Holland theme scores in the Skills Confidence Inventory (SCI; Betz, Harmon, Borgen, 1996; Betz & Wolfe, 2005). Because the measures of other SCCT constructs in this study produce a single composite score for math and science activities or careers, I averaged all of the items in the respective math and science subscales to obtain a single math/science self-efficacy score. In the present sample, alpha reliability for this composite score was .92.

**Math/science outcome expectations measure.** Outcome expectations were measured with the 10-item math/science outcome expectations scale (Lent et al., 1993). The scale assesses students' perceptions of the positive outcomes that could result from obtaining a degree in math-or science-related career. Items are rated on a Likert-type scale ranging from 0 (strongly disagree) to 9 (strongly agree). Sample items include, "receive a good job offer," and "earn an attractive salary." Items were averaged with higher scores indicative of higher outcome expectations for math/science careers. Prior studies using the scale in college samples have yielded adequate reliability estimates, with Cronbach alphas ranging from .90 to .91 (Lent et al., 1991; Lent, Brown, Schmidt, et al., 2003). Furthermore, validity for the scale has been
established through observed correlations with math and science-related self-efficacy, interests, and interests, and intentions (Lent, Lopez, & Bieschke, 1993). In the present sample, alpha reliability was .91.

**Math/Science Interest Scale (MSIS; Smith & Fouad, 1999).** The MSIS measures interests in the math and science-related domains. The measure includes 20 items rated on a Likert-type scale ranging from 1 (very strongly dislike) to 6 (very strongly like). Sample items include, "taking classes in science," and "solving math problems." Item responses are averaged with higher scores indicative of greater math- and science-related interests. The scale has demonstrated adequate reliability estimates, with Cronbach αs ranging from .90 to .91 in college and middle school samples, respectively (Navarro et al., 2007; Smith & Fouad, 1999). Validity for the measure has been established through observed relationships with math/science self-efficacy, outcome expectations, and goal intentions (Navarro et al., 2007; Smith & Fouad, 1999). In the present study, alpha reliability was .93.

**Math/Science Intentions and Goals Scale (MSIGS; Fouad & Smith, 1996).** Participants' intentions and goals in math and science were assessed with the MSIGS. Initially developed for middle school students and later modified for college students, the MSIGS includes 7 items that assess students' intentions to pursue and persist in math- and science-related school activities and future career plans. Items are rated on a Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree) with greater scores reflective of higher levels of math/science intentions and goals. Sample items include, "I plan to take more math classes in college than will be required of me," and "I intend to enter a career that will use science." Fouad and Smith (1996) and Navarro et al. (2007) both reported alpha reliability estimates of .81 for scale scores on the MSIGS. Validity has been established through observed correlations with math/science interests ($r = .45$),
self-efficacy \((r = .44)\), and outcome expectations \((r = .54;\) Fouad & Smith, 1996). Scores are computed by averaging all items, with higher scores indicating greater math/science intentions and goals. In the present study, alpha reliability for the scale was .88.

**Procedure**

Initially, the instruments were pilot tested with a group of six local high school students. Overall, the students reported that the instruments for the present study were easy to follow and understand. One student noted that the grade scale was incorrect on the demographic form and that correction was made. For those students who returned signed parental consent forms, I distributed survey packets consisting of youth assent forms, the demographic form, and the remaining research instruments in two orders. The two orders were given to alternate students in each class. The first order of instruments included the following: Demographic questionnaire, Math/Science Supports and Barriers scale, MEIM, math and science subscales from the ESCI-HS, Math/Science Outcome Expectations scale, Math/Science interests scale, and the Math/Science Goals and Intentions scale. Alternate students completed the forms (after the assent and demographic forms) in the reverse order. The order of administration of measures of the SCCT constructs was not raised as an issue in the literature. As permitted by the high schools, I collected the data during lunch and after school. High school staff were present to assist with classroom management and encouragement, when needed. It took students thirty to forty-five minutes to complete the demographic form and the six instruments. After completing the surveys, participants received a debriefing form. All instruments were administered in their English versions, the language of instruction in the high school.

As permitted by the high school, upon completion of the measurement instruments, students were given one ticket for a lottery drawing. To protect confidentiality, tickets did not
include any personal identifying information. There was an extra copy of each ticket with a set of matching numbers and students were given one copy of each ticket upon completing the measurement instruments. During the last day of data collection there was a drawing for three fifty dollar certificates. A volunteer high school staff randomly selected the winning tickets and assisted with announcing the three student winners.
CHAPTER 4

Results

Descriptive Statistics

Table 2 shows descriptive statistics for the various measures in the study. By relating the scale means to the original rating scales for each instrument, the average level for each variable can be characterized. The scale mean for the Math/Science Supports and Barriers measure indicates that students, on average, perceived a moderate likelihood of social support for their decision to pursue math/science careers. The mean ethnic identity (MEIM) score indicated that the students, on average, agreed with and endorsed feelings of belonging and pride, a secure sense of group membership, and positive attitudes for one’s ethnic group. Average scores for the math/science self-efficacy measure (ESCI-HS) corresponded to “moderate confidence,” which indicates that the sample reported moderate levels of math/science self-efficacy. Average scores for the math/science outcome expectations measure indicated that the students, on average, agreed that positive outcomes will likely result from obtaining a degree in math- or science-related career. Average scores for the math/science interest measure (MSIS) indicate that the students, on average, “slightly disliked” math and science-related activities. Lastly, average scores for the measure of math/science intentions and goals (MSIGS) indicated that the students were, on average, “uncertain” about their intentions to pursue and persist in math- and science-related school activities and future career plans.

Table 2 also shows the Pearson correlations among the primary study variables. The generally moderate to strong correlations among ethnic identity (MEIM), math/science self-efficacy, interests, outcome expectations, and math/science goals and intentions are consistent with SCCT and Hypothesis 1. In addition, perceptions of greater support were associated with
stronger ethnic identity, as well as greater self-efficacy, outcome expectations, and intentions/goals (but not interests) for math/science careers. I did not include a path from ethnic identity (MEIM) to math/science interests in my hypothesized structural model (see Figure 2). However, the large correlation \((r = .60)\) relating these two variables suggests that I will need to add such a path in a revised path model. Also, contrary to expectations, math/science outcome expectations were not significantly correlated with either math/science self-efficacy or interests. It is important to note is that these correlations only show the bivariate (pair-wise) relationships among the variables, whereas the path analysis used to test Hypothesis 1 examined the simultaneous relationships among all the variables (see below).

Table 2

Correlations among Primary Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived Supports (versus Barriers)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Ethnic Identity (MEIM)</td>
<td>.24**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Math/Science Self-Efficacy (ESCI-HS)</td>
<td>.54**</td>
<td>.49**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Math/Science Outcome Expectations</td>
<td>.34**</td>
<td>.27**</td>
<td>.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. Math/Science Interests (MSIS)</td>
<td>-.07</td>
<td>.60**</td>
<td>.58**</td>
<td>.06</td>
<td>-</td>
</tr>
<tr>
<td>6. Math/Science Intentions and Goals (MSIGS)</td>
<td>.43**</td>
<td>.43**</td>
<td>.35**</td>
<td>.41**</td>
<td>.44**</td>
</tr>
</tbody>
</table>

Note. *\(p \leq .05\) (2-tailed). **\(p \leq .01\) (2-tailed).
Relating SCCT Variables to Course Grades and Educational Expectations

Table 3 shows the Pearson correlations and, in parentheses, the Spearman rho (rank-order) correlations among the SCCT variables. The later correlations are included because the grades and expectations data are technically ordinal in nature (although also treated as quasi-interval for this analysis). Using the original questionnaire scale (for which lower categories were associated with higher grades; see Appendix A), the means of the math grades ($M = 4.21, \ SD = 2.02$) and science grades ($M = 4.17, \ SD = 1.62$) both corresponded to an average grade level of B+. To reduce potential confusion in interpreting the correlations involving grades in Table 3, I reversed the scoring of the grade scale so that higher scores represent higher grades.

The primary scales showed substantial relationships with both math and science grades. Ethnic Identity (MEIM) was positively associated with math and science grades, indicating that participants who endorsed stronger ethnic identity tended to report higher math and science grades. Most of the primary SCCT constructs, especially Math/science self-efficacy, interests, and intentions/goals, were moderately to strongly positively related to both math and science grades, which is consistent with SCCT. Perceived supports (vs. barriers) and math/science outcome expectations were less clearly related to math and science grades. Educational expectations were best predicted by math/science outcome expectations and intentions/goals. That is, higher educational expectations were associated with greater expectations regarding the value of, and greater intentions to pursue, math/science careers, but were not related to self-efficacy and interest in those careers. Overall, the generally sensible pattern of the correlations in Table 3 provide some evidence for the validity of the measures used in the study.
Table 3

*Correlations of SCCT Variables with Math/Science Course Grades and Educational Expectations*

<table>
<thead>
<tr>
<th>Primary Scales</th>
<th>M</th>
<th>SD</th>
<th>Math Grades</th>
<th>Science Grades</th>
<th>Education Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived Supports (versus Barriers)</td>
<td>3.32</td>
<td>.76</td>
<td>-.04 (.06)</td>
<td>.16** (.13*)</td>
<td>.09 (.09)</td>
</tr>
<tr>
<td>2. Ethnic Identity (MEIM)</td>
<td>3.07</td>
<td>.42</td>
<td>.57** (.58**)</td>
<td>.55** (.53**)</td>
<td>.04 .02</td>
</tr>
<tr>
<td>3. Math/Science Self-Efficacy (ESCI-HS)</td>
<td>3.06</td>
<td>.68</td>
<td>.57** (.58**)</td>
<td>.54** (.59**)</td>
<td>.04 (-.03)</td>
</tr>
<tr>
<td>4. Math/Science Outcome Expectations</td>
<td>6.45</td>
<td>1.17</td>
<td>.12 (.16*)</td>
<td>.11 (.15*)</td>
<td>.21** (.22**)</td>
</tr>
<tr>
<td>5. Math/Science Interests (MSIS)</td>
<td>3.25</td>
<td>.81</td>
<td>.42** (.47**)</td>
<td>.37** (.41**)</td>
<td>.04 (.03)</td>
</tr>
<tr>
<td>6. Math/Science Intentions and Goals (MSIGS)</td>
<td>3.30</td>
<td>.72</td>
<td>.28** (.26**)</td>
<td>.32** (.32**)</td>
<td>.34** (.30**)</td>
</tr>
</tbody>
</table>

Note: Table entries are Pearson correlations with Spearman rank-order correlation in parentheses.

**p < .01 level (2-tailed)
*p < .05 level (2-tailed)

Test of SCCT Model (Hypothesis 1)

In Hypothesis 1, I predicted that the SCCT model shown in Figure 2 would fit the data well and that all hypothesized positive paths depicted in the model would be statistically significant. I attempted to test this model with a structural equations model in which ethnic identity (MEIM) and the SCCT variables were each modeled as latent variables each measured by three item parcels. However, the model produced some inadmissible estimates (e.g., negative
variances) and could thus not be estimated. Therefore, I tested a path analytic model in which the raw MEIM and SCCT variables were modeled as observed variables. The first model was rejected ($\chi^2 = 65.15, p < .001$) and the model fit needed improvement ($\chi^2/df = 32.57$; GFI = .918; CFI = .826; RMR = .031; RMSEA = .350). The modification indices and the simple Pearson correlations reported earlier suggested that a path from ethnic identity (MEIM) to math/science interests was needed. In a revised model, I added that path. The need for this additional path may reflect the same theoretical rationale that led to inclusion of a path from ethnic identity to self-efficacy. Stronger ethnic identity may serve as a protective factor leading to greater self-confidence and interest or openness to a wider range of activities and careers, including math and science fields. Based on the overall $\chi^2$ test the model can be considered acceptable ($\chi^2 = 3.20, p = .074$) and the fit indices also suggested good fit ($\chi^2/df = 3.20$; GFI = .995, CFA = .994, RMR = .005, RMSEA = .092). The squared multiple correlations (proportions of variance explained) for the endogenous (predicted) variables in the model were as follows: self-efficacy ($R^2 = .24$), outcome expectations ($R^2 = .08$), interests ($R^2 = .48$), and intentions/goals ($R^2 = .35$). This indicates that the variables in the model do a fairly good job of predicting math/science self-efficacy, interests, and intentions/goals, but account for a relatively small amount of the variance in outcome expectations.

Figure 3 shows the standardized estimates for each path in the final model. All path coefficients except three were statistically significant at $p < .01$. The path coefficient relating math/science outcome expectations to math/science interests was significant at $p < .05$. The path coefficient relating math/science self-efficacy to math/science intentions and intentions/goals was marginally significant ($p < .10$). The path from math/science self-efficacy to math/science
outcome expectations was not statistically significant. The model reveals that there is a
significant positive relationship between ethnic identity (MEIM) and math/science self-efficacy.
The value of beta coefficient stands at .49, which indicates that as participants’ ethnic identity
increases, it predicts an increase in their self-efficacy. Similarly, participants’ ethnic identity
(MEIM) has a positive and statically significant relationship with their math/science outcome
expectations. This indicates that as participants’ ethnic identity increases, it predicts an increase
in participants’ outcome expectations. The strength of the relationship between ethnic identity
and outcome expectations is less strong than the relationship between ethnic identity and efficacy
because the value of the beta coefficient stands at .29. Moreover, the relationship between ethnic
identity (MEIM) and interests is positive and statistically significant, which indicates that as
participants’ ethnic identity increases, it predicts an increase in participants’ math/science
interests. Although not included in my original model, it is clear that ethnic identity has a strong
positive relationship with math/science interests and that the addition of this path was needed to
obtain acceptable model fit.

Ethnic identity also has some indirect effects/relationships on math/science interests and
intentions/goals. Ethnic identity (MEIM) is affecting interests through self-efficacy. This implies
that self-efficacy is partially mediating that relationship between ethnic identity and interests. In
addition, ethnic identity (MEIM) has indirect effects on participants’ intentions/goals through
their self-efficacy and interests, as well as through their outcome expectations.

The non-significant path between self-efficacy and expectations implies that participants’
math/science self-efficacy does not affect their outcome expectations. Self-efficacy has a direct
positive effect on interests; as participants’ self-efficacy increases, it predicts an increase in
participants’ interests. Self-efficacy also have an indirect effect on intentions/goals via interests. Outcome expectations has a moderate, positive affect on intentions/goals, as predicted, but is modestly negatively related to interests. The latter negative relationship probably represents a modest suppressor effect in the model, since the simple Pearson correlation between interests and outcome expectations was non-significant (i.e., essentially zero). Finally, the relationship between participants’ self-efficacy and their intentions/goals is modestly positive but only marginally significant (p < .10). The simple Pearson correlation between self-efficacy and intentions/goals was moderately positive (see Table 2). In combination, these two findings indicate that the simple relationship between self-efficacy and intentions/goals is largely mediated by interests. Overall, the results for the path model provide strong support for the relationships between self-efficacy, interests, and intentions/goals predicted by SCCT, but provide weaker and only partial support for the role of outcome expectations. In addition, the results indicate that ethnic identity is an important factor to include in SCCT models, as it showed both direct and indirect relationships with the SCCT constructs.
Test of Perceived Supports (vs. Barriers) as a Moderator Variable (Hypothesis 2)

In Hypothesis 2, I predicted that the relationship between STEM (i.e., math/science) interests and choice goals would be stronger for participants who perceive greater support (vs. barriers) in pursuing math/science fields (i.e., support is a moderator variable). To test this hypothesis, I used moderated multiple regression (see Table 4). To avoid multicollinearity, I first centered each variable (interest and support) around its sample mean. Then, I created the interaction terms by computing the products of (centered) interest with support (CintxCsupport). In the first step the (centered) interest (CInterest) and support (CSupport) variables were entered. In Step 2, the interaction term testing for moderation was entered. The statistical significance (or lack of) for the interaction term in Step 2 was examined to determine whether there was
significant moderation of the relationship between interest and intentions/goals by perceptions of support. Since the interaction term was not significant, nor was the change in $R^2$ value in Step 2, Hypothesis 2 was not supported.

Table 4

*Moderated Multiple Regression Predicting Math/Science Intentions/Goals from Interests, Perceived Support, and Their Interaction*

<table>
<thead>
<tr>
<th>Criterion Variable: Intentions/Goals</th>
<th>$\beta$</th>
<th>$\Delta R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>CInterest</td>
<td>.47**</td>
<td></td>
</tr>
<tr>
<td>CSupport</td>
<td>.47**</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.00</td>
<td></td>
</tr>
<tr>
<td>CInterest</td>
<td>.48**</td>
<td></td>
</tr>
<tr>
<td>CSupport</td>
<td>.46**</td>
<td></td>
</tr>
<tr>
<td>CintxCsupport</td>
<td>-.03</td>
<td></td>
</tr>
</tbody>
</table>

** $p < .01$.

**Gender Differences in SCCT Constructs (Hypothesis 3)**

In Hypothesis 3, I predicted that males, as compared to females, would report greater math/science self-efficacy, outcome expectations, interests, and intentions/goals. To test this hypothesis, I conducted a multivariate analysis of variance with gender as the independent variable and the SCCT scale scores as the multiple dependent variables. In the overall MANOVA, there was a statistically significant difference between males and females on the combined dependent variables, Wilks' $\Lambda = .94$; $F(6, 251) = 2.71, p < .05$; partial $\eta^2 = .061$. Follow-up
univariate ANOVA’s indicated that there were significant gender differences for ethnic identity (MEIM) and interests, but not the other SCCT variables. Females, as compared to males, reported somewhat stronger ethnic identity and math/science interests. The size of these gender effects were relatively modest, however, as indicated by the $\eta^2$ values in the analysis.

Table 5

*Gender Differences in Math/Science Self-efficacy, Outcome Expectations, Interests, and Goals*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 160)</td>
<td>(n = 98)</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
<td><strong>M</strong></td>
</tr>
<tr>
<td>Support</td>
<td>3.36</td>
<td>0.76</td>
</tr>
<tr>
<td>MEIM</td>
<td>2.92</td>
<td>.42</td>
</tr>
<tr>
<td>Efficacy</td>
<td>3.02</td>
<td>0.68</td>
</tr>
<tr>
<td>Expectations</td>
<td>6.42</td>
<td>1.18</td>
</tr>
<tr>
<td>Interests</td>
<td>3.09</td>
<td>0.79</td>
</tr>
<tr>
<td>Intentions/goals</td>
<td>3.24</td>
<td>0.73</td>
</tr>
</tbody>
</table>

* *p < .05.*
CHAPTER 5

Discussion

The National Action Council for Minorities in Engineering (NACME) has revealed “the 4% problem,” which refers to the fact that only 4% of underrepresented minorities are “engineering eligible” upon graduating from high school (DiFabio, Frehill, & Hill, 2008). There is consensus in the field regarding the need to better understand the career development of Hispanics in the fields of math and science (Blustein, Phillips, Finkelberg, Jobin-Davis, & Roarke, 1997; Flores O’Brien, 2002). The present study added to the existing literature on the career development of Mexican/Mexican-American high school students. Specifically, I tested core aspects of Social Cognitive Career Theory (SCCT) in an investigation of self-efficacy, outcome expectations, interests, and choice goals for STEM fields (specifically math and science) with Mexican/Mexican-American high school students. I proposed three hypotheses, drawing on SCCT, the concept of ethnic identity, and previous literature regarding differences in the math/science self-efficacy of Mexican/Mexican-American high school male and female students. In the following sections, I begin with a discussion of the results for each hypothesis, while integrating relevant literature from previous studies. Next, I consider theoretical implications of the study, as well as applied significance for counseling and education. This is followed by a discussion of strengths and limitations, future directions for research, and a conclusion summarizing the most significant aspects of the study.

Levels of Ethnic Identity and SCCT Variables

From a purely descriptive point of view, the average scores of the sample on ethnic identity and the SCCT variables are of interest. In the present study, the mean ethnic identity
(MEIM) score indicated that the students, on average, agreed with and endorsed feelings of belonging and pride, a secure sense of group membership, and positive attitudes for one’s ethnic group. This result may not be surprising given the high proportion of Mexican/Mexican-Americans living in the community from which the study sample was obtained. Indeed, the high school at which the study took place is embedded within an actively engaged Mexican/Mexican-American community and there is an abundance of culturally rich activities occurring throughout the year. Thus, participants from the sample are most likely actively involved and participate in culturally affirming community functions, contributing to relatively strong average levels of ethnic identity. At the same time, it should be acknowledged that current mainstream U.S. society is characterized by an abundance of negative beliefs about the Mexican/Mexican-American community related to immigration, poverty, and limited educational and occupational achievements. A strong ethnic identity may be serving the study participants by strengthening their self-esteem and by helping to buffer the effects of possible discrimination experienced within the broader society. The community where the study participants were sampled may be serving as a “haven” to foster a positive sense of self and pride in one’s cultural heritage. This is reflected in participants’ endorsement of their ethnic identity.

Regarding the other SCCT variables, participants endorsed “moderate confidence” (i.e., self-efficacy) in their ability to perform math/science tasks (ESCI-HS). In addition, participants, on average, indicated that they agreed that positive outcomes will likely result from pursuing a math- or science-related career. However, participants indicated that on average, they “slightly disliked” math- and science-related activities. Finally, on average, participants reported being “uncertain” about their intentions to pursue and persist in math- and science-related school activities and future career plans. The limited interest and uncertainty about pursuing
math/science careers seems consistent with the broader lack of achievement by Mexican/Mexican-American individuals in STEM fields presently (NACME, 2008). Although there have been increased efforts to strengthen recruitment and retention of minority students in STEM fields (U.S. Department of Education, 2007), the effectiveness of these programs with minority students may be limited, as noted by the U.S. Department of Education (2007). With the data collected in my study, which focused only on math and science, I could not determine what other career fields might be of greater interest to these students, or under greater consideration. Given their age, many of the students may be “uncertain” about their career plans in general.

**Test of SCCT Model (Hypotheses 1)**

In Hypotheses 1, I incorporated ethnic identity as a person input variable in a proposed integrated model based on SCCT (see Figure 2 in chapter 2). The initial model was rejected and therefore needed improvement. A modified model with an additional path from ethnic identity (MEIM) to math/science interests fit the data very well. The need to modify initial models to obtain acceptable fit is not uncommon in the literature. For example, other researchers have improved model fit by dropping or adding new paths to incorporate salient variables in studies with Latinos (Flores et al., 2006; Flores & O’Brien, 2002; Gushue & Whitson, 2006; McWhirter et al., 1998). Results from the present study revealed that the variables in the model did a fairly good job of predicting math/science self-efficacy, interests, and intentions/goals, but accounted for a relatively small amount of the variance in outcome expectations. Overall, then, the findings replicated previous studies that have found support for aspects of SCCT, including with
Mexican-Americans (Church, Teresa, Rosebrook, & Szendre, 1992; Flores & O’Brien, 2002; Flores, Navarro, Ploszaj, & Smith, 2006).

However, although outcome expectations predicted intentions/goals, they did not relate well to self-efficacy or interest in math/science. This result highlights the fact that outcome expectations are relatively independent of self-efficacy beliefs and interests, so that it is important to treat these components of SCCT as distinct constructs. Another indication that outcome expectations assess something unique is the following: Whereas greater ethnic identity, self-efficacy, interests, and intentions/goals all correlated moderately with math and science grades, outcome expectations did not (see Table 3). As noted earlier, participants, on average, seemed to recognize positive outcomes of pursuing math/science careers and had some confidence that they could do the relevant tasks, but this did not mean that they were interested in math or science (indeed, on average, they were not very interested). It is also possible that some participants anticipate encountering some hostility and discrimination in STEM environments, which reduced the relationship of outcome expectations with self-efficacy and interests. The weak relationship between outcome expectations and self-efficacy may also be related to social persuasion. Lent et al. (2005) identified social persuasion as one primary information source affecting self-efficacy beliefs. There are a limited number of Mexican/Mexican-American role models within the STEM fields. As a result, participants may think they do not “fit in” or belong in STEM careers and may believe they are not capable of adopting behaviors required to perform successfully within STEM careers.

In addition, the results indicate that ethnic identity is an important factor to include in SCCT models, as it showed both direct and indirect relationships with the SCCT constructs. Consistent with my results, ethnic identity has previously been shown to be a salient variable in
the development of a vocational identity for Mexican/Mexican-Americans (Fouad & Arbona, 1994). More generally, researchers (Arbona, 1995, 1996) have identified a strong ethnic identity (e.g., Phinney, 1992) as crucial for minority high school students. For example, according to Arbona (1995), a strong ethnic identity might buffer the detrimental effects of racism on career development. Similarly, Zimmerman and Arunkumar (1994) stated that in order to promote academic achievement and psychological adjustment in youth, it is important to ameliorate risk factors, as well as foster protective processes within individuals and their environments. A strong ethnic identity can serve as one of these protective factors.

**Test of Perceived Supports (vs Barriers) as a Moderator Variable (Hypothesis 2)**

Contrary to Hypothesis 2, perceived support (versus barriers) as a proximal contextual influence did not impact (i.e., moderate) the relationship between math/science interests and choice goals. Although this moderator hypothesis was not supported, I did find that perceived support correlated significantly with outcome expectations and intentions/goals for math/science careers. That is, my results suggested a direct effect rather than a moderator effect for perceived support on intentions/goals. This finding is nonetheless consistent with SCCT, which asserts that the environmental supports (facilitative influences) and barriers (obstacles) that people encounter or anticipate will strengthen their goals and their likelihood of being enacted (Lent et al., 2005). Indeed, in a study by Flores and O’Brien (2002), it was found that the proximal contextual variable of parental support contributed to Mexican American women’s career choice prestige and career aspirations. Although I did not revise the model to include perceived supports as a predictor in my SCCT-based model, the simple correlations involving this variable suggest that it would account for additional variance in some of the variables (e.g., intentions/goals) in the model.
Gender Differences in SCCT (Hypothesis 3)

Researchers have identified gender differences as an important variable to investigate when seeking to understand the factors underlying a women’s choice of occupations, especially in the STEM fields. For example, Byars and Hackett (1998) found that women of color may have particularly low self-efficacy and outcome expectations due to experiences with oppression and racial bias. This was not the case in the present study. In my sample of Mexican-American students, I predicted that male participants, as compared to female participants, would average higher in self-efficacy, outcome expectations, interests, and goals related to STEM (i.e., math/science) fields. This hypothesis was not supported, however. Only ethnic identity and math/science interests showed significant gender differences and females, not males, averaged higher on these two scales. My unexpected results may be due to my study being more recent than the studies upon which I based my hypothesis, which took place 10-15 years ago. Females today probably have greater access to female role models in the STEM fields. In fact, there is a middle school in the Tri-Cities named after a female Hispanic astronaut. Overall, these results might suggest that interventions to increase self-efficacy and interests for math/science careers are equally relevant for both males and females in this population, rather than implying a greater need for such interventions specifically with females.

Theoretical and Applied Significance

Theoretically, the findings in this study provide support for Social Cognitive Career Theory (SCCT). Specifically, as noted earlier, most of the primary SCCT constructs, especially math/science self-efficacy, interests, and intentions/goals, were moderately to strongly positively related to both math and science grades and showed both direct and indirect relationships among each other. The study findings also provided further theoretical support for the construct of
ethnic identity and the postulated benefits for historically marginalized youth of having a strong 
ethnic identity, for example, in their career development (e.g., Arbona, 1995).

From an applied perspective, the findings of the study are important because they add to 
the existing body of knowledge regarding the factors that may impact underrepresented students’ 
participation and retention in STEM careers. Despite the fact that over three billion dollars were 
allocated to STEM education in 2006, less than half of funded programs have been shown to 
have any meaningful positive impact (U.S. Department of Education, 2007). My results suggest 
that SCCT and the concept of ethnic identity could inform efforts to improve the effectiveness of 
career counseling interventions for math and science education and careers. An increasing 
number of researchers have begun to more closely examine the distinctive needs of students of 
color, recognizing how disenfranchised many of them are from traditional career development 
models and have modified their theories to include more salient variables into the SCCT model 
(Gushue & Whitson, 2006). It is imperative that researchers focus on ways to improve conditions 
for career development of Hispanic youth because a confluence of factors has created a 
problematic picture for them and placed them at an elevated risk for unsuccessful transitions into 
the workforce (Gushue & Whitson, 2006).

In short, my study had both theoretical significance as a test of SCCT theory in this 
unique population, as well as potential applied implications for interventions aimed at increasing 
the numbers of Hispanic youth who pursue STEM fields. SCCT also provides guidance on how 
to increase self-efficacy, for example, by facilitating relevant performance accomplishments, 
through vicarious experiences (e.g., the provision of role models in math/science careers), and 
verbal persuasion by parents and other mentors.
Strengths and Limitations

There were several strengths of the study. First, the study provided additional insight into the role of Social Cognitive Career Theory in the pursuit of STEM careers in an understudied population, Mexican/Mexican American high school students. The majority of participants in most SCCT studies have been European Americans. According to the U.S. Census Bureau (2000), studies with Hispanics are critical in providing a greater base of knowledge about factors influencing the educational and career development of this understudied population. Hispanics are underrepresented in the STEM fields and also represent the youngest and fastest growing subgroup of the U.S. labor market. Second, my sample size was rather large. This enabled more confident conclusions regarding the mean differences and relationships examined.

Third, proximal contextual variables have not been studied much in SCCT and other career development studies. Despite this, contextual factors, such as parental involvement and instrumental support for a given career choice, have been identified as critical to adolescents’ academic and career development (Lent et al., 2001; Lent, Brown, & Hackett, 1994). Thus, my inclusion of perceived support as a contextual variable was a valuable contribution to the literature. Fourth, my integration of ethnic identity as a person variable in an SCCT-based model was a fairly novel contribution.

Fifth, the use of established, valid measures of the key constructs in the study was a strength. In contrast, some SCCT researchers have constructed new measures of uncertain validity for their studies (e.g., Alexander, Perrone, & Sedlacek, 2001; Ferry, Fouad, & Smith, 2000). For example, Alexander, Perrone, and Sedlacek (2001) utilized an instrument in their
study that was designed by the staff of a university counseling center. The rationale for creating and using a new instrument was not discussed.

There were also several limitations of the study. First, only self-report data was used, so it is possible that response biases (e.g., social desirability, acquiescence) impacted the results in unknown ways. However, given the confidential nature of the data collection, the impact of response biases may be minimal. Second, inclusion of more objective and specific measures of environmental supports and barriers (e.g., social, financial, discrimination) would have been beneficial, although much more difficult to collect. Third, my research design was cross-sectional and correlational in nature and did not include a longitudinal component. Thus, although my path model implied some causal predictive relationships, confident causal conclusions cannot actually be drawn from my data. For example, it is possible that math/science interests is a predictor of math/science self-efficacy, or that both variables predict each other. Lastly, the sample is potentially not representative of all Mexican/Mexican-American high school students. The participants live in a mid-sized community and caution should be observed when generalizing results to Mexican/Mexican-American students in more urban settings. There may be possible participant sampling bias due to factors related to the participant recruitment phase. Specifically, one high school staff member who assisted with recruitment of participants works in a high school program focused on supporting Latino/a student success in school.

**Future Research Directions**

Regarding future research directions in this area, several researchers (e.g., Bores-Rangel, Church, Szendre, & Reeves, 1990; Flores, Gee, Huang, Ojeda and Lee, 2006) have recommended that researchers conduct longitudinal and path analytic studies designed to
disentangle the causal relationships among self-efficacy, interest, occupational consideration, and other relevant variables (see also Lapan et al., 1989). Other studies could draw on Bandura’s (1997) proposed sources of efficacy information to evaluate interventions aimed at increasing the self-efficacy of ethnic minority individuals for various careers, including STEM occupations. Additional environmental factors related to school (i.e., the availability of vocational guidance programs), which are not included in Lent et al.’s model, should be investigated and incorporated in more comprehensive models. Future studies should also attempt to improve on the psychometric properties of the measures used in this area of research and develop new instruments for use in research with this population. Additional testing of the revised model with several samples of Mexican/Mexican American high school students is also needed to determine if my results can be replicated and generalized to other school settings (Flores & O’Brien, 2002). Finally, although I included ethnic identity in my study, the ethnic identity construct is not the same as the acculturation-enculturation construct, which can also be investigated as a factor in the career choice behavior of Mexican American individuals.

**Conclusion**

This study added to the existing body of research on the career development of Mexican/Mexican American high school students within the domain of math and science. The present study was significant and relatively unique because it focused on adolescents, who are experiencing a critical period during which they make multiple academic and career-related decisions that result in long-term consequences for their future vocational opportunities (Lent, Brown, & Hackett, 1994). In general, the study found that SCCT provides a relevant theoretical framework for understanding the career choice behavior of Mexican American high school
students and points to potential applied interventions directed at ethnic identity and SCCT constructs in the domain of STEM careers.
References


Fawcett, M., & Maycock, G. (2001). A quantitative assessment of culture and career decision-making confidence levels of high school seniors in a School-to-Work program using the career decision scale. (ERIC Document Reproduction Service No. ED455467)


Occupational Classification Scheme. *Social Science Research, 14*, 142–168.


Appendix A

DEMOGRAPHIC QUESTIONNAIRE

Directions: The following are some questions about you and your family. Please fill in OR circle the best description of you and your family members.

1. Your Age __________

2. Your Gender:
   a. Female
   b. Male
   c. Other (if possible, please specify): ____________________________.

3. What is your current grade level?
   a. Freshmen, 9th grade
   b. Sophomore, 10th grade
   c. Junior, 11th grade
   d. Senior, 12th grade

4. Your Race/Ethnicity:
   a. Hispanic (please specify):
      Mexican-American
      Puerto Rican American
      Cuban American
      Other ____________________________
   b. White (non-Hispanic)
   c. African-American
   d. Asian American (please specify; e.g., Vietnamese, Chinese, Filipino, etc.)
   e. Native American
   f. Biracial/Multiracial (please specify): ____________________________.
   g. Other (please specify): ____________________________.
   h. Prefer not to answer

5. What was the most recent math class you took (please specify; e.g., basic math/pre-algebra, algebra, geometry, calculus, etc.)? ____________________________.
   What was your final grade in the class?
   a. A+    d. B+    g. C+    j. D+    m. F
   b. A    e. B    h. C    k. D
   c. A-    f. B-    i. C-    l. D-

6. What was the most recent science class you took (please specify; e.g., physical science, biology, chemistry, physics)? ____________________________.
   What was your final grade in the class?
   a. A+    d. B+    g. C+    j. D+    m. F
   b. A    e. B    h. C    k. D
   c. A-    f. B-    i. C-    l. D-

7. Circle the generation that best applies to you. Circle only one.
a. 1st generation = You were born in Mexico or other country.
b. 2nd generation = You were born in USA; either parent born in Mexico or other country.
c. 3rd generation = You were born in USA, both parents in USA and all grandparents born in Mexico or other country.
d. 4th generation = You and your parents born in USA and at least one grandparent born in Mexico or other country with remainder born in USA.
e. 5th generation = You and your parents born in USA and all grandparents born in USA.

8. How much education did the female head (e.g., mother/grandmother/aunt) of your household complete?
   a. less than 7th grade
   b. junior high (9th grade)
   c. partial high school (10th or 11th grade)
   d. high school graduate
   e. partial college (1 year or more)
   f. standard college or university graduate
   g. graduate/professional degree (e.g., Master’s, Ph.D., JD);
      specify:_______________________________________

9. How much education did the male head of your household (e.g., father/grandfather/uncle) complete?
   a. less than 7th grade
   b. junior high (9th grade)
   c. partial high school (10th or 11th grade)
   d. high school graduate
   e. partial college (1 year or more)
   f. standard college or university graduate
   g. graduate/professional degree (e.g., Master’s, Ph.D., JD);
      specify:_______________________

10. Please indicate the highest level of education you plan to complete.
    a. partial high school
    b. high school graduate
    c. partial college (1 year or more); specify: _______________________
    d. Associates of Arts degree, 2 year college degree
    e. Bachelors degree, 4 year college degree
    f. Masters degree
    g. PhD or professional degree (Law school/Medical school/Veterinary school)