Predicting Undergraduates' Intent to Persist in STEM:

Self-efficacy, Role Salience and Anticipated Work-Family Conflict

by

Amy Dawson

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Approved May 2014 by the
Graduate Supervisory Committee:

Bianca Bernstein, Chair
Judith Homer
Lisa Spanierman

ARIZONA STATE UNIVERSITY

August 2014

ABSTRACT

In recent years, women have made significant advances in traditionally male occupations. Despite this progress, women are still underrepresented in many science, technology, engineering, and mathematics (STEM) fields. Social cognitive career theory (SCCT) and the model of Achievement Related Choices are two widely accepted career development theories. Both theories highlight the importance of self-efficacy and personal factors in career development; yet, neither of them has considered the predictive power of a specific outcome expectation, anticipated work family conflict (AWFC), in relation to the career development of men and women in STEM undergraduate programs. The purpose of this study was to assess the incremental validity of AWFC over and above that of self-efficacy and role salience, in predicting educational and occupational aspirations of undergraduate students in STEM programs at a large southwestern university. The study provides evidence that the factor structure of the AWFC scale does not hold up with the undergraduate population, and this finding was seen as reason to combine the AWFC subscales into one composite score. In a hierarchical multiple regression higher levels of STEM self-efficacy predicted higher intentions to persist in STEM. Role salience, AWFC, and the gender-AWFC interaction were not significantly related to intentions to persist. Although the study does not provide evidence for the incremental validity of AWFC, it does suggest that work-family balance considerations that have been observed in mature STEM populations may not yet be salient for students at the undergraduate level.

TABLE OF CONTENTS

APPENDIX Page

LIST OF TABLES

LIST OF FIGURES

Figure Page

CHAPTER 1

INTRODUCTION

Today, more women pursue post-secondary education than men and have made significant advances in various science related fields, such as biological, medical, and social science fields. Despite this progress, women are still underrepresented in many science, technology, engineering, and mathematics (STEM) fields, with women comprising only 27% of the labor force (National Science Foundation, 2013). In STEM academic departments the presence of women faculty is even lower, with women representing only 18% of full professors. As of 2010, the percentage of women graduating with bachelor's degrees in the physical sciences and mathematics was hovering around 40%, while the percentage for computer sciences and engineering remains below 30% (NSF, 2013). Perhaps more telling, the number of women awarded undergraduate degrees in the physical sciences, mathematics, and computer sciences has actually decreased at a rate of about 10% since the year 2000 (NSF, 2013). When looking more closely at trends in undergraduate attrition, females tend to switch out of STEM majors at appreciably higher rates than male students, 32% vs. 26%, respectively (National Center for Education Statistics, n.d.). Further, when the reason for attrition from STEM is due to dropping out of college altogether, males leave at higher rates (24%) than females (14%; NCES, n.d.).

With so many college educated and talented women abandoning the sciences, researchers are examining which individual and social factors contribute to women's educational and occupational choices (Byars-Winston & Fouad, 2008;

Fouad & Byars-Winston, 2005). Attrition from STEM may be related to female students' experiences and perceptions, particularly feelings of isolation and a lack of role models and mentors, as well as a general discomfort with the competitive environment of some STEM departments (Espinosa, 2011; Fouad, Hackett, Smith, Kantamneni, Fitzpatrick, Haag, & Spencer 2010; Seymour, 2002. Another factor that has been called out as significant with regard to career and educational decisions is work-family balance, or "the extent to which an individual is equally engaged in- and equally satisfied with- his or her work role and family role" (Greenhaus, Collins, & Shaw, 2002, pg. 513). Distributing personal resources, such as time and energy, equally or near equally, across life domains is thought to be associated with life satisfaction (Clark, 2000; Greenhaus, Collins, & Shaw, 2003; Kirchmeyer, 2000).

Evidence suggests that individuals who experience imbalance among life domains tend to feel higher levels of work-family conflict and stress that results from role overload (Frone, Russell, & Cooper, 1992; Marks & MacDermid, 1996). The construct of anticipated work-family conflict, also known and referred to as AWFC in this thesis, can be characterized as the expectation that an individual's future work role will obstruct their future family role and vice versa (Greenhaus & Beutell, 1985). It is unknown whether or not the expectation for imbalance among life domains has significant effects on stress levels, or if the actual experience of role overload is necessary in order to accurately anticipate work-family conflict. The AWFC construct has, for the most part, not been examined aside from a few studies that have focused on variables, such as career decision making self-efficacy and core self-evaluations, that may affect the perception of future work-family conflict

(Cinamon, 2006; Greenhaus & Parasuraman, 1999; Spade & Reese, 1991; Westring & Ryan, 2011). To date, no studies have empirically considered the potential effects of AWFC on actual career and educational aspirations. The purpose of the present study is to examine the predictive value of AWFC in relation to the career and educational aspirations of students currently enrolled in STEM undergraduate majors.

Social cognitive career theory (SCCT), which is rooted in Bandura's (1986) social cognitive theory, is an understanding of career development and choice that emphasizes the interaction of self-efficacy, outcome expectations, and personal goals (Lent, Brown, & Hackett, 1994). Self-efficacy, or one's confidence in the ability to succeed at a certain task or job, is believed to influence choice and persistence in that task or career, and evidence suggests that efficacy for a field or subject is positively correlated with interests in said field (Lent et al., 1994). Furthermore, outcome expectations are the expectations that certain choices and careers will lead to desired or undesired results, such as prestige and a high salary, or work-family conflict (Lent et al., 1994). Goal setting contributes to career choice and persistence by helping people organize and guide their behavior, which serves to facilitate attainment of desired outcomes (Lent et al., 1994). While SCCT theorists do state the importance and impact of negative life outcomes, specifically work-family conflict, on career choice, the actual value of AWFC in predicting career and educational decisions has not been assessed (Lent et al., 1994; Westring & Ryan, 2011).

In an effort to understand the different educational and occupational choices of men and women, and the reasons behind the underrepresentation of women in

many high-status fields, Jacquelynne Eccles (1994) developed and applied the model of Achievement Related Choices. According to the model, educational and occupational choices are guided and determined by four important variables: 1) one's expectations for success and self-efficacy; 2) the relationship between one's available options and goals, self-identity, and psychological needs; 3) one's gender role schema; and 4) the potential costs associated with investing time in one activity rather than another. Expectations for success, or personal self-efficacy have long been established as predictors of occupational choice (Betz & Hacket, 1981, 1986; Betz & Fitzgerald, 1987; Hollinger & Clark, 1983). One of the goals of Eccles' (1994) early research was to establish that although expectations for success and self-efficacy are necessary functions of career development, they are not sufficient as lone predictors of occupational choice. Indeed, Eccles and colleagues found that the subjective task value (STV), or importance attached to job characteristics, is also a significant predictor of occupational choice (Jozefowicz, Barber, & Eccles, 1993). Eccles (1994) conceptualizes STV as being composed of four aspects: 1) The utility value of the task in reaching one's goals; 2) one's interest in or liking for the task; 3) the attainment value of a task due to its consistency with one's self image or what one considers important; and 4) the perceived cost of engaging in a task. Eccles (1994) attests that the last two components of STV are especially impacted by gender roles, and thus are important in understanding the value people attach to certain occupational choices.

Role salience, conceptualized as the degree of psychological involvement in a particular role, can be viewed as a measure of the third component of STV,

attainment value. Role salience is thought to be calculable via the amount of commitment, participation, and value or importance that one attaches to a role (Amatea, Cross, Clark, & Bobby, 1986; Super, 1980). The impact and predictive value of the last component, perceived costs, in relation to self-efficacy and attainment value, on educational and occupational choice has not been studied empirically. However, there is evidence that both men and women in STEM base some of their occupational choices on a desire for a balanced work and family life. For example, Mason, Goulden, & Frasch's (2009) found that most doctoral students hold the belief that faculty careers entail unrelenting work hours that do not permit a fulfilling family life. Furthermore, the top three reasons cited by women in the study for why they changed their career goal away from a tenure track research position were issues related to having children, negative experiences as a student, and other life interests (Mason et al., 2009). Thus, a portion of the differences between men and women's occupational choices may be impacted by foreseen costs, like AWFC, of participating in certain occupations. It is unknown how early this work-family conflict concern emerges, and the question arises as to whether a concern about work-family conflict at the undergraduate level may be a contributing factor for the higher attrition rates in STEM for women compared to men.

In line with the populations most often studied in the SCCT and achievement related choice literature, undergraduate students will be assessed in the current study. An array of issues and concerns apply to undergraduate students in STEM. In the U.S., less than half of the students who enter STEM undergraduate classes as freshman will actually graduate with a STEM degree (Hayes, Whalen, & Cannon,

2009). Further, women and minorities are even less likely to persist in undergraduate STEM majors than their white, male counterparts (Wilson, Holmes, deGravelles, Sylvain, Batiste, Johnson, McGuire, Pang, Warne, 2011). Also of importance, the primary childbearing years correspond with the undergraduate years for many women; in the U.S., 44% of women in the general public have had a child by age 25 (Hymowitz, Carroll, Wilcox, & Kaye, 2013), and according to the Institute of Education Sciences (2012), 41% of undergraduate enrollees in 2010 were between 18 and 24 years old. In the U.S., 25% of undergraduates report having children (Nelson, Froehner, & Gault, 2013). Therefore, the primary childbearing years correspond directly with the undergraduate and career decision making years for some women.

The current study combines concepts from SCCT as well as the model of Achievement Related Choices. Outcome expectations and perceived costs are conceptually similar, in that a perceived cost is analogous to a negative outcome expectation. There is a gap in the career theory literature regarding the influence of outcome expectations and perceived costs on career choice. Thus, in this study the perceived cost of AWFC will be considered to be, and referred to as, an outcome expectation. The aim of the current study was to identify the variance explained by outcome expectations over and above the established predictors, self-efficacy and role salience, in relation to the educational and occupational aspirations of men and women in STEM undergraduate programs.

The following chapters detail the relevant literature behind the theories and concepts applied in the study, such as SCCT and self-efficacy, achievement related

choices, AWFC, role salience, and career and educational aspirations. The final chapters go on to describe the research questions, hypotheses, measures, methods, and results that were implemented in the study.

CHAPTER 2

LITERATURE REVIEW

This chapter is organized according to the relevant theories and constructs used to conceptualize the current study. It begins with a review of Social Cognitive Career Theory and the model of Achievement Related Choices, and then moves forward to describe the constructs of anticipated work-family conflict, role salience, and educational and career aspirations. The chapter ends with a section describing the purpose of the current study, as well as the research questions and hypotheses.

Social Cognitive Career Theory

Among the theories developed to explain career development, social cognitive career theory (SCCT; Lent, et. al, 1994) has been the most frequently studied and supported over the last 15 years (Duffy, Allan, Autin, & Bott, 2013; Lent, 2005; Sheu, Lent, Brown, Miller, Hennessey, & Duffy 2010). According to the model, which is grounded in Bandura's (1986) social cognitive theory, vocational interest develops due to self-efficacy and outcome expectations for various domains, which in turn drive goals, or aspirations, within a certain domain (Duffy et al., 2013; Lent et al., 1994).

Self-efficacy is defined, according to Bandura (1989) as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances." SCCT views self-efficacy as an ever evolving set of beliefs that interact with other contextual, personal, and behavior factors, and is predictive of career related choice (Lent et al., 1994; Hackett & Lent, 1992; Multon, Brown, & Lent, 1991). Despite the importance of self-efficacy in making career

related choices, it is only moderately related to actual performance in a domain (Betz & Hackett, 1981; Lent, Brown, & Larkin, 1986), and it is the combination of efficacy and actual skill that predicts success in a task domain (Bandura, 1991).

Outcome expectations are, according to Lent and colleagues (1994), "personal beliefs about probable response outcomes" (pg.83). Outcome expectations are the perceived consequences of engaging in particular behaviors, and presumably are important influences on choice behaviors. In general, Bandura (1989) attests that self-efficacy has a greater influence on motivation and behavior than outcome expectations do, but in situations like academic and career environments where quality performance is not inevitably linked to positive outcomes, this level of influence may vary. Lent et al. (1994) offer the following example of how outcome expectations, particularly negative ones, could possibly play a more important role than self-efficacy during career development: "…It is not difficult to imagine a person with high self-efficacy for mathematics choosing to avoid science-intensive career fields if she or he anticipates negative outcomes (e.g. non-support of significant others, work/family conflict) to attend such options" (p. 84).

In SCCT, choice goals, or the intention to achieve certain outcomes or behaviors, are important in career development (Bandura, 1986; Lent et al. 1994). According to Lent and colleagues (1994), goal setting is a way to guide and sustain one's own behavior in the absence of external reinforcement and increase the likelihood that desired outcomes are achieved. Goals link personal satisfaction to goal achievement and the behaviors that precede it; therefore, career aspirations,

decisions, plans, and choices are viewed as the behaviors or actions used to achieve goals (Lent et al., 1994).

According to SCCT, and following from the previously described building blocks, there are three key models that are influential in career development (Lent et al., 1994). According to the interest model, people tend to be attracted to and interested in domains in which they feel competent (Lent et al., 1994). That is, self-efficacy and outcome expectations are positively correlated with interests, and the combination of the two predicts interests more strongly than either construct separately (Lent et al., 1994). Additionally, according to the Lent et al. model (1994), self-efficacy mediates the predictive relationship between objective abilities in a specific domain and interests in that domain. In SCCT, other influential constructs, such as attitudes, values, gender, and ethnicity also play a role in career development through their influence on experiences that shape self-efficacy and outcome expectations (Lent et al., 1994). In the choice model (see Figure 1 in Appendix R), self-efficacy and outcome expectations are directly related to choice goals, or aspirations, as well as indirectly related via their effect on interests (Lent et al., 1994). According to the third model, the performance model, there is a direct relationship between self-efficacy and performance, or the quality and persistence of behavior, as well as between objective ability and performance (Lent et al., 1994). Additionally, goals and self-efficacy are partial mediators of self-efficacy and performance, and ability and performance, respectfully (Lent et al., 1994). Furthermore, Lent and Brown (2006) have recently built upon SCCT and added a fourth model, educational and work satisfaction, which proposes that self-efficacy

and goals function alongside and are influenced by personality and contextual variables, such as the Big Five traits and work outcomes like role conflict, that are linked to job satisfaction or dissatisfaction.

Achievement Related Choices and Gender

The model of Achievement Related Choices was developed in an attempt to understand the motivational and social factors behind the educational and vocational decisions of women and men (Eccles, 1994). The model, which builds upon achievement and attribution theories (Crandall, 1969; Weiner, 1974), connects educational and career choices to expectations for success and the value an individual attaches to available options (Figure 2, Appendix S; Eccles, 1994). Cultural norms, experiences, and personal beliefs are considered in relation to the expectations and values that are thought to contribute to career decisions (Eccles, 1994). These cultural norms, experiences, and personal beliefs, such as gender role beliefs, parental input, and self-perceptions are believed to influence expectations for success and the subjective value that one assigns to a task, which, in turn, are believed to influence one's likelihood of participating in a task (Eccles, 1994).

Eccles (1994) points to three features of the model that are important to explicate. One is the view that achievement related choices are the products of interests and that gender differences in achievement can be conceptualized in terms of choices (Eccles, 1994). Thus the emphasis is put on why men and women make different choices, and not why women and men are different (Eccles, 1994). This leads into the second feature unique to the model, that people do choose among options, but often, they do not consider all options that are available to them (Eccles,

1994). Eccles asserts that options are often disregarded because people are simply not aware of their existence, or because people have inaccurate perceptions of them. Other times, alternatives are not considered because they do not fit well with a person's gender role schema or degree of role salience, i.e., the level of psychological involvement in a given role such as career or family (Amatea et al., 1986; Eccles, 1994). The third assumption of Eccles' model is that career and education related decisions are made based on an array of available options, which have long term as well as immediate consequences. In light of this assumption, researchers can consider *why* men and women make the choices that they do. Eccles offers the decision to enroll in an advanced math course as an example. The decision is not related solely to math variables, such as performance on math exams, but rather it is also related to the psychological meaning behind the choice (Eccles, 1994).

According to Eccles' (1994) theory, self-efficacy is a mediator of achievement choices. There is ample empirical evidence that demonstrates the link between self-efficacy and educational and occupational choice behaviors. Self-efficacy for academic subjects, such as math, has been linked to aspirations in related fields, such as engineering, as well as to self-reported ease in domain performance (Hollinger & Clark, 1983; Terman, 1926). Well known career theorists, Betz and Hackett (1981, 1986), have also reported evidence that self-efficacy in various academic subjects is predictive of career choices in related fields. Studies examining differences in self-efficacy between males and females have revealed mixed results. For example, two separate studies found that gifted girls in high school tend to underestimate their intellectual abilities and class rank, while gifted boys tend to

overestimate in both areas (Strauss & Subotnik, 1991; Terman, 1926). Jozefowicz and colleagues' (1993) longitudinal study of adolescents revealed gender differences in self-efficacy that were significantly predictive of occupational choice, specifically, females rated themselves as less efficacious in science related fields while males reported less efficacy in health related fields. Other studies, however, have found no gender differences between gifted student's self-efficacy in math and sciences courses (Benbow & Stanley, 1982). Furthermore, the Eccles, Adler, & Meece, (1984) longitudinal study revealed that the perceived value, particularly the importance, interest, and usefulness, of a math course mediated the gender differences in math course enrollment, and self-efficacy did not. Therefore, the gender differences in science and math related careers might not be primarily due to self-efficacy differences, but rather gender differences in task value (Eccles, 1994).

The second major piece of Eccles' (1994) model is subjective task value (STV), or the value people attach to the options they believe are available to them. In the model, the subcomponents of subjective task values (incentive, utility value, attainment value, and costs) are thought to embody gender differences that are important mediators of the gender disparity present in occupational choices (Eccles, 1994, 2011).

According to Eccles' (1994) model, attainment values are viewed as the degree to which an activity fulfills needs and personal values. The value that people attach to various career and educational options is influenced by an individual's self-image and self-definition, or the ideal image of what one should be (Eccles, 1994).

Eccles' model assumes that in making career related choices, people seek to confirm characteristics that they see as central to themselves, and that individuals place more value on and tend to select options that are consistent with their self-image and long term goals. The concept of work and family role salience, or role importance as expanded on in a later section, can be conceptualized as an indicator of the attainment value of various career options. Thus, because of differences in self-image between men and women, they place different, hierarchical value on various careers (Eccles, 1994). Corroborating this idea is a study (Michigan Study of Adolescent Life Transitions (MSALT); Jozefowicz et al., 1993) that found students' occupational values were both positive and negative predictors of occupational choices. Students reported strong aspirations for occupations that they valued highly, and conversely, reported less aspiration for the occupations that they did not value (Jozefowicz et al., 1993).

According to the model of Achievement Related Choices, perceived costs are the consequences one associates with participating in a certain activity (Eccles, 1994). Perceived costs can be influenced by fears and anxieties associated with failure, or even the social consequences of success (Eccles, 1994). Alternatively, costs can be characterized as a loss of time and energy for other valued activities (Eccles, 1994). Eccles (1994) gives the example that people do not have time to do everything that they would like, thus they make choices among various options. If a valued activity reduces the amount of time one is able to spend in a higher valued activity, the likelihood of participating in or choosing the former time absorbing activity may be reduced (Eccles, 1994). While attainment values, such as life values,

have been established as equally important predictors of occupational choice as expectations of success (Jozefowicz et al., 1993), the predictive role of costs has been less examined, and has not been considered in combination with or apart from attainment values.

Eccles' (1994) model goes further to explain how socialization experiences may account for gender differences in occupational and educational choices and aspirations. Six specific ways that experiences can impact one's sense of efficacy and STV have been detailed. First, gender role socialization could contribute to different hierarchies of values among men and women (Eccles, 1994). For example, evidence suggests that some women place more importance on communal, or person-oriented values, such as foregoing a career in order to have a family, while men place more importance on agentic, or thing-oriented values, such as career success (Abele & Spurk, 2011; Eccles et al., 1999; Ferriman, Lubinski, & Benbow, 2009; Jozefowicz et al., 1993). Furthermore, Abele & Spurk (2011) have shown that agentic values predict career success, and communal values predict involvement in family over career. Second, gender differences in long-term career goals are influenced by gender roles (Eccles, 1994). In the culture at large, traditional gender roles prescribe that women are to raise children and men are to work. Depending on the degree to which these notions are internalized, the role of being a mother and wife may be more salient to a woman than having a career, and as described earlier, people aim to fulfill their internalized self image (Eccles, 1994). Conversely, men are inclined to value work and family roles equally, possibly because having a family does not impact men's career success or their ability to commit time to their career,

as much as women's (Abele & Spurk, 2011; Eccles 2011; Jacobs & Winslow, 2004). Accordingly, there is evidence that women limit their career goals by making more career sacrifices for their families than their male counterparts (Eccles et al., 1999).

Following from these findings is the prospect that men and women may have differing definitions of what success in a role entails (Eccles, 1993, 2011). If women define successful parenting as being highly involved with the rearing of children, and men define success in parenting as being a reliable source of income, then occupational gender differences are even further accounted for (Eccles, 1993). Furthermore, Baruch, (1983) have found evidence that women value involvement in several activities and roles, thus dispersing their internal resources, while men are more likely to have one area of focus. Corroborating this is Sears' (1979) study of gifted men and women, in which males rated occupation as having the most importance in terms of life goals, and women rated family, friends, richness of life, and joy as all having high importance in their life plans.

Perhaps most notably, regarding Eccles' (1994) fifth assertion, it is evident that perceived conflict between family roles and achievement, or career roles, is especially salient to women (Eccles, 1989; Baruch et al., 1983; Farmer 1985). Findings on the influence of this conflict are mixed. Some women report regretting sacrifices they made in their careers (Abele & Spurk, 2011; Sears, 1979), while others attest that multiple role involvement is beneficial, mentally and physically (Crosby, 1991). Reportedly, multiple roles can provide various opportunities for satisfaction and validation in life (Crosby, 1991). Lastly, Eccles' model asserts that gender roles and/or role modeling enacted by the people that children are exposed

to as they grow up, such as parents, teachers, and peers, could influence the value that people place on various educational and career choices. For example, the gendered messages that girls receive from their parents have been found to influence, and weaken, their interest in and self-efficacy for various subjects, such as math (Eccles, 1993). These early messages may continue to influence young women and dissuade them from participating in male dominated fields (Eccles, 1994).

Role Salience

A role is essentially a set of behaviors or actions that an individual expects, and is expected to, carry out (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). As early as 1960, multiple role demands and the attempts to fulfill them have been viewed as excessively stressful (Goode, 1960). These multiple role demands lead to inter-role conflict, or the conflicting expectations that result from having multiple roles (Greenhaus & Buetell, 1985). Boundary/border theory goes further to quantify roles as specific domains in life, such as home and work (Ashforth, Kreiner, & Fugate, 2000; Clark, 2000; Michaelson & Johnson, 1997; Nippert-Eng, 1996). The examination of the importance of life roles and how engagement in certain roles changes over time first began with Super's life span, life-space theory (1990). Role salience, i.e., psychological involvement in a role (Amatea, et al., 1986), is thought to be measurable via the amount of commitment, participation, and value or importance that one attaches to the role (Amatea et al., 1986; Perrone, Webb, & Blalock, 2005; Richardson, 1981; Super, 1980). In view of Eccles' (1994) model, role salience can be viewed as a measure of the degree to which an activity fulfills personal needs and values. Although role salience doesn't measure role conflict, it

could offer one possible explanation of such conflict. Consider the case of a woman who values work and family equally, yet spends 80 hours working, or vice versa. Mathematically speaking, then, the time devoted to each role is far from equal, and role conflict could potentially result. In this light, it is possible that the anticipated work-family conflict, or outcome expectation, that may result from an anticipated conflict between two salient roles could explain career and educational aspirations better than role salience, or attainment value, alone.

Anticipated Work-Family Conflict

According to leading work-family conflict theorists, Greenhaus and Beutell (1985), work-family conflict is defined as "a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect. That is, participation in the work (family) role is made more difficult by virtue of participation in the family (work) role" (p.77). Research has identified negative effects of work-family conflict in the individual, work, and family domains, such as stress, depression, chronic health problems, lower family satisfaction, job distress and dissatisfaction, and increased levels of turnover (Anderson, Coffey, Byerly, 2002; Aryee, Fields, Luk, 1999; Carslon & Kacmar, 2000; Frone et al., 1992; Frone, Russell, & Barnes, 1996; Frone, Russell, & Cooper, 1997; Greenhaus, Parasuraman, & Collins, 2001; Grzywacz, 2000; Grzywacz & Bass, 2003; Kelloway, Gottleib, Barham 1999). Given the well-documented negative effects of work-family conflict, it is notable that little work has looked at it from a developmental issue, that is, one that may vary over time according to awareness and experience. One way that this is beginning to be studied is through anticipated work-family conflict

(AWFC), which is the expectation that an individual's future work-role will obstruct their future family role and vice versa (Greenhaus & Beutell, 1985).

It is important to note that the AWFC concept and scale does not provide a definition of family. According to the U.S. Census Bureau (2002), a family is comprised of two or more individuals who are related by blood, marriage, or adoption. This is the definition used in clinical practice and it includes LGBT couples, single parents, grandparents, and adoptive families (Medalie & Cole-Kelly, 2002). Therefore, throughout this thesis, this definition of family is adopted and implemented.

In a bi-directional model of work-family interface, originally proposed by Frone, Russell, and Cooper (1992), work role demands impact work interference with family, and family role demands impact levels of family interference with work. The construct of work-family conflict is currently viewed as being six-dimensional (Carslon, Kacmar, & Williams, 2000). There are three types of conflict, time-based, strain-based, and behavior based, and two directions of conflict, namely, work interference with family and family interference with work (Carslon, et al. 2000). The degree of permeability and flexibility of home and work domain boundaries is thought to determine the degree of conflict that an individual will experience (Ashforth, Kreiner, Fugate, 2000; Clark, 2000; Nippert-Eng, 1996). Prior to Westring and Ryan (2011) affirming the same six-factor structure in AWFC, it had been viewed as two-dimensional: 1) anticipated work interference with family, and 2) anticipated family interference with work Cinamon, 2006; Cinamon, Most, & Michael, 2008).

The few studies that have been conducted on the construct of AWFC so far have focused on variables that may affect the perception of future work-family conflict, such as beliefs about the self, role variables, outcomes, gender considerations, familial background, and self-efficacy beliefs (Westring & Ryan, 2011; Cinamon, 2006). In a study by Westring and Ryan (2011), multiple variables and their impact on AWFC were assessed, such as self-efficacy and core self-evaluations, work and family role demands, work and family role salience, and work and family role certainty. Self-efficacy for making work-family decisions strongly predicted levels of AWFC and was the only variable that predicted certainty regarding career plans (Westring & Ryan, 2011).

It is important to note that AWFC is considered to be an outcome expectation in this study; it is an expectation about the outcome of participating in future work and family roles (Westring & Ryan, 2011; Lent et al., 1994). Conceptually, AWFC could also be considered a perceived cost associated with participating in a certain task, which would be in line with Eccles' (1994) model of Achievement Related Choices. Due to the conceptual similarities between perceived costs and outcome expectations, and for the purposes of the current study, AWFC is referred to as an outcome expectation. In SCCT and the model of Achievement Related Choices, outcome expectations/perceived costs are thought to contribute to career choice (Eccles, 1994; Lent et al., 1994).

Theoretically speaking, AWFC, if viewed as an outcome expectation, should also contribute to career decisions and choices. Therefore, AWFC has potential to be studied as a unique variable in the explanation of career aspirations, or choices. To

date, no studies have empirically considered the value of AWFC in explaining actual career aspirations, particularly in comparison to other established predictors of career choice, such as domain specific self-efficacy and attainment values.

Career and Educational Aspirations

Aspirations are essentially goals, and they are especially important in career development because they influence motivation and choice actions, like choosing to obtain education and training required for an occupation (Lent et al., 1994; Looker & McNutt, 1989; Mau & Bikos, 2000; Schoon & Parsons, 2002). Career aspirations are defined as "an individual's expressed career-related goals or choices" (Rojewski, 2005, p. 132). Similarly, educational aspirations can be considered an early measure of educational and occupational choices, and the basis for future career choice (Rojewski, 2005). Educational aspirations are stable starting around eighth grade (Rojewski & Kim, 2003) and are predictive of occupational aspirations 6 years later (Rojewski & Yang, 1997). There is also evidence that educational aspirations play a significant role in predicting whether or not high school seniors endorsed science majors as second-year students in college (Ware & Lee, 1988). Additionally, adolescents with higher educational aspirations tend to be more invested in their future careers and educational training, and educations aspirations tended to predict post high school status better than occupational aspirations (Rojweski & Kim, 2003). Educational and career aspirations are affected by variables such as social support, familial environments, self-efficacy, and self-esteem (Fouad & Smith, 1996; Taylor 1982). In the current study, educational and career aspirations are

conceptualized as plans to attain higher education in STEM and pursue a career in a STEM field.

Summary and Purpose of This Research

The current study offers a unique contribution to the literature by recognizing and combining analogous aspects of SCCT and the model of Achievement Related Choices. The study recognizes the overlapping nature of the theories, and uses both as the theoretical basis for investigating the explanatory value of AWFC in relation to achievement aspirations. Both theories incorporate negative expectations, whether they are termed "perceived costs" or "outcome expectations," in their models of career development (Eccles, 1994; Lent et al, 1994). Both groups of researchers recognize the potential influence of these expectations by including them in their theories, and Lent et al. (1994) even go so far as to explicitly mention work-family conflict as being an important contributor to career decisions, and having the potential to be more influential than self-efficacy. Nevertheless, outcome expectations, measured as AWFC, have yet to be studied in comparison to attainment values, measured via role salience, and self-efficacy, in explaining career aspirations at any educational level. Given the gender gap that exists in STEM enrollment and careers, and the evidence that suggests that women are especially susceptible to role conflict (Baruch et al., 1983; Eccles, 1989; Farmer 1985), examining the early influence of role conflict expectations on career aspirations in STEM can further our understanding of when these expectations might begin to negatively influence career decisions, and where we can begin working in order to reverse that trend.

This study is framed within the context of research that explores what factors might contribute to the lower levels of degrees awarded, and the higher level of attrition for women compared to men in STEM undergraduate programs (NCES, n.d.; NSF, 2013). Considering women who have gone so far as to enroll in a STEM major, one would assume that domain self-efficacy would have already had a strong effect on choice. Perhaps one reason for the attrition level lies in role conflict expectations, in the form of AWFC, which might develop for some women during their undergraduate years. In this light, it may be possible that at this level of career development, the negative expectations of some women begin to trump high levels of self-efficacy. The first step in examining this possibility is uncovering whether early work-family conflict considerations begin to impact career decisions.

The current study sought to investigate the role of outcome expectations and previously established factors (self-efficacy and attainment values) in explaining, or accounting for, undergraduate women and men's career and educational aspirations. In doing so, this study adds to the previous literature by assessing the explanatory value of AWFC, an outcome expectation, in relation to achievement aspirations. Additionally, this study assessed the explanatory value of self-efficacy and role salience in an undergraduate population. Finally, an interaction between gender and AWFC was explored. The specific hypotheses, examined via a hierarchical multiple regression, were as follows:

H1: Science/technical self-efficacy will explain variance intentions to persist in STEM education and career.

H2. Occupational role value will explain more variance for higher levels of intentions to persist in STEM education and career than marital and parental role value.

H3. AWFC will account for unique and significant incremental validity over and above self-efficacy and role salience in predicting intentions to persist in STEM education and career.

H4. The presence of AWFC will explain variance for lower levels of intentions to persist in STEM education and career.

H5. Females with AWFC will have lower intentions to persist in STEM education and career than men with AWFC.

CHAPTER 3

METHODS

Participants and Procedure

In total, 223 undergraduate students from Arizona State University completed all study measures: 127 males, 90 females, and 6 who did not indicate their gender. Ages ranged from 20-64 years of age, and race/ethnicity self-reports included 3% African American, 3% Native Hawaiian or Pacific Islander, 21% Hispanic or Latino (a), 3% American Indian or Alaskan Native, 18% Asian, 64% Caucasian/White, and 12% identified as Multi-ethnic. All participants reported STEM majors. For complete demographic information see Tables 1-5 in Appendices H-L. Originally, 262 undergraduate students at ASU agreed to participate. Participants who did not complete the questionnaire (an entire measure or more) were excluded from the analyses. Additionally, participants who were either not enrolled in STEM majors (i.e. "business") or not at the undergraduate level were removed from the analyses. In analyses that took gender into account, the six participants who did not indicate their gender were treated at missing data in SPSS and removed from the analysis.

Participants were recruited via two main sources, the ASU directory, made available via the Office of Institutional Analysis, and STEM faculty identified via course listings. The Office of Institutional Analysis provided, upon IRB approval, a list of STEM major names, email address, gender, and current department/major. Additionally, 300 and 400 level STEM course professors were identified via course listings. Approximately 200 professors were contacted via email and asked if they

would be willing to 1) distribute the study recruitment email to their classes, and 2) offer extra credit as an incentive to the students in their classes that completed the study survey. The recruitment email detailed the purpose of the study and the level of involvement requested of participants. The purpose of the study was described as exploring factors that contribute to the career and educational aspirations of students in STEM majors. Those who were interested in participating were instructed to click on a link to the survey, administered via Qualtrics, to enroll in the study. After clicking the link, participants were taken directly to the online informed consent agreement before they could proceed to the survey, which they were informed would take approximately 10 minutes to complete. All items within a scale were presented in a random order, and subscale headings were not included in the questionnaire.

Incentives were provided for participation in the study. STEM department faculty who agreed, offered course extra credit to their students who completed the survey; approximately 50 participants reported receiving extra credit for their participation. For those study participants who did not receive course extra credit, a raffle for three Amazon Kindles was offered as incentive. The researcher was awarded a $400 GPSA Jumpstart Grant to cover incentive costs. The logistics of achieving these two incentive options, while also keeping responses separate from any identifying information (email addresses) were made possible via Qualtrics, the service that was used to create the questionnaire. The last item of the study survey was a “yes” or “no” question that asked if the participant was receiving extra credit for their participation in the survey. If the respondent answered “yes” they were

directed to another short survey, independent of their previous responses, which asked for information regarding the class for which they were receiving credit, and the instructor's name and email address. The participant was then asked to print the survey completion page, or take a screen shot of it in order to obtain proof of their participation for their instructor. If a participant answered "no" to the extra credit question, they were directed to another short survey asking them if they would like to be entered into a raffle for an Amazon Kindle. If they answered "yes" they were asked to provide their email address for the raffle. If the participant answered "no" they were directed to a survey completion page. In this way, the researcher was never able to link participant incentive information to their responses on the study questionnaire. Furthermore, the anonymous data has been kept confidential by using a password-protected spreadsheet.

According to Wampold and Freund (1987), the number of subjects needed to achieve power levels for detecting various sizes of R^2 can be calculated using effect size, alpha level, and the number of independent variables. When a small R^2 is of interest (.10), to achieve a power level of .70 or .80, large numbers of subjects are necessary (Wampold & Freund, 1987). When a very large R^2 is of interest (.50), very few subjects are needed. Therefore, the suggestion that researchers need "10 subjects for every independent variable" is outdated and incorrect (Wampold & Freund, 1987). Wampold and Freund (1987) advised researchers to conduct their own power analysis a priori. In following this suggestion, I completed a power analysis using the G*Power program. According to Cohen (1988), using very large effect sizes in a prospective power analysis is not recommended, as it could lead to

underpowered studies. In conducting a power analysis for a regression model, Cohen's f^2 is used as the effect size measure (Cohen, 1988). According to Cohen (1988), a small, medium, and large f^2 effect size is .02, .15, and .35, respectively. For my a priori power analysis I used the following values: $f^2 = .15$, $\alpha = .05$, power $(1-\beta) = .90$, and number of predictors= 14. The G*Power analysis revealed a minimum sample size of 166 was needed in order to have a 90% chance of obtaining a significant finding.

Instrumentation

Demographic information. Data was collected on gender, age, ethnicity, sexual orientation, marital status, number of children, plans to have children, current undergraduate program, year of study, and realistic future career (see Appendix C). Ethnicity was coded on a scale ranging from 1-8: White/Caucasian, Black/African American, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, Hispanic or Latino(a), Asian, and Multiethnic.

Anticipated work-family conflict. An 18-item Work-Family Conflict Scale was created by Carlson et al. (2000) in order to provide a multidimensional measure of work-family conflict. According to Carlson and colleagues (2000), the six-factor model of work-family conflict produced internal consistency coefficient alphas of .87 for time based work interference with family (WIF), .79 for time based family interference with work (FIW), .85 for strain-based WIF, .87 for strain-based FIW, .78 for behavior based WIF, and .85 for behavior based FIW. The time based WIF and FIWS scales measure the belief that work (or family) time demands interfere with participation in the family (or work) role (Westring & Ryan, 2011). Similarly, the

strain based WIF and FIW scales assess the degree to which strain from the work (or family) role interferes with participation in the family (or work) role (Westring & Ryan, 2011). Finally, the behavior based WIF and FIW scales measure whether or not the behaviors required in the work (or family) role interfere with one's participation in the family (or work) role.

Westring and Ryan (2011) established that the same six factor structure held for Anticipated Work-Family Conflict, or work-family conflict measured in future tense, and reported internal consistency coefficient alphas of .73 for time based AWIF (TAWIF), .80 for strain based AWIF (SAWIF), .83 for behavior based AWIF (BAWIF), .73 for time based AFIW (TAFIW), .92 for strain based AFIW (SAFIW), and .91 for behavior based AFIW (BAFIW). The Carlson et al. (2000) Work–Family Conflict Scale was altered to reflect the measurement of AWFC, using methods similar to the ones employed in Westring and Ryan's (2011) study. For the purposes of the current study, only the twelve-item time and strain-based domains of AWFC were assessed. The behavior based conflict domain did not apply to the sample being used in the current study, in that items rating "future behaviors that are effective and necessary for me at work" seem to be too general and lacking specificity in order to be adequately predicted by undergraduate students. In the current study, internal consistency alphas of .79 for TAWIF, .73 for TAFIW, .77 for SAWIF, and .85 for SAFIW were attained.

A prompt at the beginning of the instrument asked participants to indicate what their ideal future career is 5 to 10 years from now. Then, participants were asked to rate the degree to which they anticipate that they will experience in their

indicated ideal future career the conflict represented in each item on a scale from *strongly disagree* (1) to *strongly agree* (5). The items were written in future tense. A sample item (see Appendix D) of the time-based AWIF is "I will have to miss family activities due to the amount of time I will need to spend on work responsibilities." A sample item from the strain based AFIW scale is: "When I get home from work, I will often be too frazzled to participate in family activities/responsibilities." Participant ratings were averaged, to achieve a total score for each of the four subscales, with higher scores indicating higher levels of conflict.

Life role salience. The Life Role Salience Scale (LRSS; see Appendix E) developed by Amatea, Cross, Clark, and Bobby (1986) was used to assess the relative importance that participants place on work and family roles. The 40 item LRSS assesses the level of commitment and value of four specific roles, work, spouse, parent, and housework. A 10-item subscale taps each of the roles and includes five items that assess commitment to the role and five items that measure the value attributed to the role. Cronbach alphas reported by Amatea and colleagues (1986) for the commitment and value subscales of the four roles were, respectively, as follows: .83 and .86 (work), .80 and .84 (parent), .81 and .94 (spouse), and .79 and .82 (housework). Correlations among the scales were moderate, with the median being .29. Similar to Chi-Ching's (1995), Cinamon's (2010), and Vinkenburg, van Hattem and Ossenkop's (2013) more recent use of the LRSS, the housework role scale was not administered in the current study. According to Carlson and Kacmar (2000), work and family roles are the most studied because they are understood to be the roles that have the most influence on individuals as well as organizations.

Furthermore, the current study is most concerned with work and family (relationship and parent) roles, and the housework scale does not correspond to any of the other measures and items being implemented. Additionally, due to conceptual issues and length concerns, the commitment subscale was not included in the current study. Conceptually speaking, the current study purported that attainment values (such as role values) are predictive of career intentions, not the level of commitment to roles.

The script for the "marital" role was changed such that relationships referred to be the term "marriage" was adapted to incorporate other important romantic relationships (i.e. "committed relationships"). Sample items from the occupation, parental, and marital role value subscales are, respectively, "I expect my job/career to give me more real satisfaction than anything else I do," "If I chose not to have children, I would regret it," and "My life would seem empty if I never married/was in a committed relationship." The 15 items were rated on a 5-point Likert scale raging from *strongly disagree* (1) to *strongly agree* (5). Participant ratings for each of the six subscales were averaged, with higher scores indicating higher salience. Internal consistency alphas for the current study were .65, .88, and .89 for work, parental, and marital role salience, respectively.

Self-efficacy in STEM. Because of the relative importance of assessing domain specific self-efficacy (Eccles, 1994), a STEM-specific scale was used in the current study. Self-efficacy was assessed using the Self-Efficacy for Technical/Scientific Fields (STF; see Appendix F) scale developed by Lent et al. (1984) and used in multiple career, counseling psychology, and engineering

education studies to examine STEM career self-efficacy (Gwilliam & Betz 2001; Hackett, Betz, Casas & Rocha-Singh, 1992; Hamann, Raelin, & Whitman, 2010; Lent et al., 1984, 1986, 1987; Luzzo, Hasper, Albert, Bibby, Martinelli, 1999; Reisberg, Bailey, Burger, Schaefers, Epperson, & Nauta, 1997; Scott & Mallinckrodt, 2005). Internal reliability alpha levels range from .89 to .95, and the authors report a test-retest reliability coefficient of .89 for an 8-week interval (Lent et al., 1984; Schaefers, et al., 1997). Additionally, Lent et al. (1984) report that scores on the measure are related to persistence and grades among undergraduates in science and technical majors. Importantly, measure scores have been linked to higher career aspirations of female STEM majors, range of considered career options, and persistence and achievement in engineering majors (Hackett et al., 1992; Lent et al., 1986; Schaefers et al., 1997). The 30-item measure contains two 15-item subscales designed to measure efficacy for educational requirements and job duties of several STEM job titles, such as chemical engineer, mathematician, and statistician with an option to specify "other". The measure was modified/supplemented in the current study to include occupations that are representative of the sampled population. STEM occupations identified via the Bureau of Labor Statistics (2013) that are not currently represented in the measure, like "biological scientist", were added to the scale for a total of 23 occupations. Participants were asked to rate on a *completely unsure* (1) to *completely sure* (10) scale how confident they are in completing the required education/training and job duties. Average scores ranging from 1-10 were calculated for each subscale. To obtain a total scale score, the averages of the subscales were combined to obtain a score ranging from 1-20, with higher scores

indicating higher levels of self-efficacy (Gwilliam & Betz, 2001; Lent et al., 1984). Internal consistency reliability coefficients for the educational requirements and job duty self-efficacy were .98 for both subscales in the current study.

Career and educational aspirations. Aspirations were assessed with a measure intended to gather information regarding participants' intentions to pursue higher education (i.e., master's or doctoral degree) and/or establish a career in their current STEM field.

Intent to persist. The Intentions to Persist and Further Pursue a STEM field (Toker, 2010) scale was used to measure the criterion variable, i.e., career and educational aspirations. The 12-item measure, rated on a 6-point scale from *very untrue of me* to *very true of me*, was developed on the basis of Wyer's (2003) short-, mid-, and long-term commitments framework. A factor analysis supported a three-factor structure of the measure: intentions to pursue a STEM Bachelor of Science, intentions to pursue a STEM graduate degree, and intentions to pursue a STEM career, with internal consistency reliabilities ranging from .79 to .88 (Toker, 2010). However, support for a three-factor solution was not found in a recent study (Fabert, 2014), so composite scores were created by averaging participant scores across all items. Composite scores were also created in the current study. The scale was modified slightly to make it more applicable to the study population that included senior STEM majors who may be graduating. The first item did not include the "next semester" qualifier at the beginning of the item, and instead read: "I intend to continue taking courses related to eng., sci., or math." Similarly, since graduating seniors are not likely to change their major in their last semester, the second item

("I intend to stay in a major related to eng., sci., or math.") was dropped. Additionally, the scale was supplemented with one pertinent item from Ferry, Fouad, and Smith's (2000) Math/Science Goals scale (α = .84), and one item from the Wilkins et al. (2013) Intent to Persist in STEM scale (α = .78). In total, thirteen items were rated on a 6-point scale, from (1) "very untrue of me" to (6) "very true of me " (see Appendix G). A sample item is, "I would like to pursue a PhD in engineering, sciences, or mathematics related area." The internal consistency reliability coefficient for the scale in the current study was .92.

CHAPTER 4

RESULTS

Hypothesis Testing

A hierarchical multiple regression examined the unique ability of each variable to predict intentions to persist in STEM education and career. Prior to hypothesis testing, the inter-correlations among the scales in each predictor set were examined (reported in Table 6 in Appendix M) and the data was reviewed for meeting the assumptions of multiple regression. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.853. An examination of the partial regression plots, ignoring categorical variables, revealed linear relationships between the predictors and the criterion variable. A scatter plot of residuals revealed homoscedasticity in the data (see Figure 3 in Appendix T). The presence of multicollinearity was examined via tolerance and VIF values. According to the VIF values greater than 10, multicollinearity was present between the interaction terms and the variables of gender and AWFC even after AWFC subscales were centered. In line with the standard procedure for dealing with multicollinearity, I combined the offending variables (AWFC) into one composite variable (Fattah, 2014). A principal component factor analysis on the AWFC subscales produced a scree plot that showed support for one factor, instead of four as the authors intended (Carlson et al., 2000; Westring & Ryan, 2011), accounting for 46% of the variance. The results of the factor analysis are described more thoroughly in the post hoc analysis section. Because the gender interaction with AWFC was so central to my study, and because of the evidence for one factor of AWFC, I combined the four subscales of AWFC and

obtained a composite score to be used in the regression analyses. According to VIF and tolerance, multicollinearity was no longer a problem, and the previous assumptions still held for the combined AWFC scale. Table 7 in Appendix N presents the means, standard deviations, and correlations among study variables after AWFC was combined into one variable.

Casewise diagnostics did not reveal any standardized residuals that were greater or less than 3 standard deviations, showing no evidence of outliers in the data. An examination of leverage points revealed that there were no leverage values above .2. Further, there were no highly influential cases, as indicated by Cook's Distance values <1. A histogram of the standardized residuals appears to be approximately normally distributed. Further examination of the P-P Plot confirms normality in the distribution.

Hierarchical multiple regression was used to determine whether AWFC and/or its interaction with gender provides incremental validity above and beyond self-efficacy and role salience. See Table 8 in Appendix O for full details on each regression model. In the first step of the equation, gender and ethnicity were unrelated to persistence. Higher STEM self-efficacy scores explained a significant amount of variance for higher intentions to persist in the second step, F (3, 213) = 9.877, R^2 = .122 (p < .001), with a medium effect size, Cohen's f^2 = 0.11. Role salience, AWFC, and the interaction between gender and AWFC in the subsequent steps were not significantly related to intentions to persist and further pursue education or a career in STEM. Although the subscales of role salience did not account for significant variance in intentions to persist in the regression analysis,

they were related in the directions that would be expected based on the literature; work salience was positively and significantly correlated with intent to persist r = .14, p = .023, and marital and parental salience were negatively correlated with intent to persist, r = -.10 and r = -.09, respectively.

Post Hoc Analyses

A principal components analysis (PCA) was run on the 12-item AWFC scale for the 226 participants who completed the measure. Items 1, 2, 3, 5 and 6 all had correlations below the coefficient level of .30, indicating that these items were measuring something different than the other variables. The overall Kaiser-Meyer-Olkin (KMO) measure was 0.901 with individual KMO measures all greater than .80, classifications of "meritorious" and "marvelous" according to Kaiser (1974). Bartlett's Test of Sphericity was statistically significant (p < .0001), indicating the data was factorable.

PCA revealed three components that had eigenvalues greater than one and which explained 46.1%, 10.8%, and 9.0% of the total variance, respectively. Visual inspection of the scree plot, as presented in Figure 4 in Appendix U, clearly indicated that only one component should be retained (Cattell, 1996).

A Varimax orthogonal rotation was employed to aid interpretability. The rotated solution exhibited a complex structure (Thurstone, 1947), with many of the three components loading moderately to strongly on more than one variable. The interpretation of the data was not consistent with the different types of work family conflict that the questionnaire was designed to measure (TAWIF, TAFIW, SAWIF, SAFIW). Component loadings and communalities are presented in Table 9 in

Appendix K. Therefore, because the four-factor structure was not supported, one composite score for AWFC was calculated and used in hypothesis testing.

Interesting trends were uncovered in post hoc analyses examining the impact of gender differences, plans to have children, and differences between ideal vs. realistic careers on study variables. In exploratory, post hoc regressions, plans to have children explained significant variance in intentions to persist, in that those who did not plan on having children had higher intentions of persisting in STEM education and career, F (1, 221) = 4.177, R^2 = .019 (p = .042). An examination of a potential interaction between gender and plans to have children did not reveal significant effects on intentions to persist, F (3, 213) = 2.722, R^2 = .037 (p = .391). Further, plans to have children were found to be significantly related to higher levels of parental and marital salience, F (1, 221) = 111.104, R^2 = .335 (p < .001), and F (1, 221) = 29.531, R^2 = .118 (p < .001), respectively. That is, those participants who did not indicate plans to have children also reported lower levels of parental and marital role salience. When examining potential gender differences in study variables via an exploratory one-way ANOVA (see Table 10 in Appendix Q), it was revealed that women participants indicated plans to have children at a significantly lower rate (M = 1.25, SD = 0.44) than their male counterparts (M = 1.12, SD = 0.32), F (1, 215) = 7.049, p = .009, η^2 = .032. Additionally, women had significantly stronger intentions to persist in STEM education and careers (M = 4.69, SD = 1.10) than male participants, (M = 4.32, SD = 1.21), F (1, 215) = 5.248, p = .023, η^2 = .024. Also interesting was the finding that men indicated significantly higher levels of SAFIW

(M = 2.21, SD = 0.85) than their female counterparts (M = 1.95, SD = 0.72), F (1, 215) = 5.636, p = .018, η^2 = .018.

An examination of participants' responses on "ideal" vs. "realistic" future careers also yielded some interesting results. Fifty-three participants chose realistic career occupational code categories that were different than the ones they indicated for their "ideal" career, and although an ANOVA did not reveal significant differences between the groups on intentions to persist in STEM, the responses provided by participants show potential for some illuminating differences. For example, of the 224 participants who provided a written response, four women designated "mother" or "stay at home mom" as their realistic career, although their ideal careers included occupations such as business analyst, auditor, drug researcher, and supply chain professional. No male participants indicated "father" or "stay at home dad" as their realistic future career. Clearly, there are nuances in ideal vs. realistic careers, and although the occupational codes may not have captured these discrepancies, a qualitative analysis and future research might shed light on who reports different realistic vs. ideal careers and what these differences mean.

CHAPTER 5

DISCUSSION

In these results, role salience, AWFC, and the interaction of AWFC with gender, were not found to explain career and educational aspirations. The finding that STEM self-efficacy is significantly related to STEM career and educational aspirations confirms previous conclusions (Eccles et al., 1994; Lent et al., 1994) and underscores the importance to persistence intentions of STEM self-efficacy relative to personal variables such as role salience. That is, the current findings fully support the theoretical notion of SCCT (Lent et al., 1994) and the model of Achievement Related Choices (Eccles et al., 1994) that self-efficacy is influential in career decision-making; however, they do not fully corroborate the impact that attainment values have on career choice as hypothesized in Eccles' theory.

Notably, the participants were undergraduate students, the majority of whom were seniors, with an average age of 24; 90% had no children. It may be that the anticipation of role conflict, in terms of work-family interference, sets in later, such as in the graduate school years when partners and children are among the reasons women in STEM graduate programs cite for abandoning their academic career goals (Bernstein & Russo, 2009; Mason et al., 2009). The precise time in which work-family conflict actually begins to effect the career decisions of women in STEM is still unknown, but the results of the current study shed some light on the matter.

Indeed, previous research points to the possibility that awareness of work family conflict sets in later, perhaps even after getting a PhD in STEM (Turk-Bicakci,

Berger, & Haxton, 2014). Female STEM PhD degree holders are less likely to hold tenure-track positions in academia than their male counterparts, and instead pursue careers outside of academia, with most careers in private, for profit companies or government (Turk-Bicakci et al., 2014). One of the primary reasons women cite for leaving STEM careers is the desire for a job that offers better work-life balance, with women being two times more likely than men to abandon a tenure track career (Williams & Ceci, 2012). Further evidence has pointed out that among science and engineering graduates with bachelor's degrees, women are 25% less likely than men to pursue a career in their field of study, and among married women with children the odds are much lower (Xie & Shauman, 2003). Indeed, the authors conclude:

> Our analyses have shown that even for this highly motivated and accomplished group the potential for role conflict between career and family is real: family responsibilities disadvantage women by depressing their rates of participation in the labor force or for graduate education and by making them less likely than their male peers to pursue S/E careers (Xie & Shauman, 2003, p. 117).

Further, Ann Preston (2004) found that almost 37% of women with Bachelor's degrees in science never enter a career in a related field, and twice as many women exit science careers than men. It appears then, that although work-family conflict is influential in the career paths of women in STEM, the awareness of this conflict may not be noted until family formation begins. This is a possibility that remains to be elucidated by future research.

In career development literature, uncertainty about career outcomes has been established as a unique factor contributing to career indecision (Germeijs & De Boeck, 2001). The problems that some young adults experience in career decision making have long been linked to the complex intersection of decisions that have to be made at the same time (Germeijs & De Boeck, 2001). The intersecting choices at this juncture, about marriage and family, careers to pursue, financial moves, geographical moves, and relative roles in life, have long- lasting consequences (Germeijs & De Boeck, 2001; Super, 1957). In the midst of these life-altering decisions, there could be a lack of knowledge about the future outcomes of career decisions (like work-family conflict), or a sort of sensory overload, in which individuals may be cognizant of their academic interests and talent in STEM, but relatively unaware of their feelings concerning having a family or children, or which roles they value most. This may be reflected in the current finding that role salience did not significantly explain variance in intentions to persist in STEM education and career. Perhaps the young sample is simply substantiating the hypothesis that core personalities, and therefore roles, are not fully developed at this stage (Ployhart, Ryan, & Bennett, 1999). Corroborating this is evidence that successful career decision-making and exploration during the undergraduate years is related to the identity exploration and formation that is simultaneously occurring (Blustein, Devenis, & Kidney, 1989; Guerra & Braungart-Rieker, 1999) That is, fruitful personal investigation encourages the career choice process, and subsequently, a lack of ego identity formation is linked to career indecision. Further, the degree of salience associated with traditional gender roles changes over time is especially

important at three distinct periods in life, the preschool ages, early and mid-adolescence, and during the family formation and child-rearing years (Eccles, 2009). According to stage theorists, during late adolescence and early adulthood (i.e., the undergraduate years), an awareness of discriminatory gender roles is thought to contribute to females' development of a more balanced, or feminist identity, which is reflected in the value associated with activities and behaviors that reflect untraditional roles (Eccles & Bryan, 1994; Eccles, 2009). Especially for women, the undergraduate years mark a time of questioning and exploration, in terms of gender-role identities and career decision-making (Eccles & Bryan, 1994; Eccles, 2009). Therefore, this particular stage of identity formation is markedly self-centered, and may result in the pursuit of careers that do not easily allow for eventual family formation, and the accompanying shift in gender role centralization (Eccles, 2009). This absence of foresight could ultimately lead to the abandonment of the career path that was once considered "ideal."

The post hoc analyses do corroborate some previous findings and trends in STEM career research. For example, in the current study, the absence of plans to have children was related to higher intentions to persist in STEM education and career and lower levels of marital and parental role salience. This finding might suggest that work-family conflict is simply not a concern at present, or that there are real and detectable differences in aspirations between those who do and do not plan to have children. Further, women in this study were significantly less likely than men to indicate future plans for children. Indeed, this is consistent with the findings detailed earlier that women's careers in STEM, especially academia, are much more

affected by the decision to have children than are men's (Williams & Ceci, 2012). Another interesting gender difference was the finding that men reported greater levels of strain anticipated family interference with work. That is, men in the current sample expect that the stress and anxiety they will experience from their future family will impact their ability to adequately do their job. This finding might suggest that men at this stage are beginning to consider or become aware of the implications of future role conflict, perhaps more so than their female counterparts.

Limitations and Future Directions

As is true in all research, there were limitations to the current study. A major limitation of the study was the AWFC measure employed. A confirmatory factor analysis revealed that the factor structure of the scale did not hold up, leading to the utilization of a composite AWFC score. The implications are extensive; the AWFC scale may not be valid for use with the study sample, and may not have adequately captured the construct. Although the quantitative measure of AWFC in the current study did not reveal statistically significant trends in the data, a qualitative examination of participants' ideal vs. realistic future careers might shed light on some obscure, but telling differences in the sample.

Future studies should aim to examine the role of AWFC and role salience in a longitudinal fashion, beginning in high school or the undergraduate years, and continuing into early career stages. Although AWFC did not account for unique and incremental variance in intentions to persist in STEM education and career, the findings could be indicative of the transitory nature of the undergraduate years, in terms of identity formation and career decision-making. Therefore, the evidence

suggests that the undergraduate sample may not yet be impacted by outcome expectations in terms of work-family concerns, and a longitudinal analysis would help elucidate when exactly these concerns become impactful.

Conclusion

The current study contributes to the literature by supporting the notion that undergraduates may not yet be affected by the work-family interference that sets in later, perhaps during the graduate years. Additionally, it provides support for the theory that during the young adult years, personality and role salience may not be fully developed. The study underscores the importance of STEM self-efficacy relative to intentions to persist in STEM education and occupations. A fruitful area for future research is to explore, cross-sectionally or longitudinally, the role of work-family interference and its potential influence on career decision-making in order to continue the quest of determining when these outcome expectations become impactful to career decisions.

REFERENCES

Abele, A. E., & Spurk, D. (2011). The dual impact of gender and the influence of timing of parenthood on men's and women's career development: Longitudinal findings. *International Journal of Behavioral Development*, *35*(3), 225-232.

Amatea, E. S., Cross, E. G., Clark, J. E., & Bobby, C. L. (1986). Assessing the work and family role expectations of career-oriented men and women: The life role salience scales. *Journal of Marriage and the Family*, 831-838.

Anderson, S. E., Coffey, B. S., & Byerly, R. T. (2002). Formal organizational initiatives and informal workplace practices: Links to work-family conflict and job-related outcomes. *Journal of Management*, *28*(6), 787-810.

Aryee, S., Fields, D., & Luk, V. (1999). A cross-cultural test of a model of the work-family interface. *Journal of Management*, *25*(4), 491-511.

Ashforth, B. E., Kreiner, G. E., & Fugate, M. (2000). All in a day's work: Boundaries and micro role transitions. *Academy of Management Review*, *25*(3), 472-491.

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

Bandura, A. (1989). Regulation of cognitive processes through perceived self-efficacy. *Developmental Psychology*, *25*(5), 729.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*(2), 248-287.

Baruch, G. Barnett. R., & Rivers. C.(1983). *Lifeprints: New patterns of love and work for today's women*. New York, NY: New American Library.

Benbow, C. P., & Stanley, J. C. (1983). Sex differences in mathematical reasoning ability: More facts. *Science*, *222*(4627), 1029-1031.

Bernstein, B. L. & Russo, N. F. (2009). Explaining too few women in academic science and engineering careers: A psychosocial perspective. In M. Paludi (Ed.), Series on *The psychology of women at work: Challenges and solutions for our female workforce.* Vol 2: *Obstacles and the identity juggle* (pp. 1 – 33). Westport, CN: Praeger Press.

Betz, N. E., & Fitzgerald, L. F. (1987). *The career psychology of women*. San Diego, CA: Academic Press.

Betz, N. E., & Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *Journal of Counseling Psychology*, *28*(5), 399.

Betz, N. E., & Hackett, G. (1986). Applications of self-efficacy theory to understanding career choice behavior. *Journal of Social and Clinical Psychology*, *4*(3), 279-289.

Blustein, D. L., Devenis, L. E., & Kidney, B. A. (1989). Relationship between the identity formation process and career development. *Journal of Counseling Psychology*, *36*(2), 196.

Bureau of Labor Statistics. (2013). May 2013 Occupation Profiles. *U.S. Bureau of Labor Statistics*. Retrieved April 5, 2014, from http://www.bls.gov/oes/current/oes_stru.htm#15-0000

Byars-Winston, A. M., & Fouad, N. A. (2008). Math and science social cognitive variables in college students contributions of contextual factors in predicting goals. *Journal of Career Assessment*, *16*(4), 425-440.

Carlson, D. S., & Kacmar, K. M. (2000). Work–family conflict in the organization: Do life role values make a difference?. *Journal of Management*,*26*(5), 1031-1054.

Carlson, D. S., Kacmar, K. M., & Williams, L. J. (2000). Construction and initial validation of a multidimensional measure of work–family conflict. *Journal of Vocational Behavior*, *56*(2), 249-276.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245–276.

Chi-Ching, Y. (1995). The effects of career salience and life-cycle variables on perceptions of work-family interfaces. *Human Relations*, *48*(3), 265-284.

Cinamon, R. G. (2006). Anticipated work-family conflict: Effects of gender, self-efficacy, and family background. *The Career Development Quarterly*,*54*(3), 202-215.

Cinamon, R. G. (2010). Anticipated work-family conflict: effects of role salience and self-efficacy. *British Journal of Guidance & Counselling*, *38*(1), 83-99.

Cinamon, R. G., Most, T., & Michael, R. (2008). Role salience and anticipated work–family relations among young adults with and without hearing loss. *Journal of Deaf Studies and Deaf Education*, *13*(3), 351-361.

Clark, S. C. (2000). Work/family border theory: A new theory of work/family balance. *Human Relations*, *53*(6), 747-770.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.).* Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, Jacob. *Statistical power analysis for the behavioral sciences*. New York, NY: Psychology Press, 1988.

Crandall, V. C. (1969). Sex differences in expectancy of intellectual and academic reinforcement. *Achievement-related Motives in Children*, 11-45.

Crosby, F. J. (1991). *Juggling: The unexpected advantages of balancing career and home for women and their families*. New York, NY: Free Press.

Duffy, R. D., Allan, B. A., Autin, K. L., & Bott, E. M. (2013). Calling and life satisfaction: It's not about having it, it's about living it. *Journal of Counseling Psychology*, *60*(1), 42.

Eccles (Parsons), J. E., Adler, T., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology*, *46*(1), 26.

Eccles, J. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educational Psychologist*,*44*(2), 78-89.

Eccles, J. (2011). Gendered educational and occupational choices: Applying the Eccles et al. model of achievement-related choices. *International Journal of Behavioral Development*, *35*(3), 195-201.

Eccles, J. S. (1989). Bringing young women to math and science. In *Gender and thought: Psychological perspectives* (pp. 36-58). New York, NY: Springer.

Eccles, J. S. (1993). School and family effects on the ontogeny of children's interests, self-perceptions, and activity choices. In *Nebraska Symposium on Motivation* (Vol. 40, pp. 145-208). Lincoln, NE: University of Nebraska Press.

Eccles, J. S. (1994). Understanding women's educational and occupational choices. *Psychology of Women Quarterly*, *18*(4), 585-609.

Eccles, J. S., & Bryan, J. (1994). Adolescence: Critical crossroad in the path of gender-role development. In M. Stevenson (Eds.), *Gender Roles Through the Life Span* (pp. 111-148). Muncie, IN: Ball State University Press.

Eccles, J. S., Barber, B., & Jozefowicz, D. (1999). Linking gender to educational, occupational, and recreational choices: Applying the Eccles et al. model of

achievement-related choices. In Swann, B., Lanlois, J.H., & L.A. Gilbert (Eds), *Sexism and stereotypes in modern society: The gender science of Janet Taylor Spence*, (pp. 153-192). Washington, DC: American Psychological Association.

Espinosa, L. L. (2011). Pipelines and pathways: Women of color in undergraduate STEM majors and the college experiences that contribute to persistence. *Harvard Educational Review*, *81*(2), 209-241.

Fabert, N. (2014). Changing attitudes about intelligence to increase women's interest in science and engineering: A randomized-controlled study. *Unpublished dissertation.*

Farmer, H. S. (1985). Model of career and achievement motivation for women and men. *Journal of Counseling Psychology*, *32*(3), 363.

Fattah, M. A. (2014). Multicollinearity. *Multicollinearity*. Retrieved April 5, 2014, from http://www.chsbs.cmich.edu/fattah/courses

Ferriman, K., Lubinski, D., & Benbow, C. P. (2009). Work preferences, life values, and personal views of top math/science graduate students and the profoundly gifted: Developmental changes and gender differences during emerging adulthood and parenthood. *Journal of Personality and Social Psychology*, *97*(3), 517.

Ferry, T. R., Fouad, N. A., & Smith, P. L. (2000). The role of family context in a social cognitive model for career-related choice behavior: A math and science perspective. *Journal of Vocational Behavior*, *57*(3), 348-364.

Fouad, N. A., & Byars-Winston, A. M. (2005). Work: Cultural perspective on career choices and decision making. In R. T. Carter (Ed.), *Handbook of racial-cultural psychology and counseling: Vol 1. Theory and research* (pp. 232-255). Hoboken, NJ: Wiley.

Fouad, N. A., & Smith, P. L. (1996). A test of a social cognitive model for middle school students: Math and science. *Journal of Counseling Psychology*,*43*(3), 338.

Fouad, N. A., Hackett, G., Smith, P. L., Kantamneni, N., Fitzpatrick, M., Haag, S., & Spencer, D. (2010). Barriers and supports for continuing in mathematics and science: gender and educational level differences. *Journal of Vocational Behavior*, *77*(3), 361-373.

Frone, M. R., Russell, M., & Barnes, G. M. (1996). Work–family conflict, gender, and health-related outcomes: A study of employed parents in two community samples. *Journal of Occupational Health Psychology*, *1*(1), 57.

Frone, M. R., Russell, M., & Cooper, M. L. (1992). Antecedents and outcomes of work-family conflict: testing a model of the work-family interface. *Journal of Applied Psychology*, *77*(1), 65.

Frone, M. R., Russell, M., & Cooper, M. L. (1997). Relation of work–family conflict to health outcomes: a four-year longitudinal study of employed parents. *Journal of Occupational and Organizational psychology*, *70*(4), 325-335.

Germeijs, V., & De Boeck, P. (2003). Career indecision: Three factors from decision theory. *Journal of Vocational Behavior*, *62*(1), 11-25.

Goode, W. J. (1960). A theory of role strain. *American Sociological Review*, 483-496.

Greenhaus, J. H., & Beutell, N. J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, *10*(1), 76-88.

Greenhaus, J. H., & Parasuraman, S. (1999). Research on work, family, and gender: Current status and future directions. In Powell, G.N. (Ed), *Handbook of gender and work* (pp. 391-412). Thousand Oaks, CA: Sage Publications.

Greenhaus, J. H., Collins, K. M., & Shaw, J. D. (2003). The relation between work–family balance and quality of life. *Journal of Vocational Behavior*, *63*(3), 510-531.

Greenhaus, J. H., Parasuraman, S., & Collins, K. M. (2001). Career involvement and family involvement as moderators of relationships between work–family conflict and withdrawal from a profession. *Journal of Occupational Health Psychology*, *6*(2), 91.

Grzywacz, J. G. (2000). Work-family spillover and health during midlife: is managing conflict everything?. *American Journal of Health Promotion*, *14*(4), 236-243.

Grzywacz, J. G., & Bass, B. L. (2003). Work, family, and mental health: Testing different models of work-family fit. *Journal of Marriage and Family*,*65*(1), 248-261.

Guerra, A. L., & Braungart-Rieker, J. M. (1999). Predicting career indecision in college students: The roles of identity formation and parental relationship factors. *The Career Development Quarterly*, *47*(3), 255-266.

Gwilliam, L. R., & Betz, N. E. (2001). Validity of measures of math-and science-related self-efficacy for African Americans and European Americans. *Journal of Career Assessment*, *9*(3), 261-281.

Hackett, G., & Lent, R. W. (1992). Theoretical advances and current inquiry in career psychology. In Brown, S.D., & Lent, R.W. (Eds), *Handbook of counseling psychology (2nd ed.).,* (pp. 419-452). Oxford, England: John Wiley & Sons.

Hackett, G., Betz, N. E., Casas, J. M., & Rocha-Singh, I. A. (1992). Gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. *Journal of Counseling Psychology*, *39*(4), 527.

Hayes, R. Q., Whalen, S. K., & Cannon, B. (2009). CRSDE STEM retention report, 2008–2009. *Center for Institutional Data Exchange and Analysis.* Norman, OK: University of Oklahoma.

Hollinger, R. C., & Clark, J. P. (1983). *Theft by employees*. Lexington, MA: Lexington Books.

Hymowitz, K., Carroll, J. S., Wilcox, W. B., & Kaye, K. (2013). Knot yet: The benefits and costs of delayed marriage in America. The National Marriage Project: University of Virginia.

Institute for Digital Research and Education (IDRE; 2014). *Regression with SPSS: Lesson2.* Retrieved April 5, 2014 from http://www.ats.ucla.edu/stat/spss/webbook

Jacobs, J. A., & Winslow, S. E. (2004). Overworked faculty: Job stresses and family demands. *The Annals of the American Academy of Political and Social Science*, *596*(1), 104-129.

Jozefowicz, D. M., Barber, B. L., & Eccles, J. S. (1993). Adolescent work-related values and beliefs: Gender differences and relation to occupational aspirations. In *biennial meeting of the Society for Research on Child Development*.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity.* Oxford, England: John Wiley.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31-36.

Kelloway, E. K., Gottlieb, B. H., & Barham, L. (1999). The source, nature, and direction of work and family conflict: a longitudinal investigation. *Journal of Occupational Health Psychology*, *4*(4), 337.

Laerd Statistics. (2014). Multiple regression in SPSS. *SPSS tutorials and statistical guides*. Retrieved April 5, 2014, from https://statistics.laerd.com/premium/mr/multiple-regression-in-spss.php

Lei, P. W., & Wu, Q. (2007). Introduction to structural equation modeling: Issues and practical considerations. *Educational Measurement: Issues and Practice*, *26*(3), 33-43.

Lent, R. W. (2005). A social cognitive view of career development and counseling. In Brown, S.D., & Lend, R.W. (Eds), *Career Develiomeent and Counseling: Putting Theory and Research to Work,* (pp. 101-127). Hoboken, NJ: John Wiley & Sons Inc.

Lent, R. W., & Brown, S. D. (2006). On conceptualizing and assessing social cognitive constructs in career research: A measurement guide. *Journal of Career Assessment*, *14*(1), 12-35.

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, *45*(1), 79-122.

Lent, R. W., Brown, S. D., & Hackett, G. (1996). Career development from a social cognitive perspective. *Career Choice and Development*, *3*, 373-421.

Lent, R. W., Brown, S. D., & Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *Journal of Counseling Psychology*, *31*(3), 356.

Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of counseling psychology*, *33*(3), 265.

Lent, R. W., Brown, S. D., & Larkin, K. C. (1987). Comparison of three theoretically derived variables in predicting career and academic behavior: Self-efficacy, interest congruence, and consequence thinking. *Journal of Counseling Psychology*, *34*(3), 293.

Looker, E. D., & McNutt, K. L. (1989). The effect of occupational expectations on the educational attainments of males and females. *Canadian Journal of Education/Revue Canadienne de L'education*, 352-367.

Luzzo, D. A., Hasper, P., Albert, K. A., Bibby, M. A., & Martinelli Jr, E. A. (1999). Effects of self-efficacy-enhancing interventions on the math/science self-efficacy and career interests, goals, and actions of career undecided college students. *Journal of Counseling Psychology*, *46*(2), 233.

Mason, M. A., Goulden, M., & Frasch, K. (2009). Why graduate students reject the fast track. *Academe*, *95*(1), 11-16.

Mau, W. C., & Bikos, L. H. (2000). Educational and vocational aspirations of minority and female students: A longitudinal study. *Journal of Counseling & Development*, *78*(2), 186-194.

Medalie, J. H., & Cole-Kelly, K. (2002). The clinical importance of defining family. *American Family Physician*, *65*(7), 1277.

Michaelsen, S., & Johnson, D. E. (1997). *Border theory: The limits of cultural politics*. Minneapolis: University of Minnesota Press.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, *38*(1), 30.

National Center for Education Statistics (n.d.). *Fast facts*. Retrieved April 8, 2014 from http://nces.ed.gov/fastfacts/display.asp?id=98.

National Science Foundation (2013). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2013*. NSF 13-304. Arlington, VA: National Science Foundation, Division of Science Resources and Statistics Available from http://www.nsf.gov/statistics/wmpd/.

Nelson, B., Froehner, M., & Gault, B. (2013). College students with children are common and face many challenges in completing higher education. *Institute for Women's Policy Research.* Retrieved April 19, 14 from http://www.iwpr.org/publications/pubs/college-students-with-children-are-common-and-face-many-challenges-in-completing-higher-education-summary.

Nippert-Eng, C. E. (1996). *Home and work: Negotiating boundaries through everyday life.* Chicago, IL: The university of Chicago Press.

Perrone, K. M., Webb, L. K., & Blalock, R. H. (2005). The effects of role congruence and role conflict on work, marital, and life satisfaction. *Journal of Career Development*, *31*(4), 225-238.

Ployhart, R. E., Ryan, A. M., & Bennett, M. (1999). Explanations for selection decisions: Applicants' reactions to informational and sensitivity features of explanations. *Journal of Applied Psychology*, *84*(1), 87.

Preston, A.E. (2004). *Leaving science: Occupational exit from scientific careers*. New York, NY: Russell Sage Foundation.

Reisberg, R., Bailey, M., Hamann, J., Whitman, J., Raelin, J., and Burger, C. (2010). The effect of gender on support and self-efficacy in undergraduate engineering

programs. *Proceedings of the American Society for Engineering Education 2010 Annual Conference and Exhibition*, Louisville, KY, June 20- 23, 2010.

Reynolds, A. L., & Constantine, M. G. (2007). Cultural adjustment difficulties and career development of international college students. *Journal of Career Assessment*, *15*(3), 338-350.

Richardson, M. S. (1981). Occupational and family roles: A neglected intersection. *The Counseling Psychologist*.

Rojewski, J. W. (2005). Occupational aspirations: Constructs, meanings, and application. In S. D. Brown & R. W. Lent (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 131-154). Hoboken, NJ: John Wiley.

Rojewski, J. W., & Kim, H. (2003). Career choice patterns and behavior of work-bound youth during early adolescence. *Journal of Career Development*,*30*(2), 89-108.

Rojewski, J. W., & Yang, B. (1997). Longitudinal analysis of select influences on adolescents' occupational aspirations. *Journal of Vocational Behavior*, *51*(3), 375-410.

Schaefers, K. G., Epperson, D. L., & Nauta, M. M. (1997). Women's career development: Can theoretically derived variables predict persistence in engineering majors?. *Journal of Counseling Psychology*, *44*(2), 173.

Schoon, I., & Parsons, S. (2002). Teenage aspirations for future careers and occupational outcomes. *Journal of Vocational Behavior*, *60*(2), 262-288.

Scott, A. B., & Mallinckrodt, B. (2005). Parental emotional support, science self-efficacy, and choice of science major in undergraduate women. *The Career Development Quarterly*, *53*(3), 263-273.

Sears, P. S. (1979). The Terman genetic studies of genius, 1922-1972. In A. H. Passow (Ed.), *The gifted and talented: Their education and development* (pp. 75-96). The 78th Yearbook of the National Society for the Study of Education. Chicago, IL: University of Chicago Press.

Seymour, E. (2002). Tracking the processes of change in US undergraduate education in science, mathematics, engineering, and technology. *Science Education*, *86*(1), 79-105.

Sheu, H. B., Lent, R. W., Brown, S. D., Miller, M. J., Hennessy, K. D., & Duffy, R. D. (2010). Testing the choice model of social cognitive career theory across

Holland themes: A meta-analytic path analysis. *Journal of Vocational Behavior*, *76*(2), 252-264.

Spade, J. Z., & Reese, C. A. (1991). We've come a long way, maybe: College students' plans for work and family. *Sex Roles*, *24*(5-6), 309-321.

Strauss, S., & Subotnik, R. F. (1991). Gender differences in classroom participation and achievement: An experiment involving advanced placement calculus classes. *Part JL Unpublished manuscript, Hunter College of the City University of New York*.

Super, D. E. (1957). *The psychology of careers* (pp. 253-268). New York, NY: Harper & Row.

Super, D. E. (1980). A life-span, life-space approach to career development. *Journal of Vocational Behavior*, *16*(3), 282-298.

Super, D. E., Duane, L, (1990). Career choice and development: Applying contemporary theories to practice (2nd ed.). *The Jossey-Bass management series and The Jossey-Bass social and behavioral science series*., (pp. 197-261). San Francisco, CA, US: Jossey-Bass.

Taylor, K. M. (1982). An investigation of vocational indecision in college students: Correlates and moderators. *Journal of Vocational Behavior*, *21*(3), 318-329.

Terman, L. M. (1926). *Genetic studies of genius. Vol. 1, Mental and physical traits of a thousand gifted children*. Stanford, CA: Stanford University Press.

Thurstone, L. L. (1947). Multiple factor analysis.

Toker, Y. (2010). Non-ability correlates of the science-math trait complex: searching for personality characteristics and revisiting vocational interests. *Dissertation.*

Turk-Bicakci, L., Berger, A., & Haxton, C. (2014). The nonacademic careers of STEM PhD holders. *Broadening Participation in STEM Graduate Education.* Retrieved April 8, 2014 from http://www.air.org/sites/default/files/downloads/report/STEM%20nonacademic%20careers%20April14.pdf

Vinkenburg, C. J., van Hattem, A. Y., Ossenkop, C., & Dikkers, J. S. (2013). Life role salience and values. *Cross Cultural Management: An International Journal*, *20*(4), 607-624.

Wampold, B. E., & Freund, R. D. (1987). Use of multiple regression in counseling psychology research: A flexible data-analytic strategy. *Journal of Counseling Psychology*, *34*(4), 372.

Ware, N. C., & Lee, V. E. (1988). Sex differences in choice of college science majors. *American Educational Research Journal*, *25*(4), 593-614.

Weiner, B. (Ed.). (1974). *Achievement motivation and attribution theory*. New York, NY: General Learning Press.

Westring, A. F., & Ryan, A. M. (2011). Anticipated work–family conflict: A construct investigation. *Journal of Vocational Behavior*, *79*(2), 596-610.

Wilkins, K.A., Bernstein, B.L., Bekki, J.M., Prime, D. (2013). Intent to persist in STEM scale. *Pending submission.*

Williams, W. M., & Ceci, S. J. (2012). When scientists choose motherhood. *American Scientist*, *100*(2), 138-145.

Wilson, Z. S., Holmes, L., Sylvain, M. R., Batiste, L., Johnson, M., McGuire, S. Y., & Warner, I. M. (2012). Hierarchical mentoring: A transformative strategy for improving diversity and retention in undergraduate stem disciplines. *Journal of Science Education and Technology*, *21*(1), 148-156.

Wyer, M. (2003). Intending to stay: Images of scientists, attitudes toward women, and gender as influences on persistence among science and engineering majors. *Journal of Women and Minorities in Science and Engineering*, *9*(1).

Xie, Y., & Shauman, K. A. (2003). *Women in science: Career processes and outcomes* (Vol. 26, No. 73.4). Cambridge, MA: Harvard University Press.

APPENDIX A

IRB APPROVAL

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Bianca Bernstein
SLS - Counseling and Counseling Psychology
480/965-2920
bbernstein@asu.edu

Dear Bianca Bernstein:

On 1/28/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Achievement Aspirations of STEM Students: The Contribution of Anticipated Work-Family Conflict
Investigator:	Bianca Bernstein
IRB ID:	STUDY00000583
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• consent, Category: Consent Form; • Bernstein Dawson IRB thesis app 1 27 14, Category: IRB Protocol; • Study measures questionnaire, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Study Recruitment Letter_participants_revised_1_27.pdf, Category: Recruitment Materials; • Study Cover Letter_revised_1_27.pdf, Category: Recruitment Materials;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 1/28/2014.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

APPENDIX B

CONSENT FORM

I am graduate student under the direction of Dr. Bianca Bernstein in the Counseling Psychology doctoral program at Arizona State University. I am conducting a research study to explore the career and educational aspirations of science, technology, engineering, and mathematics (STEM) majors.

I am inviting your participation, which will involve a brief online questionnaire that will take approximately 10 minutes to complete.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your academic standing in any way or grade in any course. You must be 18 or older to participate in the study.

There are no foreseeable risks or discomforts to your participation. You will either have the opportunity to receive extra credit for one of your STEM courses (your professor would have informed your class of this opportunity), or, if you complete the questionnaire in the absence of an extra-credit opportunity, you will have the chance to be entered into a raffle to win one of three Amazon Kindles upon completion of the survey. If you are receiving extra credit, there will be instructions at the end of the survey to print or take a screen shot of the survey completion page, as proof of your participation for your professor. Any identifying information you provide (email address) in order to receive either incentive will be completely independent from, and unable to be linked to, your survey responses.

Your responses will be anonymous and confidential. The results of this study may be used in future reports, presentations, or publications but your name will not be used. Any results that are used will only be shared in the aggregate form.

The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

If you have any questions concerning the research study, please contact the researchers, Bianca Bernstein, Ph.D., or Amy Dawson, at: aedawso2@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

By clicking "I accept" below you are confirming that you are at least 18 years of age, currently a STEM major, and agree to be part of the study. If you wish to decline, you may do so by exiting this page on your web browser.

I Accept _____

APPENDIX C

DEMOGRAPHIC INFORMATION

1. Date of Birth: Month_____ Day_____ Year____

2. Gender: ____Male _____Female

3. What is your current marital status?

_____ Married/ Committed Relationship

_____ Separated

_____ Divorced

_____ Widowed

_____ Never married

4. Do you consider yourself to be one or more of the following (check all that apply):

_____ Straight

_____ Gay

_____ Lesbian

_____ Bisexual

_____ Transgender

_____ Other (please specify)

5. How would you describe your ethnicity/race? [Mark one or more]

_____ White, Caucasian

_____ Black, African American

_____ American Indian or Alaska native

_____ Native Hawaiian or other Pacific Islander

_____ Hispanic or Latino(a)

_____ Asian

_____ Other (please specify)_____

6. How many children do you currently have?

_____ 0

_____ 1

_____ 2

_____ 3

_____ 4

_____ 5

_____ 6 or more

7. Do you plan/hope to have children in the future?

_____ Yes

_____ No

8. What is the name of your current major? (i.e. Mechanical Engineering)

_____

9. What is your current year of study in your program? (3rd year, undergraduate junior)

_____ 1st year, undergraduate freshman

_____ 2nd year, undergraduate sophomore

_____ 3rd year, undergraduate junior

_____ 4th year, undergraduate senior

_____ 5th year (or beyond), undergraduate senior

_____ Master's student

_____ Doctoral student

Please indicate what year in your master's or doctoral program (e.g. 2nd year master's student) _____

10. When did you declare your Major? (Semester/Year, i.e. Spring 2012)

11. [This appeared as the very last question of the entire questionnaire] Instructions: As you predict (or think about) what you will be doing 10 years from now, please indicate which of the following occupations is the most realistic. [dropdown menu].

Management Occupations

Business and Financial Operations Occupations

Computer and Mathematical Occupations

Architecture and Engineering Occupations

Life, Physical, and Social Science Occupations

Community and Social Service Occupations

Legal Occupations

Education, Training, and Library Occupations

Arts, Design, Entertainment, Sports, and Media Occupations

Healthcare Practitioners and Technical Occupations

Healthcare Support Occupations

Protective Service Occupations

Food Preparation and Serving Related Occupations

Building and Grounds Cleaning and Maintenance Occupations

Personal Care and Service Occupations

Sales and Related Occupations

Office and Administrative Support Occupations

Farming, Fishing, and Forestry Occupations

Construction and Extraction Occupations

Installation, Maintenance, and Repair Occupations

Production Occupations

Transportation and Material Moving Occupations

Ten years from now, what type of job to you realistically think you'll be doing? Try to be as specific as you can (e.g. university professor of physics" or "registered nurse"). _____

12. Instructions: Please indicate which of the following occupations fits most closely with what you would presently consider to be your ideal or dream career for 10 years from now. [dropdown menu].

Management Occupations

Business and Financial Operations Occupations

Computer and Mathematical Occupations

Architecture and Engineering Occupations

Life, Physical, and Social Science Occupations

Community and Social Service Occupations

Legal Occupations

Education, Training, and Library Occupations

Arts, Design, Entertainment, Sports, and Media Occupations

Healthcare Practitioners and Technical Occupations

Healthcare Support Occupations

Protective Service Occupations

Food Preparation and Serving Related Occupations

Building and Grounds Cleaning and Maintenance Occupations

Personal Care and Service Occupations

Sales and Related Occupations

Office and Administrative Support Occupations

Farming, Fishing, and Forestry Occupations

Construction and Extraction Occupations

Installation, Maintenance, and Repair Occupations

Production Occupations

Transportation and Material Moving Occupations

Please indicate (write in) what you would presently consider to be your ideal or dream career for 10 years from now. Try to be as specific as you can (e.g. "medical doctor" or "high school mathematics teacher ") _____

APPENDIX D

ANTICIPATED WORK FAMILY CONFLICT

Rate the degree to which you anticipate that you will experience the conflict represented in each of the items in your ideal (dream) career. Please rate on a scale from strongly agree (5) to strongly disagree (1).

Time-based work interference with family

1. My work will keep me from my family activities more than I will like.

2. The time I will need to devote to my job will keep me from participating equally in household responsibilities and activities.

3. I will have to miss family activities due to the amount of time I will need to spend on work responsibilities.

Time-based family interference with work

4. The time I will spend on family responsibilities will often interfere with my work responsibilities.

5. The time I will spend with my family will often cause me not to send time in activities at work that could be helpful to my career.

6. I will have to miss work activities due to the amount of time I will need to spend on family responsibilities.

Strain-based work interference with family

7. When I get home from work, I will often be too frazzled to participate in family activities/responsibilities.

8. I will often be so emotionally drained when I get home from work that it will prevent me from contributing to my family.

9. Due to all of the pressures at work, sometimes when I come home I will be too stressed to do the things that I enjoy.

Strain-based family interference with work

10. Due to stress at home, I will often be preoccupied with family matters at work.

11. Because I will often be stressed from family responsibilities, I will have a hard time concentrating on my work.

12. Tension and anxiety from my family life will often weaken my ability to do my job.

Scale obtained from Carlson, Kacmar, & Williams (2000), and Westring & Ryan (2011).

APPENDIX E

LIFE ROLE SALIENCE SCALE

Instructions: Please rate the degree to which you agree with the following statements on a scale from strongly disagree (1) to strongly agree (5).

I. Occupation Role Reward Value

1. Having work/a career that is interesting and exciting to me is my most important life goal.

2. I expect my job/career t give me more real satisfaction than anything else I do.

3. Building a name and reputation for myself through work/a career is not one of my life goals. [reverse item]

4. It is important to me that I have a job/career in which I can achieve something of importance.

5. It is important to me to feel successful in my work/career.

II. Parental Role Reward Value

1. Although parenthood requires many sacrifices, the love and enjoyment of children of one's own are worth it all.

2. If I choose not to have children, I would regret it.

3. It is important to me to feel I am (will be) an effective parent.

4. The whole idea of having children and raising them is not attractive to me [reverse item]

5. My life would be empty if I never had children.

III. Marital Role Reward Value

1. My life would seem empty if I never married/was in a committed relationship.

2. Having a successful marriage/committed relationship is the most important thing in life to me.

3. I expect marriage/ a committed relationship to give me more real personal satisfaction than anything else in which I am involved.

4. Being married/committed to a person I love is more important to me than anything else.

5. I expect the major satisfactions in my life to come from my marriage/committed relationship.

Scale obtained from Amatea, Cross, Clark, & Bobby (1986).

APPENDIX F

SELF-EFFICACY FOR TECHNICAL/SCIENTIFIC FIELDS SCALE

Part A. Instructions: For each occupation listed below, please indicate how sure you are that you could successfully complete the education and/or training required to enter the occupation—assuming you were motivated to make your best effort.

Occupation	Completely Unsure									Completely Sure
1. Aerospace Engineer	1	2	3	4	5	6	7	8	9	10
2. Agricultural Engineer	1	2	3	4	5	6	7	8	9	10
3. Architect	1	2	3	4	5	6	7	8	9	10
4. Landscape Architect	1	2	3	4	5	6	7	8	9	10
5. Astronomer	1	2	3	4	5	6	7	8	9	10
6. Chemical Engineer	1	2	3	4	5	6	7	8	9	10
7. Chemist	1	2	3	4	5	6	7	8	9	10
8. Civil Engineer	1	2	3	4	5	6	7	8	9	10
9. Computer Scientist	1	2	3	4	5	6	7	8	9	10
10. Electrical Engineer	1	2	3	4	5	6	7	8	9	10
11. Geologist	1	2	3	4	5	6	7	8	9	10
12. Mathematician	1	2	3	4	5	6	7	8	9	10
13. Mechanical Engineer	1	2	3	4	5	6	7	8	9	10
14. Physicist	1	2	3	4	5	6	7	8	9	10
15. Statistician	1	2	3	4	5	6	7	8	9	10
16. Biological Scientist	1	2	3	4	5	6	7	8	9	10
17. Environmental Scientist	1	2	3	4	5	6	7	8	9	10
18. Agricultural and/or	1	2	3	4	5	6	7	8	9	10

Food Scientist	
19. Medical Scientist	1 2 3 4 5 6 7 8 9 10
20. Conservation Scientist	1 2 3 4 5 6 7 8 9 10
21. Social Scientist	1 2 3 4 5 6 7 8 9 10
22. Healthcare Practitioner	1 2 3 4 5 6 7 8 9 10
23. STEM Education/training	1 2 3 4 5 6 7 8 9 10
24. Other (please specify)	1 2 3 4 5 6 7 8 9 10

Part B. Instructions: For each occupation listed below, please indicate how sure you are that you could successfully perform the job duties of that occupation—assuming you had the necessary education/training and that you were motivated to do your best.

Occupation	Completely Unsure	Completely Sure
1. Aerospace Engineer		1 2 3 4 5 6 7 8 9 10
2. Agricultural Engineer		1 2 3 4 5 6 7 8 9 10
3. Architect		1 2 3 4 5 6 7 8 9 10
4. Landscape Architect		1 2 3 4 5 6 7 8 9 10
5. Astronomer		1 2 3 4 5 6 7 8 9 10
6. Chemical Engineer		1 2 3 4 5 6 7 8 9 10
7. Chemist		1 2 3 4 5 6 7 8 9 10
8. Civil Engineer		1 2 3 4 5 6 7 8 9 10
9. Computer Scientist		1 2 3 4 5 6 7 8 9 10
10. Electrical Engineer		1 2 3 4 5 6 7 8 9 10

11. Geologist	1 2 3 4 5 6 7 8 9 10
12. Mathematician	1 2 3 4 5 6 7 8 9 10
13. Mechanical Engineer	1 2 3 4 5 6 7 8 9 10
14. Physicist	1 2 3 4 5 6 7 8 9 10
15. Statistician	1 2 3 4 5 6 7 8 9 10
16. Biological Scientist	1 2 3 4 5 6 7 8 9 10
17. Environmental Scientist	1 2 3 4 5 6 7 8 9 10
18. Agricultural and/or Food Scientist	1 2 3 4 5 6 7 8 9 10
19. Medical Scientist	1 2 3 4 5 6 7 8 9 10
20. Conservation Scientist	1 2 3 4 5 6 7 8 9 10
21. Social Scientist	1 2 3 4 5 6 7 8 9 10
22. Healthcare Practitioner	1 2 3 4 5 6 7 8 9 10
23. STEM Education/training	1 2 3 4 5 6 7 8 9 10
24. Other (please specify)	1 2 3 4 5 6 7 8 9 10

Occupations 1-15 obtained from Lent, Brown, & Larkin (1984); occupations 16-23 adapted from the Bureau of Labor Statistics (2013).

APPENDIX G

INTENTIONS TO PERSIST IN AND FURTHER PURSUE A STEM FIELD

Instructions. Please rate the following statements on a 5-point scale from 1 (very untrue of me) to 6 (very true of me).

1. I intend to continue taking courses related to engineering, sciences, or mathematics.

2. I intend to stay in a major related to engineering, sciences, or mathematics.

3. I intend to get a Bachelors degree from a major related to engineering, sciences, or mathematics.

4. I am planning to apply for master's education in a field related to engineering, sciences, or mathematics.

5. I intend to get a masters degree in a field related to engineering, sciences, or mathematics.

6. I would like to pursue a PhD in engineering, sciences, or mathematics related area. 5

7. I am sure that I would like to continue with my education in engineering, sciences, or mathematics.

8. I intend to find a job as an engineer, scientist, or mathematician.

9. I can see myself working as an engineer, scientist, or mathematician in the future.

10. I am planning on earning my living as an engineer, scientist, or mathematician.

11. I intend to devote my career to an area related to engineering, sciences, or mathematics.

12. I am determined to use my engineering, science, or math knowledge in my future career.

13. I am thinking about pursuing a career that is different from the one I am preparing for now.

Items 1-11 obtained from Toker (2010); items 12 obtained from Ferry, Fouad, & Smith (2000); Item 13 obtained from Wilkins, Bernstein, & Prime (2013).

APPENDIX H

TABLE 1

Table 1

Participant Reported Gender

Gender	N	Percentage
Female	90	40%
Male	127	57%
Unspecified	6	3%

APPENDIX I

TABLE 2

Table 2

Participant Reported Academic Year

Year	N Women	Percentage Women	N Men	Percentage Men
Freshman	4	2%	3	1%
Sophomore	15	7%	7	3%
Junior	20	9%	29	13%
Senior	51	23%	88	39%

Note. Total percentage is <100 due to 6 participants who did not indicate gender.

APPENDIX J

TABLE 3

Table 3

Participant Reported Race/Ethnicity

Ethnicity	N Women	Percentage Women	N Men	Percentage Men
White, Caucasian	62	28%	78	35%
Black, African American	2	1%	4	2%
American Indian or Alaska Native	5	2%	1	1%
Native Hawaiian or other Pacific Islander	2	1%	4	2%
Hispanic or Latino(a)	22	10%	24	11%
Asian	11	5%	28	12%
Multiethnic	11	5%	12	5%

Note. Total percentage is >100 due to overlap from Multiethnic choices.

APPENDIX K

TABLE 4

Table 4

Participant Reported Major

Major	N Women	N Men	Percentage Women	Percentage Men
Accountancy	1	3	0.4%	1.3%
Aerospace Engineering	1	1	0.4%	0.4%
Biochemistry	2	3	.8%	1.3%
Biological Science	26	2	11.5%	0.8%
Biomedical Engineering	20	31	8.8%	13.7%
Chemical Engineering	3	0	1.3%	0.0%
Civil Engineering	2	2	0.8%	0.8%
Computer Information Systems	18	46	7.9%	20.3%
Computer Systems Engineering	0	4	0.0%	1.7%
Electrical Engineering	0	4	0.0%	1.7%
Electronics Engineering Technology	1	3	0.4%	1.3%
Engineering (not otherwise specified)	1	2	0.4%	0.8%
Forensic Science	1	0	0.4%	0.0%
Life Sciences	4	3	1.7%	1.3%
Manufacturing Engineering	1	2	0.4%	0.8%
Mathematics	4	1	1.7%	0.4%
Mechanical Engineering	0	20	0.0%	8.8%
Nutrition	2	0	0.8%	0.0%
Physics	0	2	0.0%	0.8%
Secondary Education (math)	1	0	0.4%	0.0%

Note. Total percentage is <100 due to 6 participants who did not indicate gender.

APPENDIX L

TABLE 5

Table 5

Participants' Children/Plans for Children

Response	N Women	N Men	Percentage Women	Percentage Men
Have children	8	14	3.5%	6.2%
Do not have children	82	113	36.7%	50.6%
Plan to have children	66	113	29.5%	50.6%
Do not plan to have children	24	14	10.7%	6.2%

Note. Total percentage is <100 due to 6 participants who did not indicate gender.

APPENDIX M

TABLE 6

Table 6

Means, Standard Deviations, and Correlations Among Study Variables (N = 217)

	Variable	1	2	3	4	5	6	7
1	Persistence		.27*	.04	.02	-.02	.03	.04
2	Self-efficacy	.36*		.04	.22*	.28*	.06	-.05
3	Work salience	.27*	.05		.30*	.17*	.03	-.10
4	Parental salience	-.22	.05	-.27*		.54*	.08	.03
5	Marital salience	-.14	.09	-.15	.57*		.08	.08
6	TAWIF	.08	.02	.07	.13	.02		.46*
7	TAFIW	-.14	-.17	-.12	.33*	.11	.63*	
8	SAWIF	.08	-.05	.09	.04	-.03	.74*	.50*
9	SAFIW	.03	-.16	-.01	.14	.03	.52*	.53*
10	Ethnicity	.01	-.19*	.23*	-.20*	-.23*	.11	-.02

Table 6 Continued

Means, Standard Deviations, and Correlations Among Study Variables (N = 217)

	Variable	8	9	10	*M*-M	*SD*-M	*M*-F	*SD*-F
1	Persistence	-.07	-.05	-.05	4.32	1.21	4.69	1.10
2	Self-efficacy	-.18*	-.20*	-.21*	11.36	6.20	10.64	5.33
3	Work salience	-.05	-.08	.00	3.79	.60	3.87	.60
4	Parental salience	-.02	-.20*	-.08	3.87	.86	3.63	1.07
5	Marital salience	-.03	-.08	-.01	3.60	.86	3.37	1.07
6	TAWIF	.48*	.36*	-.02	2.97	.90	2.82	.98
7	TAFIW	.51*	.61*	-.04	2.47	.82	2.53	.83
8	SAWIF		.71*	-.01	2.37	.87	2.45	.88
9	SAFIW	.53*		.13	2.21	.85	1.94	.73
10	Ethnicity	.16	.05		3.24	2.61	3.02	2.63

Note. Male correlations are located above the break; Female correlations are located below the break. TAWIF = Time Anticipated Work Interference With Family; TAFIW = Time Anticipated Family Interference With Work; SAWIF = Strain Anticipated Work Interference With Family; SAFIW = Strain Anticipated Family Interference With Work. Persistence was rated on a scale from *very untrue* (1) *of me* to *very true of me* (6)*;* Self-efficacy was rated on a scale from *completely unsure* (1) to *completely sure* (10); Role Salience was rated on a scale from *strongly disagree* (1) to *strongly agree* (5); Ethnicity was coded from (1) to (8); AWFC was rated on a scale from *strongly disagree* (1) to *strongly agree* (5).
*p <.05.

APPENDIX N

TABLE 7

Table 7

Means, Standard Deviations, and Correlations Among Study Variables: AWFC Composite (*N* = 217)

Variable		1	2	3	4	5	6
1	Persistence		.27*	.04	.02	-.02	.05
2	SE	.36*		.04	.22*	.28*	-.21*
3	WS	.27*	.05		.30*	.17*	.00
4	PS	-.22*	.05	-.27*		.54*	-.08
5	MS	-.14	.09	-.15	.57*		-.00
6	Ethnicity	.01	-.19*	.23*	-.20*	-.24*	
7	AWFC	.02	-.10	.01	.19*	.04	.10

Table 7 Continued

Means, Standard Deviations, and Correlations Among Study Variables: AWFC Composite (*N* = 217)

Variable		7	*M*-M	*SD*-M	*M-F*	*SD-F*
1	Persistence	-.02	4.32	1.21	4.7	1.10
2	SE	-.11	11.36	6.20	10.64	5.32
3	WS	-.06	3.79	.60	3.87	.60
4	PS	-.03	3.87	.86	3.63	1.07
5	MS	.02	3.60	.86	3.37	1.07
6	Ethnicity	.02	3.24	2.61	3.02	2.63
7	AWFC		10.01	2.75	9.74	2.84

Note. Male correlations are located above the break; Female correlations are located below the break. TAWIF = Time Anticipated Work Interference With Family; TAFIW = Time Anticipated Family Interference With Work; SAWIF = Strain Anticipated Work Interference With Family; SAFIW = Strain Anticipated Family Interference With Work. Persistence was rated on a scale from *very untrue* (1) *of me* to *very true of me* (6)*;* Self-efficacy was rated on a scale from *completely unsure* (1) to *completely sure* (10); Role Salience was rated on a scale from *strongly disagree* (1) to *strongly agree* (5); Ethnicity was coded from (1) to (8); AWFC was rated on a scale from *strongly disagree* (1) to *strongly agree* (5).
**p* <.05.

APPENDIX O

TABLE 8

Table 8

Hierarchical Multiple Regression Predicting Intent to Persist (N = *217*)

	Step and predictor variable	*B*	*SE B*	β	R^2	ΔR^2
Step 1					.02	
	Gender	0.37	0.16	.16		
	Ethnicity	0.01	0.03	.03		
Step 2					.12	.09**
	Self-efficacy	0.06	0.01	.32**		
Step 3					.15	.03
	Work salience	0.21	0.13	.12		
	Parental salience	-0.10	0.09	-.08		
	Marital salience	-0.12	0.10	-.09		
Step 4					.15	.00
	AWFC	0.02	0.03	.04		
Step 5					.15	.00
	Interaction	0.01	0.06	.05		

Note. Interaction = Gender*AWFC
**p <.001.

APPENDIX P

TABLE 9

Table 9

Summary of Items and Factor Loadings for Varimax Orthogonal Three-Factor Solution for AWFC (*N* = 226)

	Factor Loading			
Item	1	2	3	Communality
11	**.81**	.10	.23	.73
12	**.80**	.12	.22	.71
10	**.73**	.09	.36	.68
8	**.65**	.46	-.00	.64
7	**.58**	.56	-.03	.66
9	**.52**	.43	.10	.47
3	.16	**.79**	.18	.69
1	.09	**.79**	.22	.68
2	.21	**.71**	.21	.60
6	.16	.08	**.84**	.74
5	.18	.37	**.69**	.65
4	.46	.32	**.55**	.62

Note. Major loadings for each item are bolded.

APPENDIX Q

TABLE 10

Table 10

Means, Standard Deviations, and One-Way Analyses of Variance for the Effects of Gender on Ten Variables

	Male		Female				
Variable	*M*	*SD*	*M*	*SD*	$F(1,215)$	*p*	η^2
Intent to persist	4.32	1.21	4.68	1.10	5.24	.023*	.024
Self-efficacy	11.36	6.20	10.64	5.33	.80	.372	.004
Work salience	3.79	.60	3.87	.60	.97	.325	.004
Parental salience	3.87	.86	3.63	1.07	3.38	.067	.015
Marital salience	3.60	.86	3.37	1.07	3.06	.081	.014
TAWIF	2.96	.91	2.90	.96	.75	.385	.003
TAFIW	2.49	.81	2.54	.82	.16	.683	.001
SAWIF	2.36	.86	2.47	.87	.80	.370	.004
SAFIW	2.21	.85	1.95	.72	5.36	.018*	.018
Plans-children	1.12	.32	1.26	.44	7.04	.009*	.032

Note. N = 217. Persistence was rated on a scale from *very untrue* (1) *of me* to *very true of me* (6)*;* Self-efficacy was rated on a scale from *completely unsure* (1) to *completely sure* (10); Role Salience was rated on a scale from *strongly disagree* (1) to *strongly agree* (5); AWFC was rated on a scale from *strongly disagree* (1) to *strongly agree* (5); Plans-children was rated on a scale from (1) *yes* to (2) *no*.
*p <.05

APPENDIX R

FIGURE 1

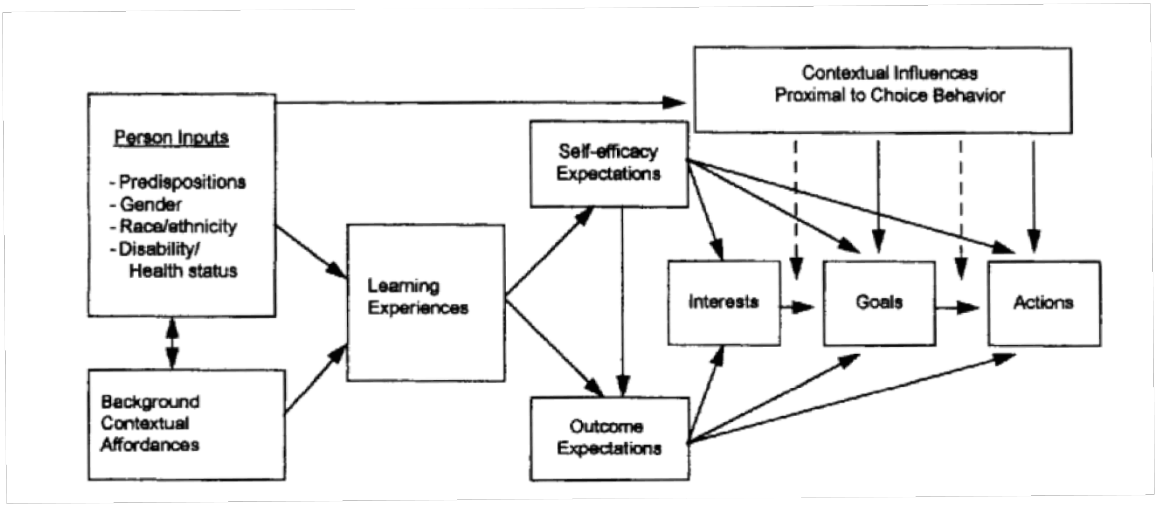

Figure 1. SCCT Model of Career Choice (Lent & Brown, Hackett 1993).

APPENDIX S

FIGURE 2

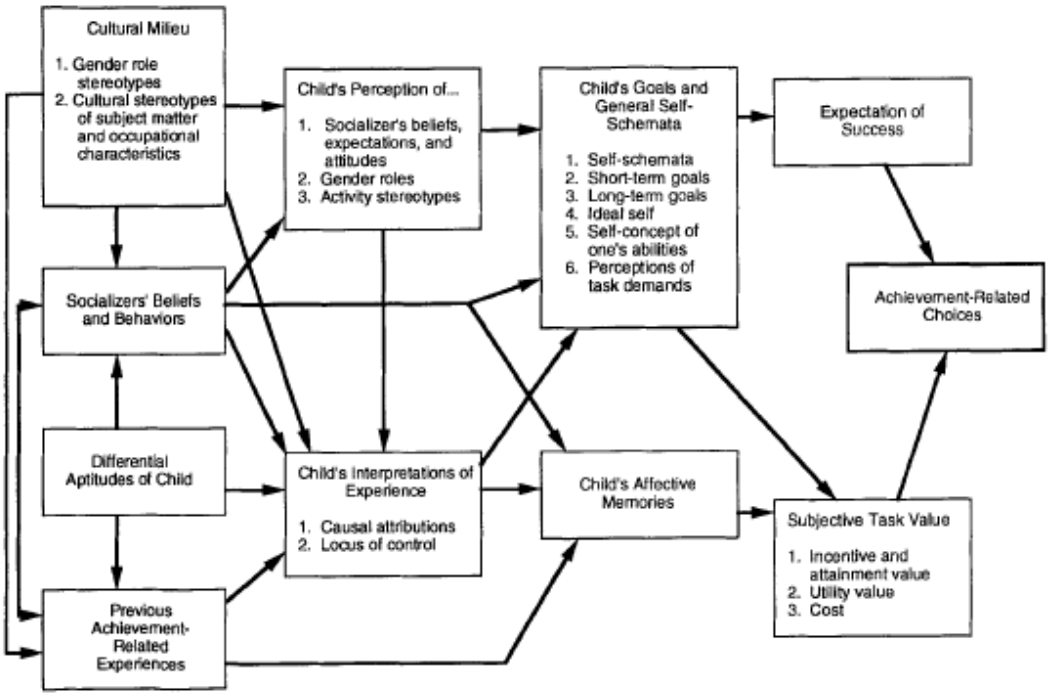

Figure 2. Model of Achievement Related Choices (Eccles, 1994).

APPENDIX T

FIGURE 3

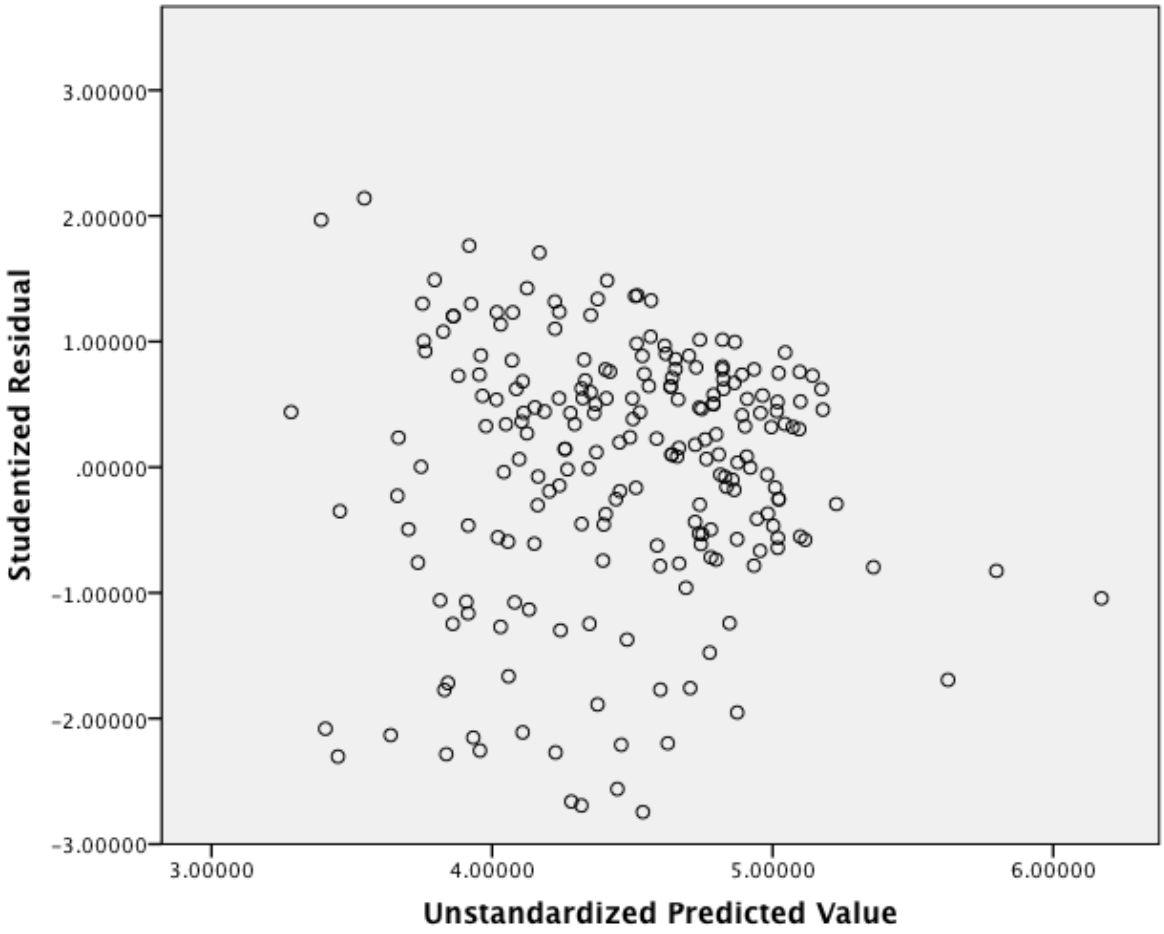

Figure 3. Scatter plot of residuals.

APPENDIX U

FIGURE 4

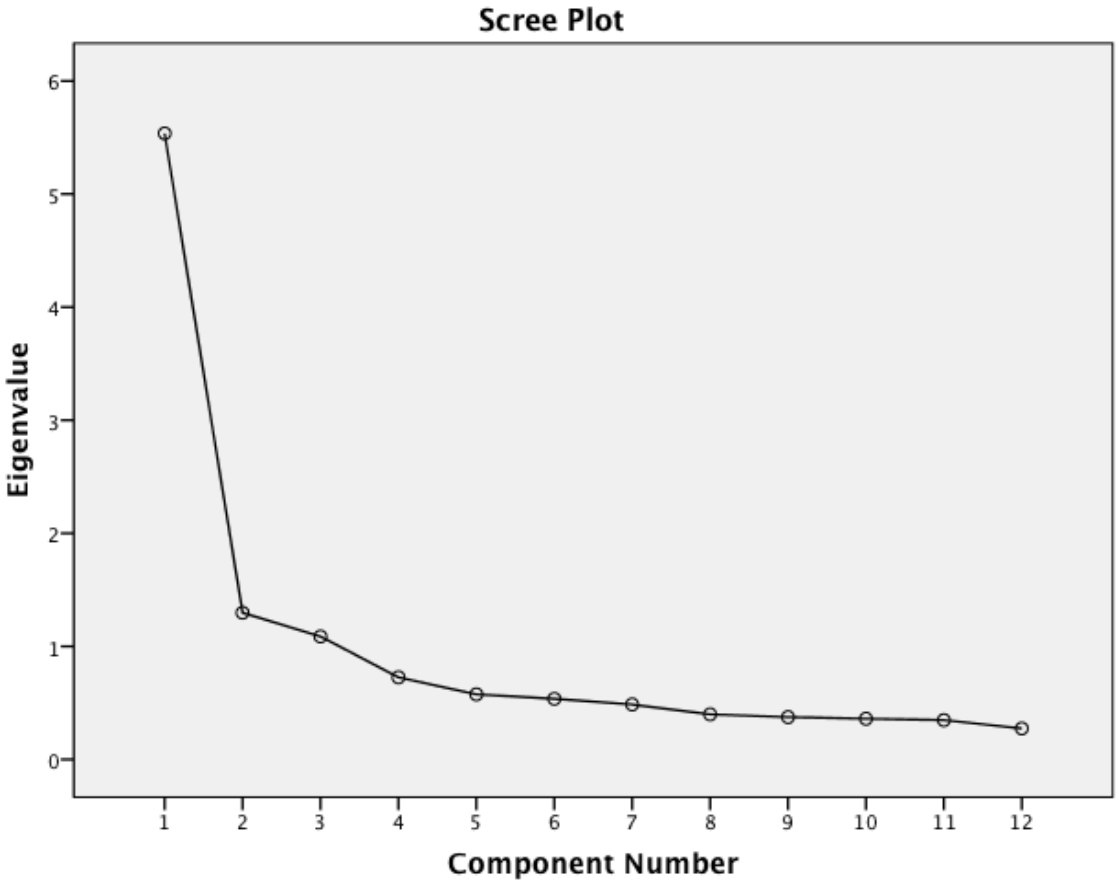

Figure 3. Scree plot of AWFC scale PCA.