

GENDER DIFFERENCES IN SCIENCE, MATH, AND ENGINEERING
DOCTORAL CANDIDATES' MENTAL MODELS
REGARDING INTENT TO PURSUE
AN ACADEMIC CAREER

by

COLETTE JACQUOT

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ABSTRACT

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Colette Jacquot, PhD

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Supervising Professor: Monica Ramirez Basco, Ph.D.

Across university departments in the science, technology, engineering, and math (STEM) fields, there has been a long-standing problem of underrepresentation of women at all professorial ranks. Despite efforts over the past 30 years, many obstacles remain to the recruitment, retention, and advancement of women in STEM fields. The present study utilized Lent, Brown, and Hackett's (1996) Social Cognitive Career Theory (SCCT) to help gain a better understanding of why female doctoral students in STEM fields choose not to pursue academic jobs by examining their conceptualization or mental model of academic work. Using qualitative and quantitative methods, male and female doctoral students in STEM who varied in their commitment to a career in academia were compared on the five SCCT factors of genetically-determined characteristics, overt career-related behaviors, self-efficacy, goals, and outcome expectations. Focus groups and a follow-up questionnaire were utilized.

Results provided support for gender differences within those who intended to take academic jobs following completion of the doctorate as well as among those who intended to pursue jobs outside of academia. Key factors associated with interest in academia included a desire to teach in females and an optimistic perspective regarding many aspects of academic life in the males. Rejection of academic jobs

by female participants was consistent with a lack of self-confidence for being effective in a faculty position. For males, disinterest in academia stemmed from poor male role models and a negative mental model of academic work.

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CHAPTER 1

INTRODUCTION

1.1 Gender Disparity in Higher Education Across America

Competent, qualified women in the United States have not achieved ascension to top ranks of professorship compared to men who have the same qualifications and experience (Beyond Bias & Barriers, 2007; Kahveci, Southerland, & Gilmer, 2006; Mason & Goulden, 2004; Mooney, Chrisler, Williams, Johnston-Robledo, & O'Dell, 2007; Schultz, 2007; Ward & Wolf-Wendel, 2004). Although women across the nation have closed the gap regarding the number of female faculty members teaching in higher education, only 23.7% of full professors across all subject areas are women (U.S. Dept. of Education, 2005). Moreover, at doctoral-granting universities in the United States, women are 50% less likely to attain tenure compared to men (Curtis, 2005). Similar results from a recent comprehensive study conducted by the National Science Foundation (NSF; 2004) indicate that women are less likely than men to be hired into tenure-track positions and to advance to full professorship.

For three decades the inequitable ratio of male to female full professors has pervaded the U.S. (Trower & Chait, 2002). This same trend is also evident at individual colleges and universities. For example, at the University of Texas at Arlington in 2006, only 5.6% of full professors across all subjects were female (UTA Report, 2007). Starker statistics exist for women in the science and engineering fields. In 2001 in the United States, 80% more men held full-time faculty positions in science and engineering than did women (Commission on Professionals in Science and Technology, 2002), and only 10% of full professors in science and engineering were female (Trower & Chait, 2002).

Researchers have proposed a plethora of causes which may be responsible for hindering women's advancement to tenure. Issues that professionals have identified include family/work conflicts (Armenti, 2000; Grant, Kennelly, & Ward, 2000; Perna, 2001; Ward & Wolf-Wendel, 2004), inequitable access to resources compared to men (Gersick, Bartunek, & Dutton, 2000; Krefting, 2003), male-favored

policies of recruiting, hiring, and promotion (Curtis, 2005; Ginther & Kahn, 2006; Seymour, 1995; Trower & Chait, 2002), the chilly male-dominant climate in academe (Hartman & Hartman, 2008; Tonso, 1996; Whitt, Edison, & Pascarella, 1999), the glass ceiling effect (Federal Glass Ceiling Commission, 1995; Geisler et al., 2007), the maternal wall (Williams, 2004), and others (Eagly & Carli, 2003). Until recently, however, only a few investigators have researched an obvious piece of the puzzle – the perceptions of the women themselves (Beilock, Rydell, & McConnell, 2007; National Academies of Sciences 2006a, 2006b, 2007).

Few researchers would argue that cognitions or mental models have a compelling influence on career aspirations that, in turn, impact career selection (Bandura, 1977, 1986; Blaine, 2007; Matlin, 2008). Investigating women's mental models could reveal accurate or skewed self-perceptions of perceived bridges or barriers to an academic job. Also, women's mental models of others and of the world around them could also serve to bolster or hinder their academic pursuits. A thorough, in-depth analysis of women's mental models regarding their pursuit of an academic career should provide a clearer explanation regarding the prevalent gender disparity in the academy. As such, the proposed research will investigate female's academic mental models by using a social-cognitive approach to uncovering perceived barriers.

1.2 Design and Aims of the Present Study

In order to adequately analyze female professors' mental models of career choice, it is necessary to research the mental models that academic women embraced before they embarked on their academic careers. Therefore, this study will investigate graduate students' mental models of academic success. Specifically, this research will focus on both female and male graduate students in science, engineering, and math who are pursuing an academic career and graduate students in science, engineering, and math who are not pursuing an academic career. The experimental design will be a 2 (female or male) X 2 (intent to pursue an academic career in science, engineering, or math or intent not to pursue an academic career in science, engineering, or math) qualitative design that will address the following four aims: (1) to identify in men a mental model that is consistent with a plan to pursue an academic career in science, (2)

to identify in women a different mental model that is consistent with a plan to pursue an academic career in science, (3) to identify in men a mental model that is consistent with a plan not to pursue an academic career in science, and (4) to identify in women a different mental model that is consistent with a plan not to pursue an academic career in science.

1.2.1 Social-Cognitive Career Theory (SCCT)

Vocational and career researchers have uncovered a number of factors that influence career-decision making, including self-efficacy (personal beliefs regarding one's performance abilities), perceived achievement levels, and viable career options (Patton et al., 2004; Stevens, Wang, Olivarez, & Hamman, 2007; Weiss, 2000). Specifically in regard to women's career choices, Hackett and Betz (1981) wrote a seminal paper on the relationship of females' career options and self-efficacy that theorized that socialization factors have paramount influences on women's self-efficacy levels and, in turn, on expanding or limiting their mental models of success, performance expectations, perceptions of ability levels, and career prospects. Other researchers have also found support for the predictive relationships and interactions of self-efficacy, mental models, and academic performance for both sexes (Hackett & Lent, 1992; Lent & Hackett, 1987).

As a framework from which to organize career developmental processes, psychologists have applied Bandura's (1986) Social Cognitive Theory (SCT) to career selection (Brown & Lent, 1996). The SCT postulates that self-efficacy influences choices in activities, levels of exertion, and determination to persist in those activities, regardless of difficulties. The first to apply the SCT to career choice, Lent, Lopez, and Bieschke (1991) investigated participants' interests in math and found that interest mediated the influence of self-efficacy on choosing mathematical careers. Although these researchers did not focus on gender in their study, they did note significant sex differences, such that male college students reported higher math self-efficacy levels, ACT scores, interest in math, course intentions regarding math, and outcome expectations compared to females. Lent, Brown, and Hackett (1996) then developed a career path model to organize pertinent social and cognitive influences on career choices, and their

framework evolved into the Social-Cognitive Career Theory (SCCT). In contrast to the SCT, the SCCT focuses more on internal factors contributing to career choice than external ones.

Specifically, the SCCT is organized by the reciprocal interactions of five factors: (1) genetically-determined characteristics (e.g., gender, ability levels, biological clock), (2) overt career-related behaviors (e.g., selection of courses, majors, job, role conflict), (3) self-efficacy beliefs (e.g., self-confidence, mental models, role models, lack of social support), (4) goals, (e.g., determination to act on beliefs and to persist in a career), and (5) outcome expectations (e.g., expected results of behaviors). The SCCT outlines the mental processes involving how people develop cognitions of success in career domains, how these cognitions translate into interests that, in turn, evolve into career-relevant choices, and how people perform and persist in their careers (Lent et al., 1993; Patton et al., 2004; Stevens et al., 2007; Weiss, 2000). Specifically, the theory explains reciprocal interactions of these five factors as being intertwined and inextricably linked. For example, genetically-determined characteristics may operate through self-efficacy beliefs to influence career-related behaviors and goals. Furthermore, outcome expectations and goals may reciprocally interact with self-efficacy beliefs and genetically-determined characteristics to shape overt career-related behaviors (Lent et al., 1993). Due to the present study's focus on the influences of mental models regarding career-decision making, the SCCT serves as the optimum conceptual framework for organizing this investigation.

1.2.1.1 Genetically-determined Characteristics

1.2.1.1.1 Gender

The SCCT posits that a person's career choices and behaviors are based, in part, on genetically-determined characteristics, such as gender and ability levels, that reciprocally interact with each other as well as with other components in the SCCT model (Hackett & Lent, 1992; Lent et al., 1996, 2000). Because a person's gender is influenced by cultural and societal expectations, an individual often internalizes these expectations as cognitive sex categorizations. These expectations frequently serve to define one's career choices and behaviors, at times limiting options to only those domains that match socially-accepted gender roles (Blaine, 2007; Eagly, 1987; Eagly & Wood, 1991). For example, in

American society, women have primarily pursued female-specific occupations. Females comprise 90% of all secretaries, 98% of all dental hygienists, 87% of all bank tellers, and 83% of all elementary schoolteachers. These statistics contrast with the low percentage of women working in male-specific occupations. Females comprise only 10% of all mechanical engineers, 19% of all dentists, and 20% of all architects (U. S. Bureau of Labor Statistics, 2004).

More recent investigations also demonstrate that negative female stereotypes often hinder them from successful scholastic performance in science, math, and engineering, thereby discouraging further career pursuits in these domains (Beilock et al., 2007; National Academies of Sciences, 2006a; 2006b; 2007). Thus, gender and female stereotypes influence women's career mental models often by limiting women to only traditional gender-conforming jobs.

1.2.1.1.2 Ability Levels

Along with gender influences, varying biologically-based ability levels between the sexes have been proposed to explain the gender gap in scientific academia (Benbow & Stanley, 1980). In the past, boys scored higher on science achievement tests than girls (Jones, Mullis, Raizen, Weiss, & Weston, 1992; Kahle & Lakes, 1983; Simpson & Oliver, 1985). However, recent studies reveal that sex differences in science and math performance have all but disappeared (National Center for Education Statistics, 1995; Hall, Davis, Bolen, & Chaia, 1999; Hyde, 1997). For example, studies conducted by the National Center for Education Statistics (2001) indicate no sex differences in middle school students' science and math abilities.

In regard to high school, Xie and Shauman (2005) performed an investigation of 7th – 12th graders' math and science performance and found that female high school students consistently outperformed males in math and science. Furthermore, even though boys were more likely to report positive attitudes toward these subjects than were girls, researchers did not find a relationship of positive attitudes toward math and science to be strongly related to students' scholastic efficacy. Other research results also indicate that high school assessments of science achievement tests and grades do not reveal significant gender differences (Catsambis, 1999; Hassan & Khalifa, 1999). Beilock et al.(2007) and other

sources found that females for the most part have learned to embrace traditionally negative cognitions regarding their own competency levels, abilities, and skills as they contemplate pursuing a career in a male-dominated field, regardless of outperforming males in those fields (National Academies of Sciences 2006a, 2006b, 2007).

1.2.1.1.3 Biological Factors

Along with gender and ability levels, research of academic gender disparity indicates that females' inherent trait of being able to bear children can negatively affect women's academic mental models of success (Barnett & Hyde, 2001). Often at odds with one another in academe, females' biological and tenure clocks can generate high levels of stress unique to females, along with the physical stress of pregnancy and childbirth (Varner, 2000; Williams, 2000) as these pursuits often coincide.

Work and family conflict authorities posit that balancing work with family demands falls solely at the feet of women (Perna, 2001). As such, many women believe that they must choose between having an academic career and having a family. It is not surprising that women in traditional academic jobs are less likely to have children compared to women in medicine and law (Cooney & Uhlenberg, 1989). Further support is also evident within academia itself: Only one-third of female faculty members have children (Perna, 2001). Additionally, academic females without children report their concerns that having children might impede their career advancement (Armenti, 2000; Aisenberg & Harrington, 1988). This barrier that many working mothers experience has been called the "maternal wall" (Williams, 2004).

In contrast, the maternal wall affects men positively in that, male faculty who have children are actually respected more than men without children (Mason & Goulden, 2004). This double standard further affects not only women's perceptions of whether they are good mothers and good employees, but also others' perceptions of them when they take time away from work to have a family or tend to family needs. Often perceived as uncommitted and unstable, working mothers experience additional pressure from their colleagues and supervisors whereas men who have children within five years of earning their doctorate degrees are more likely to be viewed as stable and 38% more likely to secure tenure (American Association of University Professors, 2001). It seems that, for male faculty, having children builds a bridge

to tenure whereas for female faculty, having children builds a wall blocking tenure. Thus, the biological clock can impact females' mental models of what success in academia looks like.

1.2.1.2 Overt Career-related Behaviors

Along with genetically-determined characteristics, the SCCT postulates that career-related behaviors, such as choices of academic courses and majors, are an integral part of the career-decision process (Lent et al., 1996). Frome, Alfeld, Eccles, and Barber (2006) conducted a longitudinal study of 1000 18-year-old high school females who aspired to male-dominated jobs by following them to age 25. After seven years, the majority of the females had changed their careers to female-dominated jobs. Similarly, Mau (2003) found that the majority of young women who aspire to male-dominated careers (e.g., architect, engineer, scientist) in their younger years switched to more traditionally feminine careers (e.g., bookkeeper, nurse, secretary). Again, women's mental models of gender-appropriate careers can restrict their potential career aspirations and decisions.

1.2.1.2.1 Academic Pipeline

A popular analogy used to explain the pattern of females not choosing male-dominated jobs, including science, engineering, and math is the pipeline metaphor (American Association of State Colleges and Universities, 2002; Foote, 1996; Gandara, 1998; Glazer-Raymo, 1999; Kulis, Sicotte, & Collings, 1992; McMillen, 1986). Beginning at elementary school, the first juncture in the scientific and mathematical academic pipeline begins with young girls who are as excited and involved as boys in these subjects. However, at the next juncture in the pipeline, many middle school females begin to "leak" out of the pipeline as they lose interest in science and math (Camp, 1997; McBride, 2002). For example, Mau (2003) investigated eighth-grade girls and boys and found that only 4.8% of girls reported an interest in science or engineering careers compared to 12.5% of boys. Furthermore, six years later boys were much more likely (26.5%) to persist in their science or engineering aspirations than were girls (12.1%). High school years tend to reveal an even larger leak in the pipeline as females' career interests in science, math, and engineering sharply decline. Hanson (1996) investigated senior high school students' pursuits

of a career in science, math, or engineering, and the results indicated that females were three times less likely to pursue these fields than were males.

The next pipeline juncture, when adolescents enter college, shows some promise with regard to the number of women earning college degrees compared to 50 years ago. In 1966 American women earned 43% of all bachelor's degrees, 34% of master's degrees, and 12% of doctorate degrees. By 2002, females earned 57% of bachelor's degrees, 59% of master's degrees, and 45% of doctoral degrees (STEM Workforce Data Project, 2006). However, the bad news is that, in science, women still remain the minority.

Provoked by the persistent scarcity of women in science, Congress in 1982 appointed the National Science Foundation (NSF) to create programs and policies that encourage women and minorities to pursue STEM careers and to keep lawmakers abreast of the progression of females and minorities in those fields. Results from numerous NSF reports and other conclusive studies indicate that women have made some progress in earning STEM undergraduate degrees. For example, in 2004 females earned twice as many STEM bachelor's degrees compared to the same degrees earned in 1966. Also, women currently outnumber men in the social sciences (54.5%), psychology (77.8%) and biological/agricultural sciences (60.1%) whereas males are still the norm in computer science (74.9%), physical science (57.9%), and engineering (79.5%) (STEM Workforce Data Project, 2006).

In regard to STEM master's degrees, in 2004 women outnumbered men in psychology (78.1%), social science (55.9%), and biological/agricultural science (56.8%), but men dominated engineering (78.9%), chemistry (53.8%), computer science (68.8%), physics (74.8%), and mathematics (54.6%) (STEM Workforce Data Project, 2006). An example at the local level, the University of Texas at Arlington reported in 2006 that only 31.5% of graduate students studying science and engineering were female (UTA Report, 2007).

Concerning doctoral degrees earned by women in the STEM fields, only 8% of doctoral degrees in 1966 were awarded to females. Almost 50 years later, women earned 37.4% of all doctoral degrees (STEM Workforce Data Project, 2006). Some progress has been made but women are still under-

represented in doctoral degrees. Stark statistics exist for females who transition into academia. In universities across the country, 80% more men than women hold full-time faculty positions in science and engineering (Commission on Professionals in Science and Technology, 2002). Additionally, qualified female professors are more likely to be overlooked for promotion while their male colleagues advance to tenure (Ginther & Kahn, 2006). For example, in 2003 full professors nationwide across all subject areas consisted of only around 20% females even though women have closed the gap regarding the number of faculty members who were female (U.S. Dept. of Education, 2005). Thus, at each progressive academic stage in the pipeline, females decrease in number exponentially. Clearly, a significant discrepancy exists in regard to the under-representation of STEM female graduate students, female faculty members, and tenured female professors compared to their male counterparts. Leaks still exist in the academic STEM pipeline for females, albeit further down the line than before (Ginther, 2001; Long, 1990, 1992, 2001; Perna, 2001).

1.2.1.2.2 Role conflict

Although the above statistics are informative, they do not provide explanations as to why women are leaking out of the pipeline in STEM fields. One answer may be the stress a woman often experiences trying to balance dual role expectations as mother and employee. When women attempt to juggle both work and family, they frequently feel discord when their roles diverge (Armenti, 2000; Grant, Kennelly, & Ward, 2000; Varner, 2000; Ward & Wolf-Wendel, 2004). For example, physical and emotional stress from playing roles as both caregivers and employees negatively affects 40% of working mothers (National Organization for Women, 2007). Moreover, when both parents are employed and a child or family member becomes sick, the mother, not the father, is socialized to assume the caregiver's role by taking time away from work (Bem, 1993; Ferber & O'Farrell, 1991). In fact, one in three childless women who accept a tenure fast-track position tends to stay childless throughout their lives (Mason & Goulden, 2004).

Many women feel conflicted in their work on the job and at home not only because responsibilities in these domains often collide but also because more demanding responsibilities are expected from them in both domains than ever before (Jacobs & Gerson, 2004; Ward & Bensimon, 2002; Williams, 2000a,

2000b). Surveying women at a research university, Finkel and Olswang (1996) found that women's mental models of academic success collided with their tenure goals, and over a third of "would-be" mothers postponed child-bearing due to job expectations and demands.

Because gender expectations in one domain often affect expectations in other domains, role conflict may decrease women's perceptions of job satisfaction levels, further discouraging females from working toward tenure or even from remaining in academe altogether (Barnett & Hyde, 2001; Boice, 2000; MacDermid et al., 1994). For those who do persist, women tend to have less time than men for their careers (Shelton & John, 1996; Tierney & Bensimen, 1996; Ward & Wolf-Wendel, 2004). Indeed, female professors who are also mothers truly work two jobs: one at school and the "second shift" when they arrive home (Hochschild, 1989). In fact, regarding childcare alone, females spend up to 50% more time on average than do males (National Organization for Women, 2007). Moreover, Mason and Goulden (2004) report that mothers in academia spend over 100 hours per week on completing household duties, attending to their families, and performing professional responsibilities contrasted with fathers who approximately 85 hours a week. Many women, including female graduate students observing their female professors, perceive success in academe to be virtually limited to men and to childless females (Hartman & Hartman, 2008).

1.2.1.3 Self-efficacy Beliefs

Along with genetically-determined characteristics and overt career-related behaviors, the SCCT model posits that an individual's beliefs and perceptions of ability directly impact her or his career-decision making (Lent et al., 1996). This self-concept of ability, or self-efficacy, was first defined by Bandura (1977) as personal beliefs regarding one's abilities and skills to perform a certain behavior. In this study self-efficacy refers to personal beliefs regarding one's abilities and skills as they relate to pursuing an academic career. Specifically, self-efficacy beliefs serve as a conduit for people to transmit their career-related cognitions or mental models, behaviors, and skills to a task or job (Mau, 2003; Taylor & Betz, 1983).

Based on over thirty years of studies on the gender gap in science and math, researchers have concluded that people's self-efficacy levels are as important as, and even sometimes more important than, their actual performance levels (Eccles, 1987; Eccles & Wigfield, 1995; Farmer, Wardrop, & Rotella, 1999; Fennema, 1984; Stake, 1979). For example, although females perform equally as well as or even outperform boys in science and math, girls tend to report lower self-efficacy in these domains than do boys (Jacobs, 1991; Jacobs & Eccles, 1992; Juang & Silbereisen, 2002; Pajares, 1995). In fact, as early as fifth and sixth grades, girls outscore boys on science standardized tests and science grades but express lower self-efficacy levels regarding their performance in science (Meece, Glienke, & Burg, 2006). Frome and Eccles (1998) as well as Jacobs (1991) arrived at similar conclusions regarding middle-school girls' self-efficacy levels in science and math conflicting with their actual outstanding performance in these subjects. As a result, females' actual scientific abilities and perceived scientific abilities ironically juxtapose one another.

Self-efficacy also impacts high school and collegiate academic performance. Lent, Brown, and Larkin (1986) studied the self-efficacy levels of college students majoring in scientific and technical fields and reported that the students with high self-efficacy expectations of completing college earned higher grades and demonstrated higher levels of resolve in these domains than did students with low self-efficacy expectations. In addition, Multon, Brown, and Lent (1991) performed a meta-analysis on the relationship of self-efficacy to performance in college and concluded that self-efficacy, school achievement, and persistence were positively related to one another.

Stereotypically-biased career restrictions also significantly affect women's self-efficacy levels of perceived potential performance in male-dominated jobs (Blaine, 2007; Matlin, 2008). For example, in their investigation of career choice and self-efficacy levels, Hackett and Betz (1981) found that, compared to college males, the self-efficacy levels of college females were higher regarding their potential performance in traditionally female occupations but decreased substantially when asked about potential performance in traditionally male occupations. Similarly, Bonnet's (1994) study supports the position that

women tend to underestimate their abilities to succeed in male-dominated professions whereas men tend to overestimate their abilities.

Self-efficacy also differs across gender in regard to perceived career success of scientists already in the field. Despite actual ability levels being equal, female scientists tend to report lower self-efficacy levels than do males. Cross (2001) investigated the levels of academic ability and self-confidence among scientists and engineers and found no gender differences regarding previous standardized test scores and graduate school grades. However, she did find markedly lower levels of career self-confidence among female scientists and engineers compared to males.

1.2.1.3.1 Mental Models

Mental models are schemas or organized cognitive structures based on observations and experiences with the world that reveal one's reality. They provide frames of reference that aid individuals in making sense of their world and in deciding how to behave in certain situations (Senge, 1990). As a main element of thinking, mental models are derived from experiences, judgments, values, beliefs, perceptions, and alternative solutions and may be conscious or unconscious (Chermack, 2003; Ford & Sterman, 1998; Johnson-Laird, 1983; Sange, 1990). By investigating mental models, researchers are able to uncover individuals' perspectives about a subject as well as viewpoints that may be unconscious and, at times, erroneous (Byram, Fischhoff, Embrey, Bruine de Bruin, & Thorne, 2001). For example, Byram et al. (1998) explored women's thinking regarding mammographies and breast implants and found that many females had fears based on incorrect or incomplete information about mammography, self-examinations, and professional breast exams. In fact, some women went so far as to avoid getting mammograms altogether due to their faulty thinking. However, when provided with accurate information, most women changed their thinking and, in turn, their behaviors, supporting the position that people's mental models are directly correlated to their decision-making processes and personal experiences (Chermack, 2003).

Parents' mental models are often influential in their children's development. In a study of parental influence on their children's mental models of self, developmental psychologists uncovered evidence

linking boys' confidence levels in mathematics with their parents' confidence levels in their sons' math skills, suggesting that parents who had positive mental models of their son's mathematical abilities translated into their sons having positive attitudes toward their math skills, regardless of the boys' actual math performance levels. Similarly, parents who viewed math as a "boy's only" subject impacted their daughters, such that girls reported lower confidence in their mathematical abilities compared to boys, mirroring their parents' negative mental models of their daughters' abilities, despite the fact that the girls consistently outperformed the boys in math at every level (Jacobs, 1991; Jacobs & Eccles, 1992). Parents also tend to embrace similar gender-related mental models about science, again distorting their daughters' mental models regarding their science aptitude levels and in turn, limiting their daughters' interest in science and other male-dominated fields (Crowley, Callanan, Tenenbaum, & Allen, 2001; Tenenbaum & Leaper, 2003).

Not only do parents' gender-role mental models of their children's abilities influence their children's formation of their own mental models but also parents' gender-role mental models affect their children's career options later in life (Eccles, Wigfield, & Schiefele, 1998; Jacobs & Eccles, 2000). In a longitudinal study of northwestern sixth-grade participants through their young adulthood (24 - 25 years old), Bleeker and Jacobs (2004) investigated mothers' beliefs about their children's science and math abilities to determine if maternal beliefs impact their sixth graders' later career choices. Interestingly, these researchers found support for a positive correlation between mothers' early predictions in regard to their children's math aptitude and the careers that the young adults chose. Thus, mental models directly affect the career decision process.

1.2.1.3.2 Role Models or Mentors

Another source of support in academia is having a mentor or role model. However, scientific female undergraduates and graduate students face further disadvantage than their male counterparts due to the limited number of female mentors. Because mentors not only provide mentees with support, feedback, and direction in career development but also pass on "unwritten" mores and gender

expectations in academia, students are best served by having same-sex mentoring relationships (Chandler, 1996; Ervin, 1995; Kirsch, 1993; Spore, Harrison, & Haggerson, 2002).

From post-secondary education into graduate school, early academic careers, promotion, and finally tenure, mentoring influences do not diminish (Mullen, Cox, Boettcher, & Adoue, 1997). Specifically, research demonstrates that women faculty members have a significant impact on young women's college interests, academic competency levels, choice of careers, and persistence in pursuing male-dominated jobs, such as STEM (Betz & Fitzgerald, 1987; Hackett, Esposito, & O'Halloran, 1989; Hayden & Holloway, 1985; Little & Roach, 1974; Stake & Noonan, 1985). However, an insufficient number of tenured female professors in these fields encourage young women to enter academia (Frehill et al., 2007). Thus, the scarcity of female mentors further propagates disadvantages for the new and upcoming STEM female students in that their scholastic support system may be less than adequate (Reppert, 2005; Trower & Chait, 2002). With few women advancing to the levels of full professors, department chairs, deans, and higher-ranking administrators, female professors might get discouraged from seeking tenure and be less likely to encourage younger women to follow in their footsteps (Callister, 2006; Frehill et al., 2007; Geisler et al., 2007; Krefting, 2003; Reppert, 2005; Valian, 1998).

1.2.1.3.4 Lack of Social Support

Social support, another perceived influence on career choice, is experienced differently by academic women than men. Some women have to contend with their families' and friends' traditional subjective norms of stereotypical occupations appropriate to females that may conflict with their own career choice (Fishbein & Ajzen, 1975, Ajzen & Fishbein, 1989). As such, they may perceive themselves as lacking a supportive network. For those women who persist in academia, they may further experience psychosocial problems, such as discouragement from their male colleagues, supervisors, and friends (Hartman & Hartman, 2008). As a result, women faculty are likely to gingerly make their way through the tenure process, not knowing whom to trust or whom to ask for assistance (Gersick et al., 2000; Krefting, 2003).

Moreover, the environment in higher education values independence, initiative, and self-sufficiency, causing many women to believe that if they ask for help, they will be viewed as weak (Surry, 1991). STEM female faculty report experiencing not only an unsupportive academic atmosphere more so than do men but also unrelenting intimidation and pressure from some male faculty and male students. Indeed, vocational researchers and experts have coined the term, “chilly climate,” to refer to the competitive male dominance that is rampant in STEM departments (Blaine, 2007; Hartman & Hartman, 2008; Tonso, 1996; Whitt et al., 1999).

1.2.1.4 Goals

Gender stereotypes, mental models, and perceived self-efficacy levels also influence the formation of goals, the fourth component of the SCCT (Bandura, 1977, 1986). In this study, goals will be addressed in relation to participants’ intentions to pursue an academic career. Researching career interests and intentions, Taylor and Popma (1990) found that low levels of self-efficacy in a domain restrained participants from expressing an interest in that domain, much less from setting career goals in that field.

Investigators have also found that middle-school students restrict their career intentions and goals based on occupational stereotypes, similar to the overt career-related behaviors factor. Kelly (1993) and Post-Kammer and Smith (1985) found that junior-high school students’ career self-efficacy levels significantly differ across traditionally female- and male-dominated jobs, such that the majority of female students perceive themselves as succeeding only in female-dominated jobs and, therefore, confine their career intentions and goal-setting to only those domains. Similarly, in an investigation of almost 2,000 high school seniors who tested in the 90th percentile of the SAT’s math section, Matyas and Dix (1992) revealed that females limited their occupational pursuits along traditionally gendered lines. Male seniors were 33% more likely than were female seniors to set career goals in science or engineering fields, even though females in this group also performed exceptionally well in math. In another research project, Church, Teresa, Rosebrook, and Szendre (1992) investigated minority high-school students’ career intentions and found that females reported a significantly lower likelihood of pursuing stereotypically male

professions compared to males. Thus, career intentions and goals tend to be influenced by gender stereotypes, perceived self-efficacy levels, and overt career-related behaviors (Bandura, 1986, 1989).

1.2.1.5 Outcome Expectations

The final component of the SCCT (1996) is outcome expectations. Whereas self-efficacy beliefs address the question, “Can I do this?” outcome expectations ask the question, “If I do this, what will happen?” (Lent & Hackett, 1987, p. 348). Individuals’ outcome expectations interact with career decision making to the extent that, if people anticipate rewards and payoffs regarding their career choice, they will be more likely to choose the career that offers the most positive outcomes, provided they perceive themselves as possessing the skills and abilities required to be successful in that job (Bandura, 1986, 1989). However, regarding success in academia, women may foresee few positive outcome expectations due to the academia’s pro-male bias. For example, at every juncture in their academic careers, women do not advance as quickly as do men, and they earn less money despite their comparable qualifications and accomplishments (Federal Glass Ceiling Commission, 1995; U. S. Department of Labor Women’s Bureau, 2005).

As a result, female undergraduates and graduate students’ expectations of an academic career may include pessimistic perceptions due to existing ratios of men outnumbering and outranking women. In fact, significantly more men are hired as full-time professors even though women across the nation are now earning undergraduate and graduate degrees at virtually the same rate as males, with few exceptions (Lanier & Tanner, 1999; Roos & Jones, 1995; Valian, 1998). In addition, female faculty who are hired full-time tend to experience further marginalization in that they often receive less support and are given less esteemed duties, such as serving on low-ranking committees (Espinoza-Herald & Gonzalez, 2007; Krefting, 2003).

Others’ outcome expectations also influence females’ own outcome expectations. For example, women who choose science majors are often perceived by male faculty and graduate students as less committed and less bright compared to their male counterparts. However, the truth is that females have proved to be as dedicated, hard working, and devoted to academic success as males (Huang, Taddese,

Walter, & Peng, 2000). In fact, because women in science believe that they must work harder due to their perceived deficits in order to receive the same outcomes that their male colleagues receive, they are more likely to develop superior skills and exceptional abilities along the way. This overcompensating female behavior has occurred so frequently that it has been named the “Madame Curie effect.” Thus, when others embrace negative perceptions of women in science, those perceptions can affect females’ outcome expectations and the females themselves by placing undue pressure on female graduate students and faculty members (Rosser, 2003).

In summary, pro-male bias persists in scientific academia across age, education, and proficiency levels. Researching women’s mental models regarding perceived barriers that hinder females in academia might prove fruitful in offering a more thorough explanation of this problem. Also, investigating mental models of graduate students currently in the career-decision process should be useful in determining factors that may contribute to their outcome expectations, goals, self-efficacy levels, mental models, and career-related behaviors, thereby impacting their career choice.

1.3 The Present Study

The purpose of the current qualitative research study is to investigate the relationship between women’s mental models of academic success and their levels of intentions to pursue academic careers. Examination of mental models in females and males should assist in understanding their intention of choosing or rejecting an academic career. In addition, investigating gendered mental models is imperative to determine roots of gender inequality in STEM fields.

1.3.1 Methodological Considerations

Researching human motivation and intention can be challenging because participants often attempt to infer what experimenters are investigating and, in turn, alter their responses accordingly. Also, many qualitative researchers rely solely on questionnaires or surveys that they have created, thereby presuming that investigators are already privy to a comprehensive grasp of participants’ beliefs and perceptions concerning a topic (Morgan, Fischhoff, Bostrom, & Atman, 2002). Additionally, using surveys as the sole methodology in a study may inadvertently introduce demand characteristics, such as self-

presentation bias and experimenter bias that might influence participants' responses, resulting in inaccurate analyses and faulty conclusions. In some cases using only surveys for research might also be ineffective in capturing cognitions and opinions due to the fact that the participants themselves may not be totally cognizant of their own mental models or may not understand the question(s) on the surveys (Ickes, Robertson, & Tooke, 1986). Because the present study seeks to determine the conceptions (and misconceptions) that constitute participants' mental models regarding an academic career, a more encompassing methodology must be employed, such as focus groups.

1.3.1.1 Focus Group Discussions

Focus group discussions tend to generate a synergistic interdependence among group members, such that the interactions may often elicit cognitions that might not have been discovered using other methodologies (Campbell & Kashy, 2002; Krueger, 1994; Morgan, 2004; Rabiee, 2004). Furthermore, this technique allows participants to interact with other group members by explaining, disagreeing, commenting, and/or disclosing their viewpoints as much or as little as they wish. This methodology has been utilized as early as 1956 when Merton and his colleagues investigated how to influence Americans to invest in bonds (Merton, Kendall, & Fiske, 1956). More recently, focus groups have been used in investigating environmental campaign efficacy (Green, Fullilove, Evans, & Shepard, 2002), public opinions of environmental issues (Waterton & Wynne, 1999), and causes of social problems (Davies, 1999).

By definition, a focus group is a group interview that employs directed interactional discussion from participants in order to explore their cognitions, feelings, attitudes, and experiences (Barbour & Kitzinger, 1999; Curtis & Redmond, 2007; Powell & Single, 1996). The main purpose of focus groups is to uncover the perceptions and mentality behind individuals' opinions, beliefs, and feelings that have not previously been explored (JoEllen whatever, 1995; Morgan, 2004; Rabiee, 2004). Particularly when previous research has overlooked individuals' unique perspectives regarding an issue, focus groups can reveal data that have not been considered before (JoEllen, 1995).

Using focus group methodology for qualitative design is advantageous for several reasons. First, this methodology encourages participants to exchange ideas on clearly defined topics that can then lead to more expansive dialogue and explanations among group members (Morgan & Krueger, 1998; Powell & Single, 1996). Also, if conducted properly, focus groups can provide a more encompassing elaboration of participants' thinking and attitudes contrasted with self-reports that permit only limited responses, resulting in incomplete feedback (Happell, 1996, Hudson, Aranda, & McMurray, 2002; Verpeet, de Casterle, Van der Arend, & Gastmans, 2005).

In addition, focus groups can be efficacious at the initial stages of novel research in order to assist investigators in grasping theoretical, abstract conceptualizations that are the theoretical underpinnings (Krueger & Casey, 2000). This methodology is also best suited for research focusing on the rationale behind individual perspectives and viewpoints (Curtis & Redmond, 2007; Happell, 1996, Hudson et al., 2002; Verpeet et al, 2005). Pertaining to the current study, focus groups are an ideal methodology to investigate graduate students' mental models of academia because they can provide insight into participants' internalized cognitions regarding their plans for future career success and can serve as a guide in creating questions for the online surveys.

1.3.1.2 Surveys

Especially when investigating participants' private opinions and thoughts about issues, researchers frequently use a more eclectic approach by utilizing more than one method of data collection. By combining methodologies, experimenters can offset some of the weaknesses of one method with the strengths of another method, thereby producing convergent validity (Morgan, 1988). Results, therefore, tend to be more comprehensive and robust compared to investigations that utilize only one type of methodology (Ickes, 1994; Patton, 2002; Restall & Strutt, 2008). Thus, the present study employs a survey to validate focus group results.

Surveys can provide researchers with a window into the participants' minds while providing them with privacy that group discussions do not. They allow participants to respond to questions without others' knowledge, input, and/or influence, eliminating some of the demand characteristics that group

discussions tend to have. Specifically, participants taking a survey are not as likely to be swayed by other individuals who agree or disagree with them as they might be in a discussion setting. Therefore, they would be less likely to experience a need to concede and/or argue with another person opposing their stance. Indeed, participants are more inclined to think independently and experience less public pressure to defend, explain, and/or elaborate in their responses (Baumeister & Cairns, 1992; Baumeister & Jones, 1978; Greenberg & Pyszczynski, 1985).

Another advantage is that surveys are not susceptible to group polarization. Group polarization produces skewed results because members in the group feed off of one another and tend to pull one another toward extreme positions that they would not normally take without the group's influence. For example, when individuals in a group agree about an issue, they are more likely to become more extreme in their positions than when individuals are surveyed independently. Therefore, surveys encourage participants to reveal their thoughts from their own inimitable vantage point (Patton, 1990, 2002).

For individuals who are introverted and uncomfortable speaking in a group setting, the survey format is ideal. This format allows participants the opportunity to be frank about their opinions without feeling self-conscious about speaking in a group, especially with strangers, eliminating that restriction. Although surveys do not eliminate demand characteristics entirely, they do offset some of the weaknesses of focus group discussions (Baumesiter & Cairns, 1992; Baumesiter & Jones, 1978; Greenberg & Pyszczynski, 1985).

1.3.1.3 Research Hypotheses

This study will investigate the following three hypotheses:

1.3.1.3.1 Hypothesis 1

Male Ph.D. science, engineering, and math candidates will use a mental model that is consistent with a plan for future success in academia.

1.3.1.3.2 Hypothesis 2

Female Ph.D. science, engineering, and math candidates will use a significantly different mental model that is consistent with a plan for future success in academia compared to male Ph.D. science candidates.

1.3.1.3.3 Hypothesis 3

The factors in the mental models and/or the relative importance placed upon them will be significantly different across gender.

CHAPTER 2

METHOD

2.1 Participants

Regarding the selection of participants for this study, only graduate students who met three qualifications participated. The three criteria were as follows: (1) graduate students who were pursuing their Ph.D. in any science or engineering department, (2) were within two years of graduating, and (3) were U.S. citizens. All participants signed an informed consent that had been approved by the UTA Institutional Review Board prior to participating in the focus group or online survey.

2.2 Focus Groups

Twenty-eight science, engineering, and math Ph.D. candidates at the University of Texas at Arlington (UTA; N = 22) and the University of North Texas (UNT; N = 6) participated in focus groups. There were seven women in the women pursuing academia (WA) group, six women in the women pursuing non-academic careers (WI) group, eight men in the men pursuing academia (MA) group, and seven men in the men pursuing non-academic jobs (MI) group. Among the women, there were 11 Caucasians, one African-American and one Middle Eastern participant. Among the male participants, there were 12 Caucasians, one Asian-American, one African American, and one Middle Eastern participant. The median age for the females was 31 years and for the males, 34 years.

2.3 Online Survey

Thirty-seven additional science, engineering, and math Ph.D. candidates from UTA who met the previously described criteria for the focus groups completed an online survey. There were 20 males and 17 females in the survey sample. Data was completed for 35 of the participants: 19 males and 16 females. The sample consisted of 27 Caucasians, six Asian-Americans, two African-Americans, one Hispanic, and one Middle Eastern student. Sixteen students were from the College of Engineering and 21 were from the College of Science.

2.4 Settings & Materials

2.4.1 Focus Groups

For the focus groups at UTA, the researcher used a laboratory in the Psychology Department. At UNT, the researcher met in a conference room in UNT's Psychology Department. Depending on the number of participants in each group, five to seven chairs were placed around a table. Two microphones were strategically spaced on the table to capture all participants' responses, and the microphones were connected to a laptop on a separate table to record the discussions. As a back-up to the recording equipment, two trained undergraduate research assistants unobtrusively sat at separate desks close enough to the participants so that they could hear the discussions. Assistants took notes with pen and paper during the sessions at UTA and used laptops to type notes at UNT. Also, participants had pen and paper to use in the event that they wanted to write down their thoughts during the session. Their written comments, though, were not used for data collection.

The researcher and her advisor used Krueger and Casey's (2000) instructions for creating a focus group guide as a basis for the current study's guide of questions. Specifically, they ordered the questions sequentially by arranging them so that they flowed naturally from one question to the next. Also, they began with broad, general queries about career choices and proceeded to more detailed questions about working in academia and gender differences. See Appendix A.

2.4.2 Online Survey

Using common themes that emerged from the focus groups, the researcher and her advisor created a structured online survey (see Appendix B). Specifically, they created queries that addressed the distinct differences among the four mental models that Dr. Basco found in her data analyses as a basis. In addition, they included a question asking participants how much they deemed eight specific factors to be important in an academic career in order to test the third hypothesis. The survey consisted of 35 questions using a Likert scale from 1 (Disagree strongly) to 5 (Agree strongly), and one question was open-ended, "Why would you want to pursue a career in academia?"

2.5 Procedures

2.5.1 Focus Groups

The researcher announced the study via email to potential participants and included the three qualifying criteria. If volunteers met the criteria, they were instructed to contact the principal investigator for details. When contacted, the PI sent the volunteers an email asking questions to determine if they met the aforementioned criteria. A research assistant then contacted the qualifying volunteers and organized them into one of four focus groups: Two focus groups (one with seven females and the other with eight males) consisted of science and engineering doctoral students reported their intentions to pursue an academic career after graduation. The other two focus groups (one with six females and the other with six males) consisted of science and engineering doctoral students who did not intend to pursue an academic career upon graduation.

When at least five participants signed up to attend a focus group, research assistants contacted the participants and communicated when and where to meet. When participants arrived at the pre-determined location, the experimenter ushered them into the designated room and asked them to be seated. Then the experimenter introduced herself to the participants, explained the general purpose of the discussion and informed them about the recording equipment, assuring participants that all responses would remain confidential. Also, she guaranteed that the audio- and video-tapes would be erased once they had been transcribed. The experimenter then asked participants for their signed consent to participate in the study, including their permission to be audio- and video-taped.

Once the experimenter received the signed consent forms, she explained the process of the discussion, stating that anyone could speak up at any time. She stressed to the group that there were no wrong answers and reiterated the necessity of providing honest, candid responses. Next, she suggested that they write down their reactions to other group members' comments while they were speaking in order to prompt them to share those thoughts with the group later. After providing this brief introduction, she started the audio- and video-tapes.

The experimenter then asked previously-determined, open-ended questions from the focus group guide. She probed individuals to clarify or expand their ideas to further facilitate group interactions. This process continued until all of the predetermined questions had been asked by the experimenter. Finally, the experimenter summarized the information that the members shared and allowed participants the opportunity to provide any additional information not shared previously.

Next, the experimenter debriefed the participants and impressed upon them the importance of not sharing any details of the study with anyone. Finally, she thanked the participants and paid each either \$50 cash or gave a \$50 gift card as remuneration. Due to only 22 graduate students participating in the focus groups at UTA, the researcher also recruited volunteers at the University of North Texas (UNT) who fit the same previously mentioned criteria. However, only eight students volunteered and six participants participated. As a result of the low response rate, the participants were grouped into one focus group regardless of intent to pursue an academic career.

2.5.2 Online Survey

The experimenter invited UTA graduate students via email to participate in the online survey by listing the three required criteria and providing the link to the survey. When participants clicked on the link, they were asked if they wanted to volunteer for the study and then asked to respond to six demographic questions, including questions verifying that they met the required criteria. If participants met all criteria, they were directed to the consent form online and, if they provided their consent electronically, they were directed to the survey questions. After they completed the survey, they were asked to submit their responses and then were shown information regarding how to contact the principal investigator for remuneration. Participants were paid \$35.

2.6 Data Coding

2.6.1 Focus Groups

To analyze qualitative data for this study, the researcher used Krueger and Casey's (2000) methodology to conceptually organize clustered themes. First, two undergraduate research assistants transcribed the focus group sessions independently and then met to compare each other's transcriptions

for accuracy. They organized the data into separate, sequential quotations and parsed the quotations that contained more than one idea into separate, sequential lines of text while retaining the source of each quotation.

A five-member research team including the experimenter reviewed the transcriptions from the first focus group (men pursuing academia) and independently organized the data into major thematic clusters and patterns. Specifically, they looked for convergence in the data, i.e., emerging patterns and regularities that consistently grouped together. They reviewed their clusters again using internal homogeneity (extent of the data's cohesiveness) and external heterogeneity (extent of clear and distinct differences among the categories) as guides to ensure accuracy, thoroughness, and consistency. After investigating their final clusters to determine if each was reliable, credible, and relevant to the investigator's research questions, the team then checked all categories to ensure that each was distinct from the others.

The team compared their clusters with each other's and arrived at a consensus regarding major themes that surfaced in the first focus group. Using Lent et. al's (1994) SCCT Model as a guide, the research group then mapped their clusters onto the five-factor model and developed a coding table by creating codes for each theme. The team operationally defined each cluster to ensure reliability and accuracy (see Appendix C). Research team members independently coded each line of text using the codes in the coding table and later convened to compare their coding. When the research team disagreed with one another, they discussed their differing points of view and arrived at a consensus. Data that did not correspond to the SCCT model's framework were retained for subsequent review.

When novel patterns surfaced in subsequent focus group data, the research team determined if the new groups met all of the aforementioned criteria. If so, they created new codes for these data, added them to the coding table, and operationally defined each one. They then revisited data that was previously coded to determine if the new clusters appeared in those data as well. This process was repeated for all focus groups. When the data were exhausted to the extent that adding clusters to existing categories

would be superfluous, referred to as saturation, the research team concluded the data coding stage of the investigation.

In order to determine if the data were consistent with the SCCT model, each focus group's data were arranged onto the framework of the five-factor model without sacrificing the data's integrity. This stage of coding yielded five separate focus group outlines. Two research assistants independently counted the number of times that participants discussed each category and sub-category of the SCCT model. The research team calculated frequency proportions for each category and sub-category by dividing the number of responses in each group by the total number of responses within that category. For example, the first factor in the SCCT model, genetically-determined characteristics, consists of three sub-categories: gender, ability, and biological issues. Frequency sums were calculated for genetically-determined characteristics as well as separate frequency sums for each of the three sub-categories. Proportions were then computed for each category and sub-category. This procedure was repeated for each of the five groups.

As previously stated, the experimenter collected focus group data from the University of Texas at Arlington and the University of North Texas. Due to the fact that the UNT focus group consisted of participants from each of the four focus groups already conducted at UTA, the experimenter disaggregated the data from the UNT session and added them to their appropriate focus group at UTA. For example, all responses from the two WA participants at UNT were aggregated with UTA's WA focus group data.

To determine frequency proportions from a broader perspective, research assistants summed all of the responses to each of the five factors. They calculated the proportions of each of the five factors by dividing the factor totals by the total number of responses made during that focus group session, and then they computed frequency proportions for the focus groups. Two research assistants counted the extensiveness of the categories and sub-categories and compared their results with one another. If their totals were not consistent with each other's totals, they recounted the data together and arrived at a consensus.

Two psychologists qualitatively analyzed the focus group data independently, and their results were compared to the coded data. Dr. Nicolette Lopez has worked as an independent consultant performing job analyses and has extensive experience in facilitating focus groups and analyzing qualitative data. For the present study, she coded and analyzed the focus group data without any theoretical constraints imposed by the SCCT model. Instead, she used an analytical process that organizes qualitative data into categories reflecting major patterns and themes.

Another seasoned expert, Dr. Monica Basco, an experienced clinician and academic professional for over two decades with expertise in interactional coding, reviewed the transcripts. Dr. Basco read the focus group transcripts. She then studied the SCCT outlines with frequency percentages that the research team had developed for each focus group. The outlines contained all of the categories and sub-categories and their respective frequency percentage totals. Dr. Basco used the transcriptions and the SCCT outlines to organize each focus group's data around major clusters throughout the data analyses process. Finally, she compared and contrasted the clusters across the four focus groups and interpreted the data.

2.6.2 Online survey

Responses from the online survey were analyzed to determine whether the survey items validated the focus group data. See Appendix B for the survey.

CHAPTER 3

RESULTS

3.1 Research Hypotheses

3.1.1 Hypotheses 1 and 2: Quantitative Analyses

3.1.1.1 Focus Group Data Analyses

The first hypothesis predicted that male Ph.D. science, engineering, and math doctoral candidates would use a mental model that is consistent with a plan for future success in academia. Hypothesis 2 predicted that female Ph.D. science, engineering, and math doctoral candidates would use a significantly different mental model that is consistent with a plan for future success in academia compared to male Ph.D. science candidates.

To investigate whether significant gender differences were evident in the focus group data, the experimenter mapped participants' responses onto the SCCT Model and organized by gender. Table 3.1 consists of participants' responses in each of the five SCCT factors across gender. The data are presented in two formats: frequencies (the number of responses that participants made related to each factor) and percentages (the proportion of responses in each factor divided by the total number of responses made during the focus group sessions across gender).

Table 3.1 Number of Participants Making Comments and Percentages of Comments Regarding the SCCT Factors across Gender

SCCT Categories & Sub-categories	Totals for Women		Totals for Men	
	Number of Responses	Percentage of Responses	Number of Responses	Percentage of Responses
Genetically-determined characteristics	68	10.5%	18	3.7%
Overt career-related behaviors	30	6.0%	23	4.8%
Self-efficacy	458	73.0%	348	71.9%
Goals	39	6.2%	10	2.1%
Outcome expectations	41	0.6%	29	6.0%
Other	17	2.7%	56	11.6%
Total number of responses	627	100%	484	100%

Results of a two-tailed, independent *t*-test indicate that the SCCT factors were not significantly different across gender. The *p* value was adjusted to 0.002 to correct for possible Type I errors even though results were not significant.

3.1.1.2 The SCCT's Five Factors with Sub-categories

Three of the five factors in the SCCT model contain sub-categories. Data subsumed under the SCCT's five factors are organized as sub-categories. See Table 3.2.

Table 3.2 Number of Participants Making Comments and Percentages of Comments Regarding the SCCT's Sub-categories across Gender

SCCT Categories and Sub-categories	Totals for Women		Totals for Men	
	Number of Responses	Percentage of Responses	Number of Responses	Percentage of Responses
Genetically-determined characteristics				
Gender	62	9.9%	3	0.6%
Ability levels	4	0.6%	8	1.7%
Biological factors	2	0.3%	7	1.4%
Overt career-related behaviors				
Selection of courses, majors, careers	13		16	3.3%
Role conflict	6	1.0%	0	0.0%
Lack of role conflict	22	3.5%	7	1.4%
Self-efficacy				
Self-confidence	4	0.6%	4	0.8%
Lack of self-confidence	7	1.1%	37	7.6%
General statements about academia	99		49	10.1%
Advantages of Academia	43	6.9%	76	15.7%
Disadvantages of Academia	73	11.6%	34	7.0%
General statements about non-academia	15	2.4%	17	3.5%
Advantages of non-academic career	17	2.7%	34	7.0%
Disadvantages of non-academic career	21	3.4%	20	4.1%
Mental models of women	14	2.2%	37	7.6%

Table 3.2 – continued

Mental models of women in academia	46	7.3%	14	2.9%
Mental models of men	37	5.9%	4	0.8%
Mental models of research	0	0%	3	0.6%
Positive role models	18	2.9%	6	1.2%
Negative role models	24	3.8%	2	0.4%
Role models - Other	3	0.5%	5	1.0%
Positive social support	26	4.1%	5	1.0%
Negative social support	11	1.8%	1	0.2%
Goals	39	6.2%	10	2.1%
Outcome Expectations	4	0.6%	29	6.0%
Other	17	2.7%	56	11.6%
Total	627	100%	484	100%

Results of a two-tailed, independent t-test indicate that the SCCT factors' sub-categories were not significantly different across gender as groups, $t(11) = .34$, $p < .74$ or as individual sub-categories. The p -value was adjusted to 0.008 to correct for possible Type I errors even though no significant differences emerged.

3.1.1.3 The SCCT's Five Factors and Extensiveness

In addition to frequency totals, the research team also investigated whether extensiveness totals revealed patterns across gender. Table 3.3 contains results of the SCCT's five factors across gender with frequency and extensiveness totals given for each sub-category. Regarding extensiveness, only topics that were discussed by two or more participants were included in the totals due to the fact that topics discussed by more than one person are more relevant to the group's overall discussion. In the table below, cells with "2 of 13," for example, indicate that two different female participants out of 13 total

female participants responded whereas the cells containing the word “All” indicate that all of the participants in that gender group discussed that sub-category.

Table 3.3 Number of Participants Making Comments Regarding Each of the SCCT Factors and Sub-categories with Extensiveness Totals across Gender

SCCT Categories and Sub-categories	Women's Responses	Men's Responses
Genetically-determined characteristics		
Gender	All	All
Ability levels	4 of 13	4 of 15
Biological factors	2 of 13	7 of 15
Overt career-related behaviors		
Selection of courses, majors, careers	All	All
Role conflict	5 of 13	0 of 15
Lack of role conflict	10 of 13	7 of 15
Self-efficacy		
General statements about academia	All	All
Advantages of Academia	All	All
Disadvantages of Academia	All	All
Mental models of women in academia	All	7 of 15
Mental models of men	10 of 13	4 of 15
Negative social support	10 of 13	1 of 15

Table 3.3 - continued

Mental models of women	9 of 13	All
General statements about non-academia	8 of 13	11 of 15
Advantages of non-academic career	8 of 13	12 of 15
Negative role models	7 of 13	11 of 15
Disadvantages of non-academic career	6 of 13	All
Positive role models	6 of 13	4 of 15
Positive social support	6 of 13	5 of 15
Lack of self-confidence	5 of 13	5 of 15
Self-confidence	2 of 13	2 of 15
Role models – Other	2 of 13	3 of 15
Mental models of research	0 of 13	3 of 15
Goals	All	9 of 15
Outcome Expectations	4 of 13	10 of 15
Other	All	All

Results of a two-tailed, independent *t*-test indicated that the SCCT sub-categories with extensiveness totals were not significantly different across gender as a group, $t(52) = .27$, $p < .79$, or as sub-categories. The *p*-value was adjusted to 0.002 to correct for possible Type I errors even though no significant gender differences were found.

3.1.2 Qualitative Analyses

The following qualitative results are organized by the three sets of analysts: Dr. Lopez, Dr. Basco, and the research team. Due to the fact that results across these three groups are similar, descriptions of

the following data are repetitive but are presented in order to demonstrate that the analysts arrived at their conclusions separately, lending further support to their findings.

3.1.2.1 Results of Dr. Lopez' Data Coding & Analyses

In addition to Dr. Lopez' results described below, the information in parentheses following the results consists of the research team's calculations of the response and extensiveness totals.

3.1.2.2 SCCT Model's Five Factors & Sub-categories across Gender

3.1.2.2.1 Genetically-determined characteristics – Gender

In regard to equal treatment of women and men in academia, male participants from both groups cited research stating that women receive lower pay for equal work (four comments from three different participants). The men's groups disagreed, however, as to the degree that discrimination occurs. The men pursuing academia reported that women are promoted less frequently than men, have more obstacles to overcome to get published, and have to outperform men to gain the same respect that their male counterparts enjoy whereas male participants pursuing a non-academic career did not mention these topics but reported that women have to overcome societal pressures to work in male-dominated fields. Women, however, disagreed regarding sexual discrimination. Fifty-four percent of women reported that they did not believe it existed in academia whereas 46% reported that they believed it was a problem.

Also different from the female groups was how men depicted women regarding gender roles. Specifically, 90% of the responses from the male participants' comments regarding gender roles consisted of statements describing women in traditional gender roles. For example, male participants described women as having an innate desire to have children, staying at home once their husband is hired at a job, and quitting work after bearing children, and a few participants stating that there was no question the their wives would not return to work after starting a family.

Women, however, discussed both traditional and non-traditional gender roles. All of the women in the groups participated in the gender role discussion with 73% of the responses pertained to non-traditional roles (e.g., both wife and husband sharing household and childcare responsibilities) whereas

27% pertained to traditional roles (e.g., women quitting work after having children, women feeling a need to sacrifice their careers for their families, if need be).

3.1.2.2.2 Overt career-related behaviors – Selection of a job or career

In regard to participants' selection of a career, women and men again reported different perceptions. Men stated that they had received advice regarding career options not only from their advisors and/or professors but also from non-academic supervisors, spouses, coworkers, peers, family, and others. Women, on the other hand, reported receiving advice only from their advisors, not citing their husbands or partners as advice sources. It is possible, of course, that female participants had sought advice outside of academia but simply did not mention them during the discussion.

Men reported their job choices from a broader perspective by considering many more possibilities (11 different career possibilities mentioned by 12 different participants) than did women, e.g., working as a consultant, being a researcher, doing a post doc, working as a statistician, earning tenure, seeking out careers with stable job futures, achieving short-term and long-term goals, seeking ways to secure outside funding, and uprooting themselves in the event that their jobs relocated. Survival in the field was paramount to them, evidenced by their reports of having a back-up plan in the event that their first career option did not develop and focusing on the impact of the economy on their career options and their lives.

Women, however, reported more focused interests. Participants pursuing academia focused on teaching and researching (12 remarks from 11 participants) whereas participants pursuing non-academic careers focused on working at corporations or for the government. Also, female participants reported being stable in their career decisions across time, with only one of 13 female participants describing her indecision to teach.

Both male groups (15 comments from 11 participants) demonstrated an extensive knowledge of alternate career options available to them and disclosed paradigm shifts that were developing in industry, career opportunities overseas and online, and emerging trends of specific corporations and institutions, such as Innocentive, Boston Symantic, Johnson and Johnson, Lockheed, NIH, NSF, Pfizer, and Raytheon. The men also discussed business by sharing various scientific, mathematical, and

technological advances in nanotechnology, bio-defense, robotics, polymers, RF energy applications, neuropharmacology, bio-technology, and other topics (15 comments from 14 participants). However, absent from the women's sessions were detailed discussions of business. Female participants focused instead on relationships at work (13 comments, 13 participants): interacting with students, getting along with others, teaching, mentoring, getting involved in students' lives, setting a good role model, leading graduate students, and playing politics well (19 remarks, 13 participants). These findings lend support to the first two hypotheses.

3.1.2.2.3 Overt career-related behaviors – Role conflict

Women also reported on the ways that a job might conflict with starting a family, specifically elaborating on the dilemma of division of household labor, time constraints, and performing both work and family duties. In fact, some women stated that choosing a mate who was willing to share family and home responsibilities not only benefitted them in performing all of their tasks, but also selecting a spouse or partner who would share family and home responsibilities equally was paramount for their own job success. In fact, a participant in the WA group who reported that she and her husband equally shared family and home responsibilities was told by the other group members that she was fortunate to have such a man. In contrast, the men did not discuss scheduling family around career. Male group members stated that they were surprised to learn that women had an issue regarding scheduling work around starting a family. Gender differences regarding role conflict lend support to the first two hypotheses.

3.1.2.2.4 Self-efficacy – Mental Models

The sexes were also distinct regarding what they pictured it would be like on the job. Women equated freedom in their jobs with choice, e.g., not being forced to work on projects that they did not enjoy, doing only what they wanted to do, working on their own timetable, and having doors of opportunity opened for them. They also reported that the idea of working for a boss who did not micromanage them would be an advantage that academia has over non-academic jobs. Men, on the other hand, described themselves as supervising employees and managing departments as well as completing specific tasks, e.g., performing rat surgeries, working on machines, and running simulations (10 comments from 9

participants). Thus, these two distinct approaches to viewing career tasks lend support to the first two hypotheses.

3.1.2.2.5 Self-efficacy – Social Support

Men across groups (13 remarks from 9 participants) enumerated that they received social support from spouses, family, friends, peers, coworkers, supervisors, advisors, professors, and colleagues whereas female participants reported mixed support with half of the participants citing family, friends, and colleagues as encouraging them regarding educational and professional pursuits, but the other half pointed out that their support system discouraged them. In fact, some women reported resistance not only regarding their decision to delay starting a family until they graduate but also to attend graduate school in the first place (7 remarks from 6 participants). Thus, regarding social support, gender differences were only moderate.

3.1.2.2.6 Goals

Another difference between the sexes is how they reported their goals. In regard to relationships, men subsumed relationships under their personal goals of success (15 comments from 11 participants). For example, men discussed collaborating as a means of increasing the odds of securing grant money or advancing their careers. Indeed, men described relationships as a means to an end, deeming them as important only if they enhanced their opportunities to get promoted or become well known. However, women reported relationships in academia as keys to success, stating that their ability to get along well with others was paramount in being promoted and successful (8 remarks from 7 participants). Therefore, the sexes differed in their emphasis on the function of relationships supporting the first two hypotheses.

3.1.2.2.7 Outcome Expectations

Both female groups reported that teaching was rewarding to them (5 comments from 4 participants). However, neither of the men's groups stated that they embraced a similar attitude. Both of the academic groups (WA and MA) reported that they looked forward to interacting with students (6 remarks from 5 participants). In the MA group, two participants also anticipated earning tenure and generating grant funding. In regard to making a lot of money, the MI group mentioned it more often than

the other three groups (five times). However, the WA group never brought up the subject of money. In the WI and MA groups, making a high income in non-academic settings was mentioned twice by two participants. Therefore, support for the first two hypotheses was mixed.

In conclusion regarding focus group data, the first two hypotheses predicting gender differences across mental models were generally supported.

3.1.3.1 Survey Analyses

To validate the results from the focus group data, graduate students who did not participate in the focus groups were asked to complete a survey. Survey items were selected based on two criteria: items that would reveal whether the survey participants had similar mental models as the focus group participants did and items that covered other major themes that were discussed the most across focus groups. Items that asked participants questions specific to the four mental models include the following: WA - "Teaching is rewarding," WI - "I do not think I can write publishable papers," MA - "I like working on a university campus," and MI - "Academic life allows me the flexibility that I need." Reliability alpha levels were higher for the two academic groups, WA items ($\alpha = 0.80$) and MA items ($\alpha = .71$) whereas alphas for the non-academic groups were very low, WI items ($\alpha = .33$) and MI items ($\alpha = .17$).

3.1.4 Hypothesis 3

3.1.4.1 Focus Group Data Analyses

The third hypothesis states that the factors in the mental models and/or the relative importance placed upon them would be significantly different across gender. However, determining which factors are important to participants using only focus group data tends to be unreliable. Therefore, testing for the third hypothesis was performed using the survey data.

3.1.4.2 Survey Analyses

To test the third hypothesis, the experimenter counted the number of times that participants discussed academic work factors (e.g., job security, publications) across all focus groups to determine which factors were discussed the most by the focus group members. In one of the last questions on the survey, she listed the most commonly discussed work factors and asked participants to prioritize them in

importance relative to an academic career. Specifically, participants were asked to select which of the eight factors they deemed as the most important factor in an academic career. Then they chose which factor they believed was the second most important factor and for the rest of the importance levels. The eight factors included in the survey were publications, working 8 to 5, freedom to pursue own interests, flexibility in schedule, grants, money, interactions with students, and job security. Table 3.4 consists of the number of participants who prioritized each factor similarly across gender.

Table 3.4 Participants' Prioritization of Eight Academic Work Factors

Academic Work Factors	Most important		2nd most		3rd most		4th most		5th most		6th most		7th most		Least important	
	W	M	W	M	W	M	W	M	W	M	W	M	W*	M	W	M
Publications	7	8	5	6	1	1	1	1	2	1	0	1	1	2	0	0
Working from 8 to 5	0	0	0	0	1	0	1	1	1	2	1	2	1	5	12	10
Freedom to pursue own interests	2	0	3	3	2	5	0	3	2	4	5	3	3	2	0	0
Flexibility in schedule	1	1	1	0	3	1	3	3	4	1	1	8	3	3	1	3
Grants	4	5	4	8	2	3	2	1	0	1	3	0	2	1	0	1
Money	0	1	1	1	2	6	5	5	3	2	2	2	3	2	1	1
Interactions with students	3	3	2	0	5	3	0	2	1	6	1	1	3	3	2	2
Job security	0	2	1	2	1	1	5	4	4	3	4	3	1	2	1	3

*No factor emerged as a clear front-runner

In Table 3.4, the data show that both sexes agreed on the most and the least important factors to them in academia. Publications rated as the most important academic work factor for women (7 participants) and men (8 participants). The least important work factor was working from 8 to 5 by both women (12) and men (10). Interacting with students was the third most important factor among women (5) whereas interactions with students did not rate until fifth most important with men. For men, money was the third most important factor (6). However, job security was prioritized higher with women (fourth factor) than with men, even though, as the women's fourth factor, it tied with money. Interestingly, freedom to

pursue one's interests never appeared as a leader in any of the factors for the men, even though much of the focus group discussions with the men's groups discussing freedom as an advantage in academia. The women, however, rated freedom as their sixth most important factor

Interestingly, two significant findings emerged from this question. First, the female participants did not rate grants as important among the eight work factors. Perhaps the women in this sample have not received the message that grants are integral to a successful academic career. Also, male participants did not rate job security as an important work factor whereas female participants rated it tied for fourth and fifth most important.

3.1.4.3 Analyses of Individual Survey Items

Three items on the survey revealed significant differences between the two types of career pursuits: 19 academics (participants who reported that they definitely will and probably will pursue academia) and 18 non-academics (participants who reported that they definitely will not and probably will not pursue academia). Not surprisingly, non-academics reported more agreement with the statement, "I do not have the patience to teach" compared to academics, $t(30) = 3.50, p < .001$. The two groups also significantly disagreed in regard to the statement, "Teaching takes up too much time," with non-academics in agreement more than academics, $t(35) = 2.55, p < .02$. The last survey item significantly different between the two career groups was the statement, "I am good at teaching." Again, participants reported predictably with academics in agreement significantly more than non-academics, $t(31) = 2.28, p < .03$.

3.1.5 Other Results

3.1.5.1 Results of Dr. Basco's Data Coding and Analyses

Dr. Monica Basco analyzed the data as previously described and found a distinct mental model for each focus group.

Results from Dr. Basco's findings revealed four distinct categories of participants:

- a. Women pursuing academia (WA): "I like to teach"
- b. Men pursuing academia (MA): "The good aspects of academia outweigh the bad"

c. Women pursuing non-academic job (WI): "I can't handle an academic job"

d. Men pursuing non-academic job (MI): "I reject the work style of academia"

3.1.5.1.1 Women Pursuing Academia (WA): "I like to teach"

The WA group focused on the positive elements of teaching. Specifically, they cited positive experiences with female faculty members and shared their desires to impact students in a positive way. Participants focused on teaching rather than the other two academic tasks, researching and generating publications.

3.1.5.1.2 Men Pursuing Academia (MA): "The good aspects of academia outweigh the bad"

Although the MA group listed several disadvantages of an academic career, they focused on the positive aspects of academia. In fact, participants highlighted academia's advantages when discussing the disadvantages. Specifically, when discussing lifestyle issues (family, flexibility, workload, money, and job security), MA participants shared more positive responses compared to MI participants. Also, teaching, generating publications, and researching tasks comprised their mental model of academia. In regard to personal issues (self-discipline, organizational skills, and self-efficacy), MA participants discussed these topics three times as often as the MI group. Finally, participants contributed specific responses regarding global perspective factors which the other groups did not (altruism, job status, and creativity).

3.1.5.1.3 Women Pursuing Non-academic Careers (WI): "I can't handle an academic job"

Unlike any other focus group, the WI participants shared the most insecurities regarding performing academic work. Specifically, their self-confidence regarding researching skills and ability to generate publications seemed to be lower compared to the other groups, demonstrated by their statements of feeling nervous, scared, and unprepared to work in academia. In fact, this group discussed personal issues five times more than the WA and emphasized personal qualities and relationships as essential for academic success.

3.1.5.1.4 Men Pursuing Non-academic Careers (MI): “I reject the work style of academia”

The final focus group revealed negative mental models of academia, specifically regarding views of professors performing academic tasks. They perceived academic life as petty, self-aggrandizing, and driven by selfishness and self-promotion. MA group members also demonstrated a lack of respect for their male role models, citing difficulties in scheduling time with them and negative interactions with them. As far as teaching, researching, and generating publications, participants disliked performing all three tasks.

3.1.5.2 Research Team - Four Mental Models of Career Pursuits across Focus Groups

The research team also analyzed data for Dr. Basco's four mental models and found similar patterns. This section of findings is repetitive due to the fact that Dr. Lopez' findings, Dr. Basco's findings, and the research team's findings overlap in several areas. However, similarity across the three sets of analysts demonstrates reliability across raters.

The research team's findings below are organized by the SCCT factors.

3.1.5.2.1 Women Pursuing Academia (WA)

Genetically-determined Characteristics – Gender. Women pursuing academia revealed a mental model distinct from the other three focus groups. Of the 296 responses during the WA focus group session, almost 16% were related to genetically-determined characteristics. They also talked about women being confined to traditional roles in 5.4% of all of the focus group responses.

When discussing sexual discrimination in academia, participants responded with 42 statements of either personal accounts or of research data indicating that sexual discrimination occurs in academia, whereas other participants reported that they did not see sexual discrimination in academia (15 comments). WA was the only career group to consider women as culpable for sexual discrimination occurring to them. Other participants echoed that position in nine comments by stating that, if a woman did not have the respect of her students, colleagues, and/or supervisors, it was her fault. To explain why women in academia have not received the same recognition as men have, this group reported three responses stating that the blame lay with the women. Specifically, participants reported that they believed

women's personalities were to blame, i.e., women should have "strong" personalities that are intolerant of prejudicial attitudes or discriminatory behaviors.

Also unique to this group were their perceptions of men who were prejudiced against women. Specifically, they provided 16 comments regarding their mental models of men, including excuses for men's sexist behaviors. The most often mentioned excuse was that men were probably uncomfortable or nervous around women. Participants also reported that men might be hesitant to ask a woman for assistance with a machine because they were following their professors' examples of not permitting women to fix machinery in the lab. Some participants also stated that discrimination in academia occurs because fewer women were in academia than men. Once women in academia were equally represented, participants stated that sexism would then disappear.

Genetically-determined Characteristics – Ability Levels. Regarding ability levels, participants reported four times that men believed women lacked abilities in science and engineering.

Genetically-determined Characteristics – Biological Factors. Women in this group discussed biological factors as well. Specifically, three different participants talked about investing more of themselves to their families than did men. They also conversed about the physical stress of going through pregnancy while trying to keep up with the same work load and demands expected of them prior to pregnancy.

Overt Career-related Behaviors – Selection of Courses, Majors, and Careers. The majority of the conversation regarding overt career-related behaviors was role conflicts (89%) with discussion almost equally divided. Women sacrificed their careers for their families (53%) or husbands and wives shared responsibilities (45.4%). Indeed, participants agreed that women were accountable for fulfilling both family and career responsibilities.

Self-efficacy – Self-confidence. Women pursuing academia demonstrated self-confidence regarding their feelings toward teaching and researching (6 statements). Other participants expressed self-efficacy regarding their professional progress as graduate students and being successful in graduate school.

Self-efficacy – Mental Models. Out of 46 comments made regarding mental models of academia, the women discussed teaching the most (26% of the responses), then research tasks (13%), the never-ending work load in academia (9%), and male domination in academia (9%). The rest of the comments concerned professors getting involved in students' lives, the amount of work involved in securing tenure, the importance of being well funded, and other topics. When describing their attitudes toward academia, they focused on teaching, with all group participants stating that teaching was their career goal. One participant summed up the groups' attitude by stating, "Teachers should not lose sight of teaching. The first part of being in academia is to teach."

Also, WA participants used primarily positive phrases to describe teaching, such as, "One benefit of teaching is the excitement I have in the classroom. I have a lot of interaction with the students," "Every day is an adventure with teaching," and "It's fun working with the students. And when they finally understand something, it's really rewarding." This group also described their attitudes toward teaching at greater length and detail compared to all of the other focus groups combined.

When discussing academia's advantages, participants noted several issues: freedom (4 responses), flexibility (3 responses), and positive feelings toward teaching (6 responses). Regarding academia's drawbacks, participants listed six factors equally: competitive climate (2 responses), never-ending work (2 responses), demanding career (2 responses), low pay (2 responses), having to generate novel research ideas (2 responses), and securing grants as well as other factors (2 responses).

Another unique contribution from this group was that all participants focused on relationships in academia, e.g., inspiring students, mentoring students, and helping student to enjoy learning. In fact, 32% of responses to the query, "What do you picture a job in academia will look like?" dealt with relationships with students.

Self-efficacy – Role Models. Participants discussed that they had taken courses from both effective (27.7%) and ineffective (55.5%) professors and specified that the effective professors were those who were involved in their students' lives (4 responses).

Self-efficacy – Social Support. Out of 20 responses, 45% of the comments that the women reported were regarding resistance from family, friends, spouses, and peers. However, 55% of the responses demonstrated social support from advisors, other professors, the administration, spouses, and family. Also, three participants pointed out that, for a woman to be successful in academia, she must have a supportive spouse/partner to assist her with family duties.

Goals. WA participants reported that their goal upon graduation was to teach (9 responses, 8 participants) with four comments from two participants regarding combining teaching with researching.

Outcome Expectations. This last factor in the SCCT was the least discussed factor across all groups. Only two comments from this group were made and both referred to participants' expectations of feeling rewarded in their teaching careers.

3.1.5.2.2 Men Pursuing Academia (MA)

Genetically-determined Characteristics. Participants in the MA group discussed gender-related issues almost as much as the WA group. Specifically, they noted that women have to work twice as hard as men to receive the same recognition (32%) and women have a harder time getting respect from students (27%). The remaining responses were regarding women receiving lower pay for equal work (13.6%), having to fight traditional role expectations (9%), and having a more difficult time getting a job in industry (9%) as well as other issues.

Genetically-determined Characteristics – Biological Factors. Unique to this group was their conversation regarding biological challenges that only women face (29% of the genetically-determined characteristics remarks). Specifically, the men reported that women were not able to lift heavy loads (44%) required in some disciplines. They also stated that women have an innate desire to bear children (33%), have to deal with pregnancy for nine months (11%), and are more invested in their families than men (11%).

Overt Career-related Behaviors – Role Conflicts. When talking about role conflicts, MA group members reported that women bore more responsibilities regarding family (13 comments), specifically, being more involved with their children (5), having to schedule their careers around their child-bearing

years (3), leaving academia to have children (2), and experiencing greater challenges in generating publications and grants.

Self-efficacy – Mental Models. The MA group revealed a mental model of academia that weighed academic advantages more heavily than its disadvantages. Having the freedom to follow their personal interests was the most mentioned benefit in 34.7% of the responses (8 out of 23 responses), and the men listed collaboration as their second most-mentioned advantage (17.4%): four response frequencies, one detailed example, from three different group members.

Participants also attended to positive aspects of academic life in regard to job security: three responses from two participants. In addition, two participants mentioned job status, and others cited altruism as a positive factor in academia, e.g., making new contributions to their field and impacting students' lives. Another advantage was being able to work on a variety of tasks: teaching, researching, performing statistical analyses, and preparing labs that evoke reactions from students.

This group did, however, demonstrate their awareness of the drawbacks in academia by citing 14 disadvantages. However, when listing the downside aspects, the MA group tempered the negative effects in light of the advantages that an academic career offered, revealing a cognitive model of academia as, "The good aspects of academia outweigh the bad." For example, the most represented disadvantage discussed in this group's conversation was securing grant money. However, men pursuing academia moderated the downside of this responsibility by stating that they would enjoy having the freedom to pursue their own research interests. Receiving low pay was also mentioned as a disadvantage; however, it was referenced as a trade-off for having job security. Although working hard during the first five years as an assistant professor and serving on committees were other drawbacks discussed in this focus group session, participants highlighted positive outcomes, such as earning tenure and enjoying the flexible schedule of an academic.

Another unique characteristic of this group was its within-group similarities. Compared to the rest of the groups, these participants were more similar in several areas. First, regarding what they pictured in an academic job, the majority saw themselves teaching (5 responses, 4 participants) and/or researching

(5 responses, 3 participants). Also, as far as career goals after graduation, most of the men were focused on achieving one common goal: a post doctorate. Specifically, five out of seven participants communicated that getting a post doctoral fellowship was their next priority.

Participants viewed a non-academic career as having over two times as many disadvantages (29) as academia (14). The most often mentioned drawback was the constraints in a non-academic job; this factor was cited 10 times during the session by five participants. A close second was the instability of jobs outside of academia that was discussed eight times by five people with three detailed stories as evidence.

Self-efficacy – Role Models. Compared to the other groups, the MA members responded with the highest number of positive characteristics of women in academia; in fact, out of 23 comments, 69.5% were positive. These participants, however, were not as complimentary when revealing their opinions of men in academia: 41.6% of their responses described male professors as poor communicators, being unavailable to their students and/or mentees, lacking concern for their mentees, and being unorganized. In fact, participants shared that some male professors had actually caused them to rethink their academic career pursuits.

Self-efficacy – Social Support. When speaking about social support, the men in this group reported supported from family, spouses, friends, and even an undergraduate student. However, they contrasted their experiences with women whom they described as lacking social support.

Goals. All participants plan on earning their Ph.D.'s, and 64% of them plan on doing postdoctoral fellowships. Some participants also wanted to become consultants and others, researchers.

Outcome Expectations. Finally, regarding outcome expectations, participants looked forward to earning tenure, interacting with students, and generating grant funding.

3.1.5.2.3 Women Pursuing Non-academic Careers (WI)

Genetically-determined Characteristics – Gender. Interestingly absent from this group's conversations was talk about differential treatment toward women. Indeed, participants believed that professionals in academia treated women equally. Also, four different participants referred to programs

that level the playing field, specifically, grants that target women in science and scientific societies available to female scientists.

Overt career-related Behaviors – Role Conflict. Speaking of non-traditional roles, WI stated that they had no intention of quitting work after having children. Four out of the seven WI participants stated that, if they were to become stay-at-home moms after graduating with their doctoral degrees, they would not feel as if they had wasted their time in graduate school.

Self-efficacy – Self-confidence. Of all four focus groups, the women pursuing non-academic careers most often expressed feelings of inadequacies regarding performing academic tasks, e.g., generating publications and researching skills as well as preparedness to work in academia. Specifically, when discussing an academic career, seven out of 18 responses (39%) revealed their nervous feelings regarding research work, being afraid that they would not be able to generate enough publications, and feeling overwhelmed. The most popular drawback in academia for this group was generating an adequate number of publications every year (21.6).

They also alluded to their inability to deal effectively with students: out of 55 disadvantages given regarding academia, 25 of those responses by WI members were regarding students, and four of the seven group members participated in the discussion. Specifically, four participants described students as cheating, lying, having a poor work ethic, being lazy, and feeling entitled to receive good grades.

Self-efficacy – Mental Models. In regard to the WI group's reports of the advantages and disadvantages of academia, 56.8% (50 out of 88) spoke to the disadvantages and 23.9% to the advantages. This group also attributed some of academic stress as due to the "publish or perish" philosophy. In fact, 15% (8 of 55) of responses referred to the stress of generating publications with four of the five participants discussing the topic. Also, they described the first six years in academia pessimistically, alluding to the negative impact on professors' lives, with one participant summing up the group's attitude, "I hear the tenure process is like the worst six years of your life."

When asked what it takes to be successful in academia, they mentioned personal characteristics (e.g., organizational skills, discipline, leadership abilities, setting own deadlines) 22 times, provided two

detailed examples, and four different participants contributed their comments. Another category discussed in relation to being successful was interpersonal factors (e.g., being a good mentor, working well with others, being a good role model, getting along with other professors, making students work). Fifteen responses were made with all five participants discussing the topic.

Self-efficacy - Role Models. Absent from the WI discussions was female role models, either in regard to positive or negative role models. In fact, they mentioned their male advisors but only in reference to giving them advice. They did not state that they had sought out any other career advice outside academia. However, as stated previously, the absence of a topic does not necessarily interpret to the participants in a group deeming that issues are unimportant or irrelevant.

Self-efficacy – Social Support. In regard to social support, this group had participants who had social support and who had negative social support. Half (52%) of the participants mentioned not having their parents', family's, and friends' support whereas the other half (48%) cited examples of receiving positive support. Another observation about this group is in their responses to the question, "Have you received any advice regarding your career? If so, what advice have you received and where did it come from?" None of the participants mentioned anyone other than their advisors whereas other groups indicated family members, colleagues, coworkers, and others provided them with career insight.

Goals. Six different participants made four remarks that their career plans to work in non-academic careers had been stable over time.

Outcome Expectations. Eight participants made six comments stating that they expected to be paid a high income in non-academic jobs.

3.1.5.2.4 Men Pursuing Non-academic Careers (MI)

Genetically-determined Characteristics – Gender. The men disagreed with each other regarding sexual discrimination. Fourteen comments (54%) supported the position that sexual discrimination occurs in academia; specifically, women having fewer job opportunities (25% of responses) topped the list. However, remarks from other participants (23%) also revealed that not all group members perceived sexual discrimination occurring in academia.

Overt Career-related Behaviors – Role Conflicts. Concerning role conflicts, participants reported that women had more challenges than men in this area (all six comments on this topic). Specifically, they spoke about women being expected to do more at home, take care of the children, and pick up the slack for their husbands so that the men could succeed at work.

Self-efficacy – Self-confidence. This group revealed lower self-efficacy levels regarding academic tasks (four remarks from four participants) compared to the other male group, MA (none).

Self-efficacy – Mental Models. MI also listed almost twice as many disadvantages (44) in academia than advantages (25). Specifically, the most frequently mentioned drawbacks were writing grants and proposals (7), negative role models of male assistant professors (6), academia's long hours (5), and doing post docs (4).

Self-efficacy – Role Models. Similar to the MA group, MI were not as positive when describing male professors as when describing female professor. They cited unethical research practices (spreading one research project across five publications), poor teaching skills, theoretically driven research instead of applied, and seclusion from the “real world” in their ivory tower.

Also similar to the MA group, the MI's views of women in academia were positive. For example, they described female professors and advisors as more caring, better communicators, more understanding, and more nurturing than their male counterparts, and singled out one particular group of professional women – engineers – as being “pretty smart.”

Goals. Thirteen men stated that they were certain in their decision to work outside of academia. In fact, two participants reported that they had never considered working in academia.

Outcome Expectations. Finally, five statements regarding outcome expectations revealed that five participants reported that they would make a lot of money working outside academia.

3.1.5.3 Hierarchical Prioritization of Academic Work Factors across Data

After reviewing the focus group and survey data in the present study, the researcher constructed a hierarchy of the most integral academic work factors. Three factors stood out above the rest: high productivity, a hard work ethic, and effective interpersonal relationships. High productivity (e.g.,

generating publications, conducting research, and securing grants) was the most important factor not only across gender but also across career types. The next most important factor was a hard work ethic. Across focus groups, participants consistently reported that their picture of an academic life involved working long hours and, at times, sacrificing family and/or their personal time. Indeed, all focus groups noted that a professor's work was "never done." An integral part of a hard work ethic that also surfaced across focus groups was the significance of professors being self-disciplined, focused, and organized. The third most important work factor was effective interpersonal relationships: interacting well with students, collaborating, and being charismatic to secure outside funding for research. Both women and men reported that they perceived positive working relationships as essential to be promoted.

CHAPTER 4

DISCUSSION

4.1 Gender Differences

Analyzing data from four focus groups and the online survey, the present study investigated the relationship between women and men's mental models of academic success and their levels of intention to pursue an academic career. The first two hypotheses predicted that male and female Ph.D. science, engineering, and math doctoral candidates would use significantly different mental models consistent with a plan for future success. Qualitative data analyses from the focus group sessions generally supported the first two hypotheses; however, the survey data did not. The third hypothesis predicted that factors in the mental models and/or the relative importance placed upon them would be significantly different across gender. This hypothesis was partially supported by participants' responses on the survey.

4.1.1 Restricted vs. Expansive Perspective

As noted previously, the female participants in the focus groups reported few career options available to them, mainly teaching or working in business. The men, however, discussed numerous choices from a more expansive view of career possibilities. It seems as if the women in this sample either restricted themselves regarding their career choices or allowed others to restrict them. Thus, the women's perspective was more limited in scope whereas the men's perspective was more extensive.

Perhaps women perceive themselves as restricted by others and/or environmental forces. Rotter (1966) refers to this viewpoint as an external locus of control, i.e., viewing external forces as controlling one's options. Men, however, perceived themselves from an internal locus of control in which their personal thoughts, goals, and aspirations fueled their career options.

Female participants also reported seeking advice from only their advisors, limiting themselves to the academic field. Male participants, however, cited advice from bosses, coworkers, family, friends,

peers, and colleagues. Again, it seems as if the women perceived their world as more restricted than did the men.

4.1.2 Self-presentation Bias

Male participants from both groups seemed hesitant to express their true beliefs when asked if they thought that an academic career was different for women and men. In the MI group, one participant started to answer the question but stopped himself in mid sentence, “You typically think of the Mom as the one that takes care of the -- .” Another participant then prodded him to finish by stating, “Go ahead,” and the other group members laughed. At that point the moderator reminded the participants that there were no wrong answers, that if they were not forthright in their responses, then the data would not accurately reflect their true beliefs.

Dr. Lopez speculated that one reason traditional gender roles may still be prevalent in American society is that people are changing only how they *discuss* gender differences, i.e., being politically correct, without changing what they *believe* regarding gender differences. Social psychologists refer to people’s tendency to reveal only what they believe is acceptable to others as self-presentation bias (Park & Hahn, 1988). That is, individuals present the best of themselves to others while hiding the worst of themselves (e.g., beliefs that are not politically correct). The truth, then, about what people believe may be the opposite of what they report. This dissonance is incongruent, publically sharing similar beliefs and opinions as others while privately embracing dissimilar positions (Wilson, Lindsey, & Schooler, 2000). What may have occurred in the men’s discussions is that the participants were attempting to answer the question with politically correct responses (explicit attitudes) when, in fact, they may have held alternative or opposing beliefs (implicit attitudes). It appeared as if the men’s explicit and implicit attitudes were incongruent. Thus, paradigm shifts regarding views of women and men’s equality may be superficial at best.

4.1.3 Followers vs. Leaders

When women in the focus groups listed advantages of working in academia, some female participants shared that academia was not a job in which a manager would be “breathing down your

neck.” Interestingly, instead of picturing themselves as managing others, female participants envisioned being managed by others. They also described themselves on the job as followers, doing what they were told to do. However, male participants reported being in management positions, leading others and telling them what to do.

4.1.4 Traditional Gender Roles

When discussing gender roles, the women’s responses centered on role sharing, time demands, and balancing family with work. Most female participants perceived themselves in non-traditional gender roles in which they worked outside the home and their partners equally shared family and home responsibilities with them. Male participants, on the contrary, reported that they envisioned their wives quitting work once they graduated and that they pictured their spouses at home taking care of the children and performing household responsibilities.

One factor that may have contributed to the discussions of traditional gender roles was the fact that the experimenter was a female but the MA and MI group members were male. Perhaps men may have been more forthcoming in their responses had a male moderator conducted their focus groups. However, qualitative researchers advise using the same moderator for all focus groups to control for confounds in moderating styles (Jackson, 2003; Krueger & Casey, 2000). In future discovery processes regarding this topic among similar samples, it might prove beneficial to have a male moderator conduct similar focus groups across gender and then compare the data gathered with the current study.

Based on responses in the male focus groups in regard to female professors, it appeared that male participants perceived women in academia as capable and competent. In fact, some participants shared personal accounts of female professors who had impressed them, at times comparing them to male professors who, by their accounts, were less caring, less concerned, or less interested in their success. However, regarding their opinions about their own spouses working outside the home, it appeared that the male participants may have shifted their position. Indeed, in 90% of their responses on this subject, they reported favoring traditional gender roles. Could it be that male participants were comfortable having other women work outside the home but not their own spouses or partners? If so, it

could be that male participants in this study may have revealed a double standard regarding gender roles. This speculation would be an interesting one to investigate further.

4.1.5 Benevolent Sexism

Another psychological concept that researchers have investigated is the effect of benevolent sexism on participants' mental models, not only of male but also female participants. If the men in this investigation truly held double standards regarding women's roles in society, it is possible that their attitudes and beliefs may have been rooted in benevolent sexism. Benevolent sexism is the position that women are weak and need to be protected by men (Glick & Fiske, 1996). In this study, some of the male participants may have perceived that their partners wanted them to be the sole providers. Due to the subtle nature of benevolent sexism, male participants may not have realized that they were embracing a position that views women as weak. It might prove valuable to perform an investigation regarding the influence of benevolent sexism on male participants' gender roles and, in turn, career options for women and men.

4.1.6 Hierarchical Prioritization of Academic Work Factors

In response to being asked on the survey to prioritize eight academic work factors, female and male participants reported the same opinion regarding which factor was the most important one: publications. Both sexes also reported that working from 8 to 5 was least important. However, gender differences did emerge for the remaining factors.

First, women placed more importance on interacting with students. In previous studies on gender differences, women have demonstrated a need to connect with others and build relationships (Farrell, 1993). Second, men placed more importance on money compared to the women. Men have been socialized to focus on providing for their families and being successful in their careers (Kasser & Ryan, 1993). Therefore, one might expect women and men to prioritize money differently.

Two additional gender differences involved what women and men did *not* deem important. First, women did not prioritize grants in any of the eight academic work factors. It appears that women in this sample have not learned that grants are integral to a successful academic career compared to the men.

Another difference across gender is that male participants did not rate job security as an important work factor. Again, the fact that women value security more than men is supported by previous psychological research (Cimbalo, Anzelone, Ryan, Younkers, 1974).

In regard to academic work factors across all data, participants reported three prominent aspects of academic success: high productivity, a hard work ethic, and effective interpersonal relationships. Interestingly, the first two factors in the hierarchy, high productivity and hard work ethic, lend themselves to being masculine traits. That is, producing publications, generating grants, and conducting research are tasks that are best accomplished by being competitive and aggressive whereas the last work factor lends itself more to feminine traits. It appears that participants in this study may have perceived academia's over-emphasis on masculine characteristics and its de-emphasis on feminine traits.

Practically speaking, then, are female graduate students aware that, if they are to be promoted, they must alter some of their behaviors and perspectives to be more similar to men's? It could be that women are blind-sighted by this "unspoken rule" after they have secured an academic job. They may not have anticipated that they would be pressured to close their office doors and limit their availability to students, to prioritize their own careers over their mentees' pursuits, and to compete for scarce resources by being aggressive. Thus, they might be ill prepared to act in masculine ways that men in American society learn at an early age.

In addition, male graduate students may very well adopt the subtle message that feminine traits will not serve them best if they are to advance in academia. In turn, academia's focus on feminine traits may further serve to undermine men's respect for women in academia, particularly when they observe that masculine traits are rewarded but feminine traits are not (Eagly & Carley, 2003).

4.1.7 Societal and Cultural Influences

One cannot diminish the influence of social and cultural forces on participants' viewpoints, especially regarding gender-role norms. In American society, women are expected to assume nurturing, supportive roles that may constrain them at times to only those predictable functions and scripts. Consequently, both men and women's collective beliefs about women's roles can restrict women from

pursuing careers that delineate from those norms. Both women and men who believe that women can deviate from culturally accepted roles may then be rejected from others in society. Thus, culture can dictate what are appropriate career choices for both of the sexes to pursue (Blaine, 2007).

Are gender biases, benevolent sexism, societal and cultural norms and other limitations described above the reasons that women are not advancing into tenured positions? Alice Eagly (1987) proposed a different approach to viewing gender differences called the Social Role Theory.

4.1.8 Social Role Theory

Some professionals have assumed that women and men demonstrate different traits, such as being nurturing or aggressive, because these traits are inherent. As such, innate sexual differences served as an impetus for women and men to choose careers appropriate to their sex as deemed by society. However, Eagly's (1987) Social Role Theory (SRT) posits that women and men are born with similar traits but develop different traits as a result of socialization, specifically due to culturally-scripted roles and responsibilities imposed upon them. For example, American society expects women to be caregivers who are helpful, nurturing, supportive, sympathetic, and interpersonally sensitive, i.e., communal traits. Society expects men, however, to be the providers who are aggressive, competitive, ambitious, dominant, forceful, and independent, i.e., agentic traits. The SRT asserts that women develop supportive traits and men develop aggressive characteristics *because of* the roles that society dictates to them, *not* because they inherently possess those traits. Consequently, women tend to choose careers that elicit communal traits whereas men are more likely to select occupations that draw out their agentic traits.

In workplace settings, women are less likely to draw attention to themselves or compete for the spotlight. Instead, they tend to let others take the lead on projects, contribute to relationally-orientated problems that arise, and serve in supportive roles. Men, however, tend to be competitive at work, actively seek the spotlight, and assume leadership roles (Eagly & Johannesen-Schmidt, 2001).

What work styles does academia evoke? Are professors encouraged to be competitive, ambitious, and independent or to be helpful, nurturing, and supportive? Or all of the above? The answer

is that it depends. Research universities are more likely to pressure professors to produce (e.g., generate publications and grants), thereby evoking competitive, ambitious, independent traits. However, student-centered universities and colleges are more likely to stress using effective interpersonal skills in teaching and mentoring (e.g., interacting well with students, encouraging students to succeed), thereby encouraging nurturing, supportive, and helpful traits (Beyond Bias and Barriers, 2007).

Therefore, in order to succeed in research universities, do women have to abandon communal characteristics? In turn, are they forced to assume agentic traits to be promoted? Recent research still shows that academia, businesses and medicine not only favor the agentic style of working but also reward it (Beyond Bias and Barriers, 2007; Mason & Ekman, 2007; Mason & Goulden, 2002). It seems that American culture does not do justice to women who demonstrate communal traits but choose agentic-related careers (Blaine, 2000; Eagly & Johannesen-Schmidt, 2001; Mason & Ekman, 2007; Mason & Goulden, 2002).

Perhaps a more equitable environment for both sexes would include a tenure process that was “female friendly.” For example, a few institutions of higher learning have changed their policies by allowing mothers to stop the tenure clock when they have children. When they return to school, professors who are mothers are able to re-start their tenure clock, rather than being punished for taking time off to bear children (Beyond Bias and Barriers, 2007; Mason & Ekman, 2007; Mason & Goulden, 2002).

What would happen if women and men were free to adopt whatever social roles that suited them best? Would women choose careers that evoked independent and assertive traits? Would men select careers that evoked nurturing and supportive traits? If so, the question then becomes whether women would be perceived as independent and assertive and men as nurturing and supportive. If the SRT stands true, the answer is yes (Eagly, 1987).

4.2 Four Distinct Mental Models

As stated previously, each of the four focus groups revealed unique characteristics.

4.2.1 Women Pursuing Academia (WA)

Different from the other groups, WA participants demonstrated the most positive attitudes toward teaching compared to the other three focus groups. Also, this group diminished the importance of research.

4.2.2 Men Pursuing Academia (MA)

Men pursuing academia presented an optimistic view of academia while acknowledging its potential challenges. Also, participants revealed positive mental models of women in academia but negative mental models regarding male professors. They also demonstrated altruistic motives for being an academic and perceived academia as a high-status career.

Perhaps, though, the clearest distinction between women and men pursuing an academic career is that women seemed to emphasize teaching and relationships that they perceived as accompany teaching (e.g., interacting with students, mentoring, being a positive role model). The male participants, in contrast, tended to reveal a more inclusive mental model of academia by discussing other academic tasks such as researching, publishing, writing grants and collaborating with colleagues.

4.2.3 Women Pursuing Non-academic Careers (WI)

The WI group revealed the most insecurities regarding academia of all the other groups. Specifically, women reported negative self-evaluations regarding their abilities to teach, publish, raise grant money, and research yet not stating that working in academia would be insipid. Also, participants perceived success in academia as primarily consisting of two categories: personal qualities (self-discipline, organizational skills, and leadership abilities) and relationship factors (getting along with others, being effective mentors, setting a good example for students, playing politics, and working well with colleagues). WI also highlighted job security, flexibility in one's schedule, job status, and lifestyle factors more than the WA group.

4.2.4 Men Pursuing Non-academic Careers (MI)

Participants in this group held women in academia in high regard. They also lacked self-confidence related to their abilities to perform research tasks and revealed the most negative mental

model of academia compared to the other groups, specifically demonstrating their lack of respect for male professors' work ethic. This group also reported their disregard for pursuing academia, specifically in relation to workload, lifestyle, and work tasks.

4.3 Internal vs. External Attributions

Internal and external attributions, a psychological construct involved in judging and decision making, are inferences that individuals make regarding people's behaviors, attitudes, and opinions, including their own. Internal attributions include ability, personality, effort, mood, and attitudes whereas external attributions include situational factors, the environment, the task, other individuals, and luck (Heider, 1946). Interestingly, participants' internal or external attributions seemed to impact their career decisions differently across gender.

In particular, women used internal attributions to explain why they were not pursuing an academic career whereas men demonstrated external attributions to explain their non-academic pursuits. Regarding the WI group, participants reported a lack of self-confidence regarding their abilities to perform academic tasks, such as teaching, researching, writing publications, and generating grants. That is, the women (by their own admission) rejected an academic career because of their personal insecurities about succeeding in academic responsibilities. The MI group, however, reported external attributions, such as negative interactions with male professors and negative male role models, to explain their rejection of an academic career. Additionally, MI members reported negative emotions regarding academic tasks (e.g., teaching, researching, and generating publications) instead of attributing their career choices, in part at least, to their inability to perform the work, as the WI group had.

4.4 Contributions to the SCCT Model

Although all five factors in the SCCT Model (Lent et. al, 1994) seemed to impact participants in this study, this theoretical framework did not explain how and why differences in each of the five factors surfaced across gender. It seems as if career decisions to pursue academic or non-academic jobs are uniquely affected by one's gender.

The present investigation further develops the SCCT Model by explicating how gender differences uniquely contribute to each of the SCCT factors, in particular to academic mental models among graduate students. Specifically regarding role conflicts, women reported this factor as impacting not only their personal lives but also their professional lives; in contrast, men reported that they did not experience dissonance between career goals and family responsibilities and were surprised to learn that women did. Participants also reported self-efficacy differently, depending on their gender. Women were more likely to use internal attributions to explain their shortcomings whereas men tended to look outward at external causes for their inability to succeed in certain tasks.

Also, when women talked about academia as a career, they were more likely to discuss it in terms of its potential impact on their present or future families. For example, one of the advantages of academia mentioned several times in both women's groups was its flexible schedule that allowed women more freedom to coordinate family and career demands. As Mason and Ekman (2007) point out, women in today's workforce are gravitating toward careers that provide flexible schedules for them to balance work with family.

Concerning social support, some women reported negative feedback not only by negative comments regarding their choices but also by an absence of support from family and friends. Men, however, stated that they felt supported by spouses, family, friends, colleagues, and advisors. Having adequate social support not only in personal relationships but also in professional relationships is integral to one's success. However, women in STEM fields are at a disadvantage due to their isolation. They may be the only female faculty member among a host of men. More often than not, women do not have female role models to turn to, which can be incapacitating and unbearable. Compound the emotional isolation with the chilly male-domineering climate and sexual discrimination and the result has been women abandoning academia exponentially. Thus, the cycle perpetuates itself (Beyond Bias and Barriers, 2007; Eagly & Carley, 2003; Mason & Goulden, 2002; Mason & Ekman, 2007).

When discussing goals, female participants focused more on relationships, as previously discussed, whereas men's goals were more task oriented. Women also reported their mental models of

their future as if their goals were already predetermined: they would begin their careers but after a few years would start a family. Some participants reported that they saw themselves balancing work with family, provided they had the help of their spouse/partner. The men, however, reported that having a family was not an issue for them, most likely because they would have their wives to complete household tasks and provide childcare. However, in American society women do not have that luxury unless they are fortunate to marry someone who shares home and childcare responsibilities with them. Interestingly, some discussion in the women's groups consisted of female participants encouraging the others to marry someone who would share home and childcare responsibilities equally with them (Beyond Bias and Barriers, 2007; Mason & Goulden, 2002; Mason & Ekman, 2007).

Outcome expectations were also different for women and men. Women looked forward to helping students learn, being a role model, and leading graduate students whereas men expected to make good money, particularly in the MI group.

4.5 Limitations of the Present Study

4.5.1 Qualitative Methodology

One of the purposes of using qualitative methodology in exploratory research studies is to collect data relevant to the researcher's questions. The resulting data from this methodology lends itself to theoretical development, particularly when investigating overlooked samples and/or topics that have yet to be explored. By nature, the qualitative discovery process is unstructured and "boundary-less." As such, the richness of its data can lead to fascinating findings that can then lead to confirmatory or non-confirmatory quantitative investigations (Krueger & Casey, 2000) and can help to generate research hypotheses.

The present study sought to discover cognitive conceptions and misconceptions related to a puzzling problem. Using qualitative methodology initially allowed the experimenter to probe a targeted sample of educated individuals at a critical point in their professional lives. However, it comes at a cost in regard to external validity (Krueger & Casey, 2000).

Results in this investigation were not intended to show causality but to find new ways of approaching challenges that have been investigated quantitatively with limited success. Qualitative experts warn against placing too much emphasis on quantitative analysis of qualitative methods not only due to the fact that sample sizes of focus groups are small but also because not every participant engages in every single discussion topic. Similarly, not every participant may speak up regarding a topic that she or he has opinions about due to group dynamics, self-presentation bias, or other demand characteristics. Therefore, quantitative results may be spurious if given too much meaning (Krueger & Casey, 2000). To strengthen the interpretation of the focus group data, we asked two experts to analyze the data independently.

Finally, larger, more diverse samples of graduate students would have been ideal. Similarly, unlimited funding, a professionally trained moderator, and idyllic participants would have completed this perfect scenario. However, limitations enable researchers to stretch their creativity because there is always next time.

4.5.2 Quantitative Methodology Imposed on Qualitative Results

A few flags, however, need to be raised. The tendency for quantitative analysts first embarking on qualitative research is to force resulting qualitative data into quantitative guidelines in order to derive “significant” meaning from the results. However, doing so can defeat the purpose of the discovery process. Another tendency is to conclude that qualitative data not further supported by quantitative analyses is useless. However, the truth could not be further from this perspective.

4.6 Directions for Future Research

The topics that surfaced in the focus groups and survey need to be replicated by other researchers in similar samples to validate these results. It also might prove valuable to investigate diverse samples from this study for patterns and/or dissimilarities. For example, investigating graduate students in institutions that focus more on research than does UTA might reveal intriguing results. Also, investigators might be able to refine the methodologies used in the current study to enhance future investigations of gender disparity in academia.

Future studies could investigate the influence of working outside academia on graduate students as a potential factor in choosing an academic career. Perhaps women who have previously worked in corporate America have a more realistic view of their academic careers because they may have already faced sexual prejudices and discrimination in the work force and may not be blind-sighted by it.

It might also be intriguing to conduct a longitudinal investigation of graduate students from the onset of graduate school into their careers to determine not only attrition and “survival” rates in graduate students’ academic pursuits but also the evolution (or lack thereof) of their mental models of academic or non-academic jobs. Additionally, researchers could measure graduate students’ mental models of an academic career in their first year of graduate school to use as a baseline from which to compare their self-reports of mental models in their last year of graduate education. Moreover, future research could investigate graduate students’ levels of self-efficacy in regard to academic tasks from their first year to their last year of graduate school to discover factors that influence students’ self-confidence levels regarding performing academic work.

Another topic for future study concerns the impact that female role models have on their own children. That is, would a graduate student who has a mother with a Ph.D. view academia differently than one who does not? Furthermore, would a daughter be more influenced than a son to pursue academia if she had a mother who was a professor?

Although the present study did not have an adequately sized sample of participants to test it, one could research whether the type of academic position that graduate students pursue might alter their perception of academia. For example, graduate students pursuing a tenure-track position would most likely have a mental model of academia that comprises researching compared to those pursuing a career on a teaching-focused campus. It would seem likely that participants in a tenure-track position would expect to perform more research, secure more grants, and generate more publications than someone in a non-tenure track position. Someone, however, pursuing a non-tenure track career would most likely focus on teaching skills rather than research productivity.

4.7 Conclusion

This investigation offers a more complete theoretical framework than offered by the SCCT in that it specifically adds another piece to a useful but incomplete model. By including gender differences not only as one sub-category within the social cognitive career approach but also as an integral scaffold that further explains each factor and sub-category in the model. Ironically, it provides a more inclusive way of approaching the problem of higher education's lack of inclusivity.

The continuing problem of sexual discrimination in academia must be solved, and soon. One solution would be to provide graduate students the same training that new faculty members receive. Graduate students could be trained on effective teaching methodologies, classroom procedures, and research resources and support. Also, changing academic policies toward becoming a family-friendly workplace is imperative if STEM fields are going to retain female educators. Offering financial support for childcare and/or providing on-site childcare is a necessity in order to eliminate institutional barriers for working mothers.

However, institutional policy changes will fall short unless the underlying problem of sexual biases against women is addressed and changed. In today's halls of higher education, discrimination is more subtle and even more pernicious than before due to the fact that it is cloaked in covert attitudes, beliefs, and behaviors, making it harder to detect. However, if our country does not address the gender bias problem in academia, we all lose. It is imperative that federal and state government officials, policy-making agencies, higher education leaders, university presidents and administrators, departmental chairpersons, and faculty members work together to create an educational environment that is attractive, rewarding, and satisfying to women as well as men.

APPENDIX A
FOCUS GROUP GUIDE

1. What career plans do you have after you finish your degree?
2. Have your plans changed while you have been working on your doctorate? If so, how?
3. What made you change your mind?
4. Are there other factors that may have influenced your change?
5. What advice have you received regarding which direction to take in your career?
6. Where did this advice come from?
7. Some people have a mental picture or idea about a job. What picture do you have?
8. Do you see yourself in an academic job? If so, what do you see as you picture an academic job?
9. If not, what is it about your picture that doesn't appeal to you?
10. What might be some advantages/disadvantages of an academic job?
11. Have you thought about working in a non-academic job?
12. What might be some advantages/disadvantages?
13. What have you observed or heard about working in academia that might influence you to choose it when you graduate? If so, where have these messages come from?
14. What have you observed or heard about working in academia that might sway you away from choosing it? If so, where have these messages come from?
15. If you were to choose an academic job, what do you think it would take to be successful?
16. Do you think an academic career is different for women and men? If so, how?
17. Do you think men and women work differently in academia? If so, how?
18. Do women and men have different career expectations? If so, how?
19. Is social support is different for women and men? If so, how?
20. Do women and men have different conflicts in regard to responsibilities at home vs. at work?
21. Are women and men viewed differently in academia?
22. Have people at UTA treated you differently because you are a woman (man)?

APPENDIX B
ONLINE SURVEY

CAREER SURVEY

This survey asks questions about your opinions regarding a career in academia or industry. Your participation in this study is voluntary.

INFORMED CONSENT

PRINCIPAL INVESTIGATOR: Colette Jacquot

TITLE OF PROJECT: The Investigation of Graduate Students' Career Choices

This Informed Consent will explain about being a research subject in an experiment. It is important that you read this material carefully and then decide if you wish to be a volunteer.

PURPOSE: The purpose of this research study is to investigate graduate students' career choices. The results of this investigation will contribute to our scientific knowledge of factors involved in making career choices.

DURATION: Participation in the online survey will take approximately 15 to 20 minutes.

PROCEDURES: The procedures, which will involve you as a research subject, include participating in an online survey within the specified time frame. Once the deadline for taking the online survey has passed, the survey will be closed and no one will be permitted to take it. A unique number will be used to identify your responses instead of your name. After you have completed all of the questions in the survey, you will be instructed how to contact the Principal Investigator to receive your remuneration.

POSSIBLE RISKS/DISCOMFORTS: This study does not present any risks or discomfort to you beyond what you might experience when answering any other questions about your future career choices.

POSSIBLE BENEFITS: One benefit you will receive from participating in this research is being part of an investigation which contributes to scientific knowledge of factors involved in graduate students' career decision making. In addition, you will be compensated \$35 for your participation in completing the online survey.

ALTERNATIVE PROCEDURES / TREATMENTS: No alternatives to participation are available for this study. Participation is voluntary.

CONFIDENTIALITY: Every attempt will be made to keep study results confidential. Your name will not be attached to your survey responses. Instead, a unique number will be assigned as a substitute for your name. A copy of the records from this study will be stored in Life Science Room 404 for at least three (3) years after the end of this research. The results of this study may be published and/or presented at meetings without naming you as a subject. Although your rights and privacy will be maintained, the Secretary of the Department of Health and Human Services, the UTA IRB, the FDA (if applicable), and personnel particular to this research (individual or department) have access to the study records. Your (e.g., student, medical) records will be kept completely confidential according to current legal requirements. They will not be revealed unless required by law, or as noted above.

COMPENSATION FOR MEDICAL TREATMENT: The University of Texas at Arlington (UTA) will pay the cost of emergency first aid for any injury that occurs as a result of your participation in this study. UTA will not pay for any other medical treatment. Claims against UTA or any of its agents or employees may be submitted according to the Texas Tort Claims Act (TTCA). These claims may be settled to the extent allowable by state law as provided under the TTCA, (Tex. Civ. Prac. & Rem. Code, secs. 101.001, et

seq.). For more information about claims, you may contact the Chairman of the Institutional Review Board of UTA at 817/272-1235.

FINANCIAL COSTS: No financial costs will be incurred in order to participate in this study.

CONTACT FOR QUESTIONS: If you have any questions, problems or research-related medical problems at any time, you may call Colette Jacquot at 817-272-2011 or Dr. Monica Basco at 817-272-7559. You may call the Chairman of the Institutional Review Board at 817-272-1235 for any questions you may have about your rights as a research subject.

VOLUNTARY PARTICIPATION: Participation in this research experiment is voluntary. You may refuse to participate or quit at any time. If you quit or refuse to participate, the benefits (or treatment) to which you are otherwise entitled will not be affected. You may quit by calling Colette Jacquot, whose phone number is 469-964-6274. You will be told immediately if any of the results of the study should reasonably be expected to make you change your mind about staying in the study.

By clicking on the "I consent" button below, you are electronically signing this consent form and are confirming that you have read or had this document read to you. You may print a copy of this informed consent document for your records. You have been and will continue to be given the chance to ask questions and to discuss your participation with the investigator.

You freely and voluntarily choose to be in this research project.

To sign this consent form electronically, follow the directions below.

If you want to provide your informed written consent to participate in this study, click on the button, "I consent."

I CONSENT

If you want to provide your informed written consent to participate in this study, click on the button, "I do not provide my consent."

I DO NOT CONSENT

Please answer the following questions by clicking on only one of the answers.

1. Are you currently working on your Ph.D.?
 - a. Yes
 - b. No
2. Will you graduate with your Ph.D. in two years or less?
 - a. Yes
 - b. No
3. Are you a U.S. citizen? (NOT F-1 students)
 - a. Yes
 - b. No
4. What department are you in? Click only one.
 - a. Biology
 - b. Business
 - c. Chemistry or Biochemistry
 - d. Earth & Environmental Science
 - e. Education
 - f. Engineering
 - g. Geology
 - h. Liberal Arts
 - i. Mathematics
 - j. Nursing
 - k. Physics
 - l. Psychology
 - m. Social Work
 - n. Urban and Public Affairs
5. What is your sex?
 - a. Female
 - b. Male
6. What is your race? Click only one.
 - a. Black/African American
 - b. Asian
 - c. Caucasian
 - d. Hispanic or Latino
 - e. Middle Eastern
 - f. Indigenous American / American Indian
 - g. Pacific Islander
 - h. Other - Please enter your race if not listed above: _____

CAREER SURVEY

All of the responses you provide on this survey will be kept confidential. Your name will not be attached to your survey responses; instead, a unique number will be assigned to your survey to ensure anonymity. Please answer all questions honestly.

1. How likely are you to pursue a career in academia?
1 – Definitely won't 2 – Probably won't 3 – Probably will 4 – Definitely will
2. If I started working in academia tomorrow, I would feel very prepared.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
3. I write well.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
4. Students give more respect to older professors than to younger professors.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
5. I like working on a university campus.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
6. To be successful in academia, a person must work more than 40 hours a week.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
7. Women are equally to blame for being treated differently than men in academia.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
8. Teaching is rewarding.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
9. I want to publish research manuscripts to benefit science.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
10. Collaborating with faculty members in other departments is very important to succeed in academia.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
11. I like the flexibility of academic life.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
12. I would rather be in the laboratory than in the classroom.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree
13. When I observe faculty members, I am encouraged to choose academia as a career.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 – Strongly agree

14. I do not think I can write publishable papers.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
15. To be successful in academia, a woman must have supportive spouses/partners as involved in housework and child care as they are.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
16. If I were to work in academia, mentoring students would be one of my top priorities.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
17. An academic career is a high-status job.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
18. If I publish enough papers, I will be promoted.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
19. Family life is hard to balance with academic life.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
20. I am not sure that I have the patience to teach.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
21. I have done well in my dissertation research.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
22. Teaching takes up too much time.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
23. I don't know how to write grants.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
24. If need be, women should sacrifice their careers for their families.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
25. It is important in an academic job to write as many papers as possible.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
26. I am good at teaching.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree

27. The pay in academia is not good.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
28. Students do not need to publish their work until they graduate.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
29. Teaching well in academia will not get me promoted.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
30. Professors spend little time with their undergraduate research assistants.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
31. Academic life allows me the flexibility that I need.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
32. Although women may have been denied tenure in the past simply because they were female, today women in academia are treated the same as men.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
33. Research in academia is more important than teaching.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree
34. It will be hard in academia to have a family if I do research.
1 – Strongly disagree 2 – Somewhat disagree 3 – Undecided 4 – Somewhat agree 5 –Strongly agree

PRIORITIZING WORK FACTORS

Directions: Below is a list of eight factors that can be important in academia. Please prioritize each of the factors by ordering them according to how important or unimportant they are to be successful in academia. Next to the numbers below, identify which factor is MOST important for success by clicking on the letter for #1. Then identify which factor is 2nd most important by clicking on the letter for #2 (cannot repeat answer you gave in #1) and the rest until you identify which factor is the least important for success in #8.

_____ 1. MOST important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 2. Second most important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 3. Third most important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 4. Fourth most important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 5. Fifth most important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 6. Sixth most important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests

- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

_____ 7. Seventh most important factor

- i. Publications
- j. Working 8 to 5
- k. Freedom to pursue own interests
- l. Flexibility in schedule
- m. Grants
- n. Money
- o. Interactions with student
- p. Job security

_____ 8. LEAST important factor

- a. Publications
- b. Working 8 to 5
- c. Freedom to pursue own interests
- d. Flexibility in schedule
- e. Grants
- f. Money
- g. Interactions with student
- h. Job security

35. Why would you want to pursue a career in academia? _____

You may go back to any question and change your answers, if you wish.

Once you are satisfied with your responses, click on the "SUBMIT SURVEY" button below.

SUBMIT SURVEY

Thank you for participating in this survey!

APPENDIX C
DATA CODING KEY

DATA CODES, OPERATIONAL DEFINITIONS, AND RESPONSE EXAMPLES

Code	Operational Definitions	Examples of Responses
AA	Advantages in Academia Benefits of academia	I think there is job security in academia.
AB	Ability levels Women's different from men's	Men think that female engineers don't know what they're doing.
AFA	Advice from Advisor Does not include any other advice	Do a post doc out of the country.
AFO	Advice from Others – Advice from peers, parents, colleagues, or others (not advisors)	I've gotten advice from people who have applied for jobs as well as people who have jobs.
AI	Advantages in Industry Benefits of a non-academic job	When I work as a chemist in industry, I will be paid twice as much as my professors.
BL	Belief Statement of belief not relevant to the research questions	It's also a very good opportunity for post docs now.
CO	Comment Statement irrelevant to the research questions, e.g., filler statements	We are looking at alternate forms of energy.
CUL	Culture Statements regarding norms, practices, etc. unique to a culture or sub-culture	In Japan usually we don't do post docs.
DA	Disadvantages in Academia Drawbacks of academia	If you're in academia, you have to write grants for money.
DCP	Decision of Career Path – Responses stating career decisions	My career plans have been the same for the last 2 – 3 years.
DI	Disadvantages in Industry Disadvantages of a non-academic job	I think that industry can be fickle.
GD	Gender Difference Unspecified Statement regarding differences across gender but without judgment	Men and women have different sets of ideas.
GDB	Genetically-determined characteristics – Biological Characteristics that are unique to women due to their biology and physiology	I think women have an innate desire to have children.
GDG	Genetically- determined characteristic – Gender Responses about women regarding differential treatment because they are female	Women in academia feel that they have to work twice as hard as men to get the same recognition.
GDGN	No differential treatment due to gender	The administration deals the same with us as women as it does with males
GI	Goal – Industry Career goal is to go into industry or non-academic career	I'm going into industry.
GPD	Goal – Post doc Career goal is to do a post doctorate	After I graduate, I am getting a post doc.
GPH	Goal – Ph.D. Career goal is to earn a doctoral degree	I want to get my Ph.D. to give me credibility so that, when I speak publically, people will actually listen.
GPU	Goal – Publish Career goal is to publish	I want to work in a career where I can publish.

GR	Goal – Research Career goal is to research	I am looking for a career in research.
GS	Gender Similarities Responses which specifies that the two sexes are similar or are not different	I don't think there's really any difference between men and women regarding how they work.
GT	Goal – Timeframe Career goal is on a specific time frame	I think it will take a couple years to do a post doc then I'll look for a job.
IC	Irrelevant chatter Back-channel responses (yeah, OK) and responses not phrased as words (uh huh, laughter)	Yeah. OK.
IND	Indecision of Career Change in career plans	I guess my focus changes every year. My plans constantly change.
IVD	Individual Differences Differences between or within groups attributable to individual characteristics, not stated as an advantage or disadvantage	I think that's more of an individual rather than a group difference.
LFRM	Lack of female role models Not having a woman who is higher ranked or older who sets an example, either good or bad	I don't know of any females in aerospace engineering.
MMA	Mental Model – Academia Cognitions of being in an academic job	I see myself in the classroom, not a student, but hopefully teaching.
MMJ	Mental Model – Another job Cognitions of another job other than academia	I think that's pretty standard with people in banking.
MMM	Mental Model – Men Cognitions of men (do not include gender differences or advantages/disadvantages of being a male)	When guys think about their careers, they don't think about conflicts with work and family.
MMR	Mental Model – Research Cognitions of a career in research	In the next couple of years I'll focus on empirical research and build up my CV, especially if I want to get grants.
MMW	Mental Model – Women Cognitions of women but not tied to academia.	In the grand scheme of things, women are a lot more organized than men.
MMW A	Mental Model – Women in Academia Cognitions of women but must be in the context of academia	Women are more organized, like office hours, more organized Power Points, and better communication skills.
MN	Negative comments about men Negative statements about men when contrasted to women.	Men waste a lot of time shooting the bull, but women take things seriously.
MP	Men – Positive comment Positive statements about men contrasted to women.	Men usually leave their work at school or work, but women don't.
NA	Negative comment about academia Negative responses about academia but not	And it's getting worse and worse every semester (students less prepared in class)
NI	Negative comment re industry	I worked in industry after I got my master's degree and I came running back.

OBR	Other but Relevant Responses that are not relevant to this study but may be related to future studies	I don't know that I really noticed that she was female when she gave her presentation.
OCJ	Overt career-related behavior in job selection Responses regarding the selection of jobs	I've applied in several places already recently and I got an interview with Google. I would love to work there.
OCM	Overt career-related behavior in majors Responses regarding the selection of majors	I chose to major in psychology.
OE	Outcome Expectation Responses referring to what participants expect from their careers	In industry, I know I'll be paid well.
PA	Positive comment regarding Academia Positive responses about academia but not an advantage of working in academia	I love to teach.
PI	Positive comment regarding a non-academic job Positive responses about a non-academic job but not an advantage of working in a non-academic job	I love to create new products or improve on procedures.
QU	Question Any question asked, can be by the moderator or any participant	Do you think there's less funding for industry right now?
RC	Role Conflict Responses related to conflict between work and family or other personal and professional responsibilities that conflict	Generally when the kid gets sick, it's the mom that gets called from work.
RCN	No role conflict	If they're sick one day, you're going to have to miss work. If they are sick two days in a row, I'll miss or I'll bring them with me.
SELS C	Lack self-confidence	I'm nervous about doing research
SEN	Self-efficacy – Negative Responses about lack of confidence regarding one's abilities	I get nervous and wonder if I have what it takes to do well in corporate America.
SERM	Self-efficacy – Role Model Remarks referring to a higher ranked or older person who sets an example, good or bad	She's a demonstration for a lot of people.
SESC	Self-efficacy – Self-confidence Responses indicating confidence in one's abilities	I was very good at fixing machines in our lab.
SSA	Social Support from Advisor Responses relating to either positive or negative social support specifically from participants' advisors	I was advised by my advisor to do a post doc and get more publications.
SSN	Social Support – Negative Responses relating to negative social support from others (not advisors)	My mother thinks I should quit school to have babies.

SSP	Social Support – Positive Responses relating to positive social support from others (not advisors)	My wife was very supportive of me going back to school.
ST	Storytelling Responses which involve participants going on insignificant, tangential trails.	I mean, I work on a bio-defense project, right, so after 2001 where all the money went was bio-defense. And now you're going to have bio-defense and you'll have alternative energy.
WN	Negative comments about women Negative statements about women when contrasted to men.	Women don't leave their work at school like men do.
WO	Women-based comments Responses not relevant to this study's research questions but are in regard to a woman or women	One woman at the meeting should not have been there.
WP	Positive comments about women Positive comments about women when contrasted to men.	Women are more nurturing than men when they deal with their students. All the guys that know -- they like it when a woman is successful and they have a higher status because of me.

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BIOGRAPHICAL INFORMATION

Colette Jacquot earned a Bachelor of Science degree in 1981 in English Education from Baptist University of America (BUA). Upon graduation, she was invited to teach at BUA and immediately began working on her master's degree in English from the University of Georgia during the summers of 1981 to 1983. After teaching English for four years at BUA, Colette decided to work on her master's degree full-time at Bob Jones University. In 1987 she graduated from BJU with a master's degree in Personnel Services. She then taught 7th to 12th grade English at Forest Park Christian School and moved to Athens, Georgia the next year. There she team-taught 5th grade at Athens Christian School.

After working at several businesses in corporate America for 13 years, Colette decided to return to school to earn an accredited degree in Psychology. Six years later she graduated in 2004 with her second B.S., but this time in Psychology. Then she moved to the Dallas/Fort Worth area to attend the University of Texas at Arlington (UTA) from 2004 to 2009. In August 2009 Colette graduated with a Ph.D. in Experimental Psychology from UTA. She plans on teaching Psychology in college and hopes to research women's issues and/or work for a Women's Center.