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Examining the effects of fear of failure, self-efficacy and gender role conflict in male and female engineering students

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EXAMINING THE EFFECTS OF FEAR OF FAILURE, SELF-EFFICACY AND GENDER ROLE CONFLICT IN MALE AND FEMALE ENGINEERING STUDENTS

by

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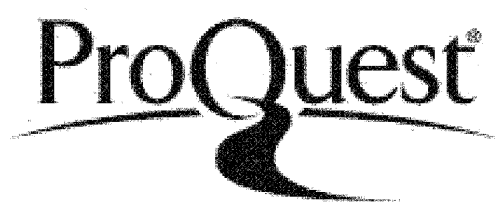

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ABSTRACT

The field of engineering continues to have significantly fewer women engineers than men. Engineering has long been considered to be a male dominated career, with fewer women receiving bachelor's degrees in engineering and gaining employment in the engineering field. The present study was an attempt to determine influencing factors that discourage women from pursuing engineering as an educational and career choice. The current study examined gender role conflict, self-efficacy, and fear of failure as potential factors influencing women's preferences to pursue an engineering degree. Both male and female genders were participants in the research to determine gender differences for these factors. All participants were students majoring in the engineering discipline. In the current study, the Gender Role Conflict Scale (GRCS), the Performance Failure Appraisal Inventory (PFAI), and The Longitudinal Assessment of Engineering Self-Efficacy (LAESE) were analyzed. An additional instrument was designed to rate potential engineering student applicants based on their individual qualities and attributes that are important for successful engineers. Results indicated that females reported higher incidence of fear for their future in the engineering field, fear of being embarrassed or shamed in front of others, and fear of self-devaluation regarding their capabilities as an engineer. Results also indicated males reported higher levels of self-efficacy for mathematics in regard to their skill and abilities as engineers. There was no support for

hypotheses that predicted females would be rated less desirably as future engineers based upon their gender, skills, and capabilities.

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Author Krista L. Hall

Date 2/28/2012

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I would like to dedicate this dissertation to my mother, Sharley Jo Roberds Pettit. I wish that you would have been here to witness my completion of my doctoral degree. You were the person that taught me to work hard to accomplish goals and to never give up. I have never known anyone that worked as hard as you to achieve their aspirations. You are my inspiration, and I miss you so very much. Thank you for all that you have given me: love, encouragement, guidance, and never ceasing support. I love you, and hope that you are watching over us even now. Blessed be, Sharley Jo.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

The field of engineering has long been an area dominated by males (Robinson & McIlwee, 1989). In the United States, females represent only eleven percent of American engineers (Baker, Krause, Yaşar, Roberts, & Robinson-Kurpius, 2007). According to the National Science Foundation (2008, 1997), women are consistently awarded fewer undergraduate degrees in engineering, technology, and science fields in the United States than their male counterparts (Hill, 1997). The need to attract, retain, and increase diverse student populations, including women and minorities, in engineering, technological, mathematical, and scientific (STEM) fields has been deemed as important by the Committee on Equal Opportunities in Science and Engineering (National Science Foundation, 2004; Werner & Denner, 2009). Research has found that in the past decade, women receiving an engineering degree decreased in overall numbers (Rosser & Taylor, 2008). The number of women who received an engineering bachelor's degree during the 2006-2007 academic year was the lowest since 1996 (Jenniches & Didion, 2009). In 2006, women received 13,300 engineering undergraduate degrees, whereas 54,821 men graduated with engineering bachelor's degrees (National Science Foundation, 2008).

Females are also underrepresented in the workforce (Lane, 1999) in careers including computer engineering, Computer Science and Information Technology (Papastergiou, 2008; Werner & Denner, 2009). Research also has suggested that women are involved in less scientific research and science employment in the American and Canadian workforce. This number was disproportionate to the number of women employed in non-science fields (Lane, 1999). Shockingly, until 2005, women comprised only approximately five percent of the science faculty at Harvard and eight percent at MIT (Coyne, 2009).

Many reasons for the imbalance of gender in the engineering field have been offered, including the controversial comment made by Harvard President, Dr. Lawrence Summers, in 2005 during an academic seminar (Bone, 2005), when he stated women may not be as talented in science and mathematics as men. Dr. Summers suggested that innate differences could be the reason for fewer women teaching math and sciences courses at Harvard University (Bone, 2005). The topic of imbalance in gender representation was an important issue that merits further examination. One possible explanation for the gender imbalance explored in this research was fear of failure in students that considering pursuing an education and career in the engineering discipline. Additionally, women had been identified as having lower levels of self-efficacy than males regarding their abilities in engineering skills (Papastergiou, 2008), which was also investigated in the following research. The belief that the self does not measure up to societal standards, particularly in regard to gender roles, will also be examined in this research study.

A research study utilizing Greek high school students recently identified several factors related to women pursuing careers in science and technology (Papastergiou,

2008). These factors could contribute to decreased interest in women who choose to pursue education and employment in the scientific and technological fields. These factors include the following: individual student's perceptions of what a profession in Computer Science and Information Technology includes, student attendance in Computer Science classes, student's personal beliefs regarding his/her own self-efficacy, computer usage in the home environment, and the level of influence of family and the educational environment. One factor of interest was gender support in the home environment (Papastergiou). Research has shown that parents often encourage boys to engage in science fields, while females are not actively pushed to pursue math and science courses in school (Papastergiou; Sherman, 1988). Because math and science have been historically viewed as the territory of males, these fields may be particularly susceptible to influence by sex role expectations (Sherman). Because of the additional hurdle of opposing these expectations, self-confidence and self-efficacy beliefs in females may be additional detrimental factors to career choice.

A woman's self-efficacy and self-confidence, which are beliefs held about one's own abilities to perform specific tasks, may influence a young woman's decision to pursue an education in the science, math or technological fields (Papastergiou, 2008). Self-efficacy was defined as those beliefs that an individual has about his/her ability to perform certain tasks in order to accomplish specific, distinctive goals (Bandura, 1977a; 1982; 1994; 1997; 2005). Initially, the concept was termed self-beliefs (Bandura, 1977a), but was later changed to the term self-efficacy. Bandura asserted that personal self-efficacy views influence how a person was motivated to achieve personal success and individual contentment (Bandura, 1986).

Self-efficacy has been identified as a job choice predictor (Dawes, Horan, & Hackett, 2000) because the higher levels of personal self-efficacy can increase job exploration and training in jobs that would have been otherwise unexplored (Dawes et al., 2000). Self-efficacy has been identified as a predictor of success for students in the field of engineering (Rittmayer & Beier, 2009). Self-efficacy has also been shown to be related to levels of determination, drive, level of interest, and achievements or success in students that intend on studying engineering as a career choice (Rittmayer & Beier; Schaefers, Epperson, & Nauta, 1997; Lent et al., 2003; Hackett, 1992). The low numbers of females in engineering has been ascribed to low self-efficacy feelings (American Association of University Women, 2008; Hyde, Fennema, & Ryan, 1990) regarding personal capabilities in skills that are necessary to be an engineer (Dawes et al.; Rittmayer & Beier; Schunk & Pajares, 2002).

Career self-efficacy was initially created as a measure of occupational and career preparation for females in jobs that were dominated by men (Hackett & Betz, 1981). Because engineering was a male-dominated occupation (Humphreys, 1982; Pfafflin, 1984; National Science Foundation, 1984), the initial research began in the identification of discrepancies between jobs that employed mainly men, including engineering, mathematics, and science (Hackett & Betz). The initial research was also used to identify areas that women suffer from low self-beliefs about their individual abilities and skills for certain careers (Hackett & Betz; Fitzgerald & Crites, 1980; Farmer, 1976). Research on career self-efficacy eventually came to include general occupational training and development as well as specific job progress for certain groups (Betz & Hackett, 2006). The term career self-efficacy was coined as a means to name the self-efficacy

expectancies and opportunities that lead an individual to choose a job or occupation (Betz & Hackett, 1986). The research focused on determining essential components of occupational activities and performance, including the ability to perform and persevere in job pursuits (Betz & Hackett, 1986).

A possible factor involved in the relative absence of females in the engineering, technology, and science fields may be misconceptions of employees and their working styles in science fields (Clarke & Teague, 1994; Gürer & Camp, 2002; Pollack, McCoy, Carberry, Hundigopal, & You, 2004). Additionally, another factor that may be influencing women's pursuit of science and engineering fields was the shortage of appropriate role models that can be utilized for mentoring young women (Clarke & Teague; Scragg & Smith, 1998; Dryburgh, 2000; Pollack et al., 2004). Role models have been suggested as a means to increase feelings of self-worth and reduce fears of failing (Smith, 2005).

Research has determined significant correlations linking fears of failing with the psychological constructs of self-confidence and self-efficacy (Sherman, 1988; Elliot & Sheldon, 1997; Martin, 2002). Fear of failure (FF) became popular in the 1960s as a construct of achievement motivation literature and has been postulated to serve different functions. Recent research has suggested that one's fear of failure was likely more focused on the feelings of anxiety and the appraisal of threat in situations where there was a possibility of failure and was less likely to be a motive to evade shameful feelings and degradation (Conroy, Kaye, & Fifer, 2007). However, Atkinson (1964) theorized fear of failure to be motivation to avert or prevent failing. Further, fear of failing can be identified as a disposition to avoid failure and/or a capacity for experiencing shame or

humiliation as a consequence of failure (Atkinson, p. 13). Another definition of fear of failure was the fear of not reaching or attaining a goal (Sherman). Conroy et al. identify fear of failure as a "tendency to appraise threat and feel anxious during situations that involve the possibility of failing" (p. 239). The fear of failing often will create anxiety to the point that a person will not attempt to attain a goal. Fear of failure can be considered a form of anxiousness regarding performing (Conroy, 2001); however, many researchers explicitly included shame in the definition of fear of failure (Atkinson; Atkinson & Litwin, 1973; Smith and Smoll, 1990; Conroy).

The common element to both definitions that include shame and anxiety as explanations for fear of failure can be argued to be emotion (Conroy, 2001). Perceived changes in the relationship with the environment can cause the individual to experience an emotional response (Lazarus, 1991). The emotional reaction can be positive or negative depending on the situation and environment. The perceived changes in the relationship with the environment are believed to be impactful regarding the capability of the individual to attain or achieve certain ambitions, tasks, or goals (Lazarus). Individuals may have real or imaginary perceived changes; however, the individual must assess in either a conscious or unconscious manner that these changes will affect his/her own goal attainment (Lazarus). The appraisals that are related to fear and anxiety are those that include (a) assessment that the perceived change was significant to their goals, (b) identifying if the perceived change will be relevant to goal attainment, (c) determination of the content of the specific goal (Lazarus).

Failure can be a threat to persons that associate failing with aversive consequences. In past research, failure that was linked to more higher-order general fear

of failure (Conroy et al., 2007; p. 239) was comprised of five specific consequences (a) experiencing shame and embarrassment experiences, (b) devaluing one's self-estimate devaluation, (c) having an uncertain future, (d) losing social influence, and (e) upsetting important others [(Conroy, 2002; Conroy, Metzler, & Hofer, 2003; Conroy, Kaye, & Fifer, 2007)]. Further, Conroy et al. (2007) reports individuals that believe that aversive consequences will occur after failure are typically more likely to feel threatened during evaluative situations.

Fear of failure has been directly correlated with lack of self-confidence, poor feelings of self-esteem, and low risk-taking (Sherman, 1988). Fear of failure has often been examined in vocational or educational arenas. Research has additionally demonstrated a link between fear of failure and sex-roles (Sherman). For example, women fear that their success will create problems in their interpersonal relationships, particularly if they are going against societal norms of sex or gender acceptable roles. Further, females often underestimate their mathematical and spatial perception skills due to lack of confidence. This lack of confidence that was related back to sex roles contributes to women's fear of failure in math and math-related areas (Sherman, p. 99).

The concept of "cognitive-motivational-relational theory" for feelings or emotion (Lazarus, 1991; Conroy, Metzler, & Hofer, 2003) was utilized to conceptualize fear of failing as a multidimensional model (Conroy et al., 2001). Fear of failure as a model has been argued as occurring within an individual when two processes transpire (Conroy et al.). First, the individuals must anticipate the possibility of failure occurring or perceive that failure has already transpired. Secondly, the individual must believe that failure in

the situation will cause or bring about one or more negative consequences (Conroy, et al.).

Past studies have examined the relationships between fear of failure and sex role consequences. However, there have been no published studies that have directly linked fear of failure to conflict within gender roles. The psychological paradigm of gender role conflict was described as "a psychological state in which gender roles have negative consequences or impact on the person or others" (O'Neil, 1981b, p. 203). Gender role conflict transpires when individuals display inflexible, prohibitive, or sexist gender roles that culminate in suppression, devaluing, or transgression towards their self or other individuals (O'Neil, Good, & Holmes, 1995). Gender role conflict has been identified as being the restriction of a person's human potential or the restriction of another person's potential (O'Neil, 2008, p. 362). Individuals that experience gender role conflict often experience problems in self-recognition regarding aspects of their selves that are linked to the opposite sex (O'Neil, 1981b). In particular, males would experience difficulty in accepting any aspect of their self that could be considered womanly or non-masculine. Males with gender role conflict experience problems with females in power positions (O'Neil, b). These men do not feel comfortable when exposed to females who are in positions of power, especially if the position was traditionally masculine in nature (O'Neil, b). Further, gender role conflict can be explained as destructive outcomes that happen to a person or others because of the various societal roles that influence the expected behaviors of males and females in social settings (O'Neil, 1981a). Specifically, gender role conflict can occur if individual or societal gender roles cause damaging consequences for individuals (O'Neil, Helms, Gable, David, & Wrightsman, 1986).

Gender role conflict may occur as directed towards the individual self or projected towards others (Thompkins & Rando, 2003). It can be identified on conscious levels or even unconsciously, and can be demonstrated cognitively, behaviorally, or affectively (Thompkins & Rando). Gender role conflict can occur when negative messages, either direct or indirect in nature, are perceived regarding a person's attempt or failure to attempt to display societal traditional gender roles (Thompkins & Rando). The most detrimental consequence of gender role conflict, according to O'Neil (1981b), has been argued as not achieving the optimal levels of success as a human being or causing others to be limited in their personal potential levels.

Gender role conflict impacts individuals both interpersonally (O'Neil, 2008; Mahalik, 1996) and intrapersonally (O'Neil, 2008). Interpersonally, gender role conflict can create problems within relationships (O'Neil 1981b). Gender role conflict has been hypothesized as negatively affecting others in relationships with the gender conflicted male (O'Neil, 1981a, 1981b, 1982, 2008; O'Neil & Egan, 1993; Pleck, 1995; Hayes & Mahalik, 2000). Males who believe their partner should exhibit traditional roles in society are more likely to have problems (O'Neil, 1981b). Relationship satisfaction has also been determined to be affected in a negative manner by gender role conflict (Campbell & Snow, 1992) and relationship worth (Mahalik, 1996; Arnold & Chartier, 1984). Additionally, gender role conflict has been studied in regard to females who have been sexually assaulted and sexually harassed (Eisler, Franchina, Moore, Honeycutt, & Rhatigan, 2000; O'Neil & Nadeau, 1999; Chartier, Graff, & Arnold, 1986; Rando, Brittan, & Pannu, 1994).

Past research has identified the correlation among gender role conflict and intrapersonal psychological problems (O'Neil, 2008). Studies have assessed gender role conflict and its relationship with depression (Cournoyer & Mahalik, 1995; Good & Wood, 1995; Sharpe, Heppner, & Dixon, 1995; Fragoso & Kashabeck, 2000; Good & Mintz, 1990; Kelly, 2000; Mahalik & Cournoyer, 2000; Magovevic & Addis, 2005; Sharpe & Heppner, 1991; Sheppard, 2002; Blazina & Watkins, 1996; Good, Robertson, Fitzgerald, Stevens, & Bartels, 1996). All gender role conflict patterns have correlated significantly with depression (O'Neil, 2008). Additionally, gender role conflict was a predictor of male anxiety (Blazina & Watkins, 1996; Cournoyer & Mahalik, 1995; Sharpe & Heppner, 1991; Theodore & Lloyd, 2000), while stress has also been significantly correlated with all patterns of gender role conflict (Fragoso & Kashabeck, 2000; Good, Heppner, DeBord, & Fischer, 2004; Good et al., 1996; Hayes & Mahalik, 2000). Stillson (as cited by O'Neil, 2008) determined that physical or psychological strain correlates also with gender role conflict.

Statement of the Problem

Examination of educational and career choices and the reasons for specific occupational selections within genders have been studied for decades. However, continued research into the reasons that women are underrepresented in the fields of engineering (National Science Foundation, 2008; Rosser & Taylor, 2008; Jenniches & Didion, 2009; Hill, 1997; Evetts, 1993; Newton, 1987; Dawes et al., 2000; Hyde et al., 1990; Rittmayer & Beier, 2009) and science and technology (Lane, 1999; Papastergiou, 2008) may have implications for contemporary society. The engineering field continues to be one that was male-dominated and gender inequitable (Baker et al, 2007; Karukstis,

2009; Brunet, 2009; Engineers Ireland, 2009; Cosentino de Cohen & Deterding, 2009; Damour, 2009). The limited number of females within the engineering discipline was of concern because of current workforce trends that require a more skilled and specifically trained labor force to meet high technological demands (Papastergiou). This was of particular interest considering women signify 46 percent of the overall labor force in the United States (Frome, Alfeld, Eccles, & Barber, 2006).

Reasons for fewer women entering the engineering field are many and varied. Sherman (1988) argued that math and science have been historically viewed as territories reserved for male education and training. False beliefs that women lack abilities in math and science have perpetuated the idea that women should not pursue careers that utilize skills in math and science, particularly engineering as an education or job option (Sherman; Papastergiou, 2008). Unfortunately, even among women who do graduate with a degree in engineering, 25 percent leave the engineering field for other pursuits (Teschler, 2009).

Research has determined that poor self-esteem and self-efficacy are factors that contribute to the lower numbers of female engineers within the American work force system (Papastergiou, 2008; Rittmayer & Beier, 2009; Hyde et al., 1990). Lower feelings of self-efficacy have been identified as predictors for women who choose to avoid engineering as a career choice (Rittmayer & Beier, 2009; Hyde et al., 1990; Schunk & Pajares, 2002). Women having fear of not measuring up to societal standards because of gender beliefs and roles decreases their beliefs about capabilities and skills for engineering (Papastergiou). This decreased belief of self-efficacy and self-esteem relates directly to having fear of being unsuccessful or failing (Sherman, 1988).

Fear of failure, according to Sherman (1988), was the fear of not reaching or accomplishing a goal. Fearing failure, often, some individuals will avoid possible shame and/or embarrassment by avoiding certain situations that could result in failure (Conroy, Kaye, & Fifer, 2007). The fear of failure was a specific link to having self-doubt and lack of self-confidence for some women who avoid engineering as a career option. Grandy (1994) determined that women often feel they are not as capable as their male equivalents regarding their personal ability to effectively problem-solve and become trained as successful engineers, which results in lower feelings of self-efficacy (Rittmayer & Beier, 2009; Schunk & Pajares, 2002; Hyde et al., 1990).

The construct of fear of failure has long been associated with beliefs regarding self-esteem (Sherman, 1988; Elliot & Sheldon, 1997), self-doubt (Fox, 1994), and self-efficacy or self-belief (Martin, 2002). Women have been found to be higher in mathematical and spatial skills than their original self-assessment because of their lack of self-confidence (Sherman). Arguably, a woman's feelings of low self-esteem and poor self-confidence can relate to career choice and educational goals. If a woman fears she will fail because she lacks ability or skills, such as in math or sciences, then her lack of self-esteem or self-efficacy may cause her to seek out educational options that are guaranteed to be successful (Sherman).

Sherman (1988) argues that sex-roles influence fear of failure, suggesting that women fear success, particularly when sex role or gender role norms are violated. Women fear their personal successes to be problematic for their significant other within relationships (Sherman). This fear of succeeding was actually a fear of breaking societal norms regarding what was considered acceptable behaviors for a woman (Sherman).

The concept of breaking societal norms relates directly to gender role conflict. Gender roles can create harmful outcomes for an individual and those around the person (O'Neil, 1981b). The damaging outcomes that can transpire are caused by gender roles, which are ways that society believes an individual should live or behave (O'Neil, 1981a). Women can experience gender role conflict because they are failing when they break societal gender roles for success (Sherman, 1988).

The present study was designed to identify the collective and independent effects of fear of failure, self-efficacy, and gender role conflict on women in the engineering field, as they relate to the educational choices and employment opportunities of women. The present study will use a college population to assist in understanding effects, specifically fear of failing and experience of gender role conflict, within women engaged in the study of engineering as an educational choice. The results will assist in the generalization of reasons that influence a woman to pursue engineering as a career, even though it may break societal norms or cause personal discomfort. Understanding of the relationships or influence from fear of failing, personal self-efficacy, and gender role conflict will assist in better recruitment of women into the engineering field. Hopefully, the current research will assist in the eventual retention of women entering in the engineering field.

Justification

Career choices are important because of the sheer amount of hours that most individuals spend working in their lifetimes. Numerous variables affect career choice; however, career choice should influence quality of life (Collard & Gelatt, as cited by Frey, 2005). Good career fit can influence relationships, mood, physical health, and

emotional health. Knowing the importance of a good career fit, and the need for understanding how to reach women who would be good engineers, have importance for recruitment and retention. Women presently account for 11 percent of the engineers found in the United States (Baker, et al., 2007). By raising the quantity of females who consider engineering to be a good career fit, the American workforce could gain valuable employees that are intelligent, capable, and available. This would aid in preparing for the technological needs of modern society by providing additional employees to utilize as a significant resource to cover the increasing demand for a highly technological labor force (Papastergiou, 2008).

Fear of failure and gender role conflict have been studied for decades as influential constructs that can have detrimental effects on the individual. Specifically, fear of failure was linked to problems with physical health (Fox, 1994); a decrease in grades and educational pursuits (Eme & Lawrence, 1976; Elliot & Sheldon, 1997; Elliot & Church, 1997); and problems with low self-esteem, self-confidence, and self-efficacy (Sherman, 1988; Elliot & Sheldon).

Self-efficacy (Bandura, 1977a; 1982; 1994; 1997; 2005) was recognized as a significant indicator for personal success as an engineer (Rittmayer & Beier, 2009; Hyde et al., 1990; Dawes et al., 2000; Schunk & Pajares, 2002). Personal levels of self-efficacy are a means to study the level of motivation or drive for a student to succeed as an engineer (Schaefers et al., 1997; Hackett, 1992; Lent et al., 2003). Therefore, females who lack self-efficacy regarding their skills and ability to be an engineer, are a significant area that merits further investigation. Increasing levels of self-efficacy for females who have chosen to enter engineering will assist in creating a good career fit.

Gender role conflict (O'Neil, 1981a) can result in mental or physical tension, called gender-role strain. Negative psychological effects, including anxiety or depression, can occur from gender role conflict (O'Neil, a; Blazina & Watkins, 1996). Low self-esteem was also a side effect of experiencing gender role conflict (O'Neil, a). Research has identified gender role conflict to be distressful to individuals in stressful or challenging situations (Good & Mintz, 1990; Lash, Copenhaver, & Eisler, 1998). Health problems are a significant possibility for gender role conflicted individuals because of the tendency to disregard physical symptoms (O'Neil, 1982). Gender role conflicted men often have elevated rates for drug or alcohol abuse (Blazina & Watkins, 1996).

Significant amounts of research have determined there was a lack of women entering engineering as a career choice (National Science Foundation, 2008; Rosser & Taylor, 2008; Jenniches & Didion, 2009; Hill, 1997; Evetts, 1993; Newton, 1987). Research has determined that women receive fewer degrees in engineering (National Science Foundation, 2008; Damour, 2009; Heyman et al., 2002). The present research was necessary to determine how the variables of fear of failure, self-efficacy, and gender role conflict are related in their contribution to the career decision-making of women studying to be engineers. Gender role conflict and fear of failure have been determined as influencing self-esteem and self-efficacy levels. Women who opt to refrain from engineering, even though they have the mathematical skills and problem-solving capacity, must have reasons for choosing to avoid engineering as a career possibility.

Research has determined that there are correlations between having feelings of low self-esteem and experiencing decreased levels of self-efficacy for women who avoid engineering as educational selection (Sherman, 1988; Elliot & Sheldon, 1997; Fox, 1994;

Martin, 2002). Determining factors that influence women to become engineers can assist in successfully recruiting more women to pursue traditionally male-dominated career roles. Society as a whole will benefit with the added influx of potential employees. By determining if there are relationships between women experiencing fear of failure or gender role conflict, career counselors can assist those individuals that have an initial interest in being a woman engineer, but are fearful of societal or personal backlash that results from going against established gender roles and social norms for acceptable feminine behaviors (Newton, 1987; Evetts, 1993; 1994).

Study One

Literature Review

Women in engineering.

History of women in engineering. In 1965, Bruno Bettelheim asserted that the reason women were underrepresented in the engineering and science fields was an indication of natural sequence because "as much as women may want to be good scientists or engineers, we must remember that they want first and foremost to be womanly companions of men and to be mothers" (Bettelheim, 1965, p. 15). While this statement described the 1960s, the representation of women in traditionally male professions remains lower than desirable (National Science Foundation, 2008). Engineering has an unusual distinction regarding gender (Robinson & McIlwee, 1989). Specifically, engineering was one field in which women have increased their numbers considerably; however, men continue to dominate the profession (Robinson & McIlwee, 1989). In the early 1990s, engineering continued to be the most male-dominated profession within the United States (Robinson & McIlwee, 1991). Women have been

recognized as representing 46 percent of the United States labor force with only 9 percent of those being engineers (Frome, et. al, 2006).

In 1981, less than one percent of women received engineering bachelor's degrees (Vetter, 1981). By the end of the 1990s, women accounted for 18 percent in the field of engineering (Frome, et al., 2006). In 2006, the percentage increased to approximately 24 percent of all engineering baccalaureate graduates are female (National Science Foundation, 2008). Men continue to obtain approximately 77 percent of engineering bachelor's degrees (Damour, 2009). Women comprise approximately 31 percent of the science professions in the United States, with the exclusion of the social sciences (Brainard & Carlin, 1998). Nonetheless, the distinction should be noted that in many other fields, including biology, psychology, and sociology, female baccalaureate graduates outnumber male graduates substantially (Frome, et al., 2006; Curious Cat, 2008). Additionally, Heyman, Martyna, and Bhatia (2002) report fewer female engineering majors contrast to the other customarily male-dominated professions in the legal system and medical fields where numbers of female students are increasing.

Recruitment of women into engineering degree programs should be an ongoing practice (Teschler, 2009). In 2007, there were only 11 percent female engineers in the United States workforce (Baker et al., 2007), thereby making engineering one of the least gender-equitable professions. Researchers agree that engineering in the new millennia will continue to be a male-dominated field (Karukstis, 2009; Brunet, 2009; Engineers Ireland, 2009; Cosentino de Cohen & Deterding, 2009; Damour, 2009; Baker et al.). The peak for women entering engineering programs occurred in 1994, with 19.5 percent

(Brainard & Carlin, 1998). However, in the early 1990s, only 15.8 percent graduated with a bachelor's degree in engineering (Babco, 1994).

Past research of women in engineering. Recently, the idea of retaining females, and other minority groups in the field of engineering, has been an ongoing consideration (Brainard & Carlin, 1998). The 1970s found some increase in the enrollment of females into engineering degree programs. However, the retention rates for females demonstrated significant decline (Brainard & Carlin). The 1972-76 engineering classes demonstrated the highest retention rate for women in university courses with about 90 percent retention (Brainard & Carlin). However, during the 1980s, the retention rate for the nation had dropped to less than 60 percent. Without continued retention in the disciplines of engineering and science, females and other minorities will be denied economic and social power associated with financial equity that can occur from training, education, and employment in engineering, science, and technology employment fields (Brainard & Carlin).

Attrition may be the cause for the reduced number of women graduating from undergraduate engineering programs (Cosentino de Cohen & Deterding, 2009) while in college. After examination and research, the results suggest that minimal gender attrition occurs within most disciples. Research has concluded that support programs aimed at retaining women engineers are not necessary (Teschler, 2009). Unfortunately, women also leave the engineering profession in greater numbers than their male colleagues (Teschler). Research has concluded that about 25 percent of women will depart from the engineering field following the receipt of an engineering degree. Conversely, only about one man out of ten will leave the engineering field before the age of 30 years (Teschler).

Dwindling recruitment of women for the engineering field may be resulting in lower numbers of engineering graduates (Cosentino de Cohen & Deterding, 2009). Gender disparity in engineering has resulted in a shortage of enrollment of women into engineering programs as opposed to inadequate retention of women. Outreach is necessary to recruit women into the engineering discipline, which will assist in balancing the ratio of men and women employed as engineers (Teschler, 2009; Cosentino de Cohen & Deterding).

The United States has not been the only country with apparent difficulty in recruiting women as engineers. In other parts of the world, specifically the Muslim countries, the European Union, and Asia, engineering continues to be a primarily male-dominated profession (Baker et al., 2007). In the countries of Sweden, Portugal, China, and South Africa, women comprise between 17 and 20 percent of all engineers. Women in the countries of Switzerland, Germany, and Japan represent only approximately two percent or less of engineers (Baker et al.). Women in Ireland account for only nine percent of engineers (Engineers Ireland, 2009).

In Canada, the number of women registering to enter into engineering programs had risen for nearly a decade before a 2001 plateau (Brunet, 2009) with 20.6 percent of students being women. However, since then, men have increased enrollment in engineering programs, while women in engineering have decreased in numbers. Brunet reports that since 2001, the number of women engineering students has decreased annually. In 2007 and 2008, the numbers dropped to 17.3 percent and down to 17.1 percent respectively. This plateau of enrollment numbers for women in engineering

programs was not witnessed only in Canada. Researchers report female enrollment has plateaued across the United States as well (Brunet).

Cultural factors can influence how women perceive engineering, and have been determined to directly influence the enrollment of women into engineering programs and the number who pursue engineering as a career (Brunet, 2009). While seen as a male domain in Northern America, much of the world does not have the deficits in women enrolling into engineering programs that are seen in Canada and the United States. Egypt was reportedly gender neutral regarding engineering as a career because it was viewed as prestigious (Brunet). Furthermore, Southeast Asia, Eastern Europe, and South America reportedly have less discrepancy in male versus female engineering enrollment due to the cultural view of engineers contributing to society (Brunet).

The reasons for fewer numbers of women in the engineering field are numerous. During the 1950s and 1960s, men primarily dominated most engineering jobs in research, production, and manufacturing (Evetts, 1994). In the past, few women considered engineering as a career option because of the reactions of doubt and disbelief received from others (Newton, 1987). Unfortunately, these reactions were oftentimes from family members, friends, and future colleagues (Newton). Engineering has a history of being viewed as a masculine profession (Evetts, 1993; 1994). In Great Britain, engineering was considered a masculine socially constructed profession (Evetts, 1993). Cultural images in society have portrayed engineering to be tough, heavy, dirty, and heavily reliant upon machinery (Evetts, 1993, p.167; 1994, p. 101) and, consequently, considered to be unsuitable employment for females during the majority of the 20th century. Often in the past, women interested in engineering as a profession were subjected to explicit or

implicit questions regarding their femininity (Newton) because the engineering field was predominantly a man's domain. Newton states that the concept of engineering being men's work has only recently begun to change. In the past, women who ventured into careers within the engineering fields were considered unusual and entering into a man's world (Evetts, 1994). There was a common stereotype that a woman could not survive a career as an engineer unless she was quite tough and had masculine tendencies (Newton). Masculinity was synonymous with technology and technological work, and engineering represented everything that was defined as manly (Cockburn, 1985, p.57; Henwood, 1998).

Women in engineering were entering work that was not only different from traditional feminine career choices, but was often of higher status (Henwood, 1996). Women choosing to enter engineering can be argued to have more status than those with careers in traditional women's work (Henwood, 1998, p. 37). This was a means of being associated directly with masculinity and male power for women (Henwood).

In the past, another tremendous reason for lack of women as engineers was the difference in secondary school promotion of high school mathematics and science. Recent enrollment for females taking high school classes in the mathematics and science fields has increased (Baker et al., 2007). The classes of engineering, physics, algebra II, chemistry, geometry, biology, trigonometry, pre-calculus, and calculus have begun to demonstrate a smaller gap in male-to-female ratios than past enrollment numbers (Baker et al.). Unfortunately, the higher enrollment numbers of females in science and mathematics courses has not increased the overall percentage of women interested in majoring in engineering and science fields since 1977 (National Science Board, 2004).

Research has determined that women with an interest in science typically enter educational fields of psychology and the biological and agricultural sciences (National Research Council, 2006). Research has determined that as early as first grade, girls express an interest in the biological and social sciences (Adamson, Foster, Roark, and Reed, 1998). These young girls in grades Kindergarten through the 12th grade demonstrate and report an interest in helping other people, the earth, and animals, which demonstrates a direct link to interests in biological and social sciences (Damour, 2009; Baker & Leary, 1995). Conversely, boys demonstrate interests in physical science as early as the first grade (Adamson et al., 1998), which has a distinct relationship to later interest in engineering. Indeed, research suggests that women are not abandoning engineering as much as they are turning toward other sciences that seem to offer not only challenging career opportunities but also the chance to make a difference (Brunet, 2009, p.60). Numerous science fields are now available that fulfill the aspirations of women to contribute to our culture and civilization who may have considered engineering in the past (Brunet, 2009).

There are additional reasons for the minimal increase of females into the science and engineering fields. One explanation was that there are insufficient female role models for young females and adolescents within engineering and computer science fields (Damour, 2009). In Ireland, female role models and the visibility of women in engineering was explored for importance as a means to encourage, attract, and retain women to the field of engineering (Engineers Ireland, 2009).

Another theory has been offered that female students consider science and mathematics courses as pathways into college as opposed to beginning a pathway to a

career. Some female students can be argued as more being interested in maintaining a good student identity for college entrance as opposed to actual interest in science (Carlone, 2004). Another theory accounting for the fewer quantity of females entering into engineering as a career was the stereotypical belief that engineering was for geeks. This belief often removes the career as a viable option for women and girls (Damour, 2009). Research has shown that the field may suffer from image issues with engineers often having the image of being out-of-touch or nerds (Brunet, 2009).

One theory regarding the minimal increase of women's interest in engineering stems from perceived competency. Girls in grades as early as kindergarten through third have reported incompetence in physical science when compared to their male counterparts (Andre, Whigham, Hendrickson, & Chambers, 1999). The next possible theory to explain the slight increase of women becoming engineers was that stereotypes continue to exist in our society. Students as young as age five years have expressed belief that careers in science and mathematics are jobs only for men (Andre et al., 1999). A fourth explanation was linked to negative classroom experiences in science courses for females (Baker et al., 2007). Research determined that boys and girls have knowledge of gender disproportion in physics, which influenced the girls negatively through fear of participation in group discussions and activities (Guzzetti & Williams, 1995).

Further contributing to the low percentage of women as engineers within the United States are psychosocial factors. Psychosocial factors that are most important to recruitment of women into engineering fields are societal relevance of engineering, tinkering self-efficacy, and technical self-efficacy (Baker et al., 2007). The engineering societal relevance refers to the constructive correlation between engineering services and

products and their ability to improve and assist life and civilization (Adelman, 1998). The contention was few women recognize the connection between how an engineered product or service can greatly influence or increase the life quality of the recipient of the product or service. An example that was a benefit to society as well as individual persons was the continued development of energy efficient appliances created to reduce global warming and the usage of natural resources. Unfortunately, women do not view engineering as a potential education and employment source because they lack awareness of the connections of overall engineering and their ability to improve societal and individual life (Adelman). Women would be more attracted to engineering if they recognized that their individual goals of contributing to and improving society could be achieved through becoming an engineer (O'Hara, 1995). Likewise, university women were found to not pursue STEM (science, technology, engineering, mathematics) careers because of the inability to see the societal good resulting from a career in a STEM profession (Sax, 1994). Elementary and high school girls were determined to make STEM career choices based on their personal perceptions of the societal contributions made by the career (Baker & Leary, 1995). Female engineers place a greater emphasis on working with people than male engineers (Grandee, 1997).

Tinkering self-efficacy was the second factor that was responsible for fewer recruitment of females into engineering as a career choice. Tinkering self-efficacy was the women engineers' experience, competence, and comfort with manual activities (McIlwee & Robinson, 1992). Tinkering self-efficacy can be defined as the personal feelings and beliefs that individuals have regarding their abilities to perform physical activity and endeavors (Baker et al., 2007). These activities include assembly,

manipulation, disassembly, construction, modification, and the ability to break and repair component parts and their mechanisms. The ability to deconstruct a computer and then reassemble the pieces into a viable and working computer was an example of tinkering self-efficacy. Lack of experience in the use of tools and machinery has been argued as a contribution to a woman's low tinkering self-efficacy (Baker et al.). Additionally, minimal experience in deconstructing objects for later reassembly was a contributing factor to low tinkering self-efficacy for women, which reduces consideration of engineering as a viable career option (Baker et al.). Damour (2009) agrees that girls do not tinker. This lack of tinkering reduces girls' ability to learn how machines and computers function from the inside out (Damour). The American Association of University Women (as cited by Damour) reported that boys view computers and machines as their own personal toys. However, computers are viewed by girls as a tool needed for task completion. When boys are tinkering with the computer and programming, intuitive learning and understanding of how computers work occur. Mechanical reasoning development, which was a cognitive skill, occurs when boys tinker with machines. Girls miss this intuitive learning and mechanical reasoning when not tinkering with computers and machinery (Damour).

Research has determined that females at a technical high school with a background preparing them academically for tinkering with simple mechanical devices were hesitant to use the devices for design activities (Crismond, 2001). Males demonstrated little hesitancy and were more confident of their capabilities. Further, males explored the devices for the design activities in depth and thoroughly (Crismond). Tinkering was not an activity that women chose to explore when younger, and these

women reported feeling unprepared for the manual tasks associated with engineering as a result (Baker et al., 2007). This can create problems with tinkering self-efficacy for females within engineering programs, which results in feelings of being inappropriately prepared for engineering coursework (Baker et al.).

The third psychosocial factor of engineering, identified by Baker et al. (2007), is technical self-efficacy. The faith and confidence in the self's own capability to study, master, utilize, and regulate academic technological subjects was the Baker et al.'s definition for technical self-efficacy. Women who are majoring in engineering have individual self-assessment of their abilities. Unfortunately, women believe their ability as problem-solvers and as future engineers to be less effective and less developed than their male counterparts (Grandy, 1994). This is believed to lead to women's lower technical self-efficacy (Grandy). Similarly, gender was determined to influence self-efficacy, which also influences technical problem-solving (Baumert, Evans, & Geiser, 1998). Girls as young as age ten were affected as evidenced by inferior beliefs regarding personal self-competence and problem-solving ability relating to their technical performance. The ascribed lack of success by the girls was of their lack of ability as opposed to their personal lack of persistence (Baumert et al., 1998). In contrast, female perception of problem-solving abilities and persistence in mathematics, which was a foundational skill in engineering necessary for success, demonstrated better technical self-efficacy (Forgasz, Leder, & Kloosterman, 2004). Previous research has identified females believed they were better and more persistent in problem-solving than did the male research participants (Forgasz et al., 2004). The lack of efficacy in technical abilities was a pervasive problem as evidenced by research. Women already in engineering programs

planning on graduate school have expressed less self-efficacy of their technical abilities than their male counterparts (Grandee, 1997; Wood, 2002). Positive outcomes for females should be addressed in programs that address perceived abilities and levels of competency (Haussler & Hoffman, 2002). Researchers argue that increasing the self-efficacy of women in engineering programs was one means of improving long-term positive results (Marra, Schurman, Moore, & Bogue, 2005; Baker et al., 2007).

Change has occurred within the engineering field in the last 50 years. The reasons for the transformation within the engineering field include changes within the industry and change in sociocultural ideals. Initiatives in the 1980s were established to raise the quantity of women in scientific and technological fields (Newton, 1987). Some of the initiatives included education regarding the masculine stereotype image of science and technology to increase female interest in STEM careers (Newton). The initiatives helped to establish assistance in education regarding the importance of science and technology to both men and women for career opportunities. Students were encouraged to question and redefine sex roles within career choices, and women were especially recommended to regard science and technology as a prospective option for their careers (Newton).

Researchers have asserted that engineering as a field has begun to change (Evetts, 1994). Specifically, there is more emphasis on using models of mathematics, computers and computer technology, printed circuit boards, and electronics within the engineering field now (Evetts). There also has been less importance placed on the usage of heavy machinery and heavy engineering. In Europe, specific campaigns were established, including the Women into Science and Engineering (WISE) campaign (Evetts). These projects were established to assist girls and women considering engineering as a career

choice through proposals and education. The campaigns created awareness and interest in engineering as a career option for females (Evetts). However, some researchers argue that the WISE campaign, in particular, was part of the continuing problem of having fewer women within the fields of engineering and technology (Henwood, 1998). The failure of WISE was attributed to the increasing number of women engineers within WISE who did not focus broadly enough in their individual choices for females. WISE misunderstood the constraint of choice for women regarding technology and the masculinity associated with engineering, which led to further alienation for females to consider engineering to be a viable career option (Henwood).

Choosing to be a woman engineer provides a great opportunity as a career option. The field of engineering is a rapidly growing professional field that provides good beginning salaries for new graduates (Robinson & McIlwee, 1989). Past research demonstrates that engineering has great potential for advancement and managerial placement (Perrucci, 1973; Whalley, 1986; Zussman, 1985; Robinson & McIlwee). The potential for college-educated women in engineering was significant for opportunities in high pay and career options (Robinson & McIlwee).

Fear of failure.

History and theory of fear of failure. During the 20th and 21st centuries, the models of fear of failure and achievement motivation have become popular areas of study (Conroy, Metzler, & Hofer, 2003). Many individuals in current society suffer from fear of failing due to the importance placed upon success in their educational goals and careers (Shaver, 1976). Research has identified several consequences and implications of fear of failure. These consequences include: health concerns (Fox, 1994); reduced

academic performance (Elliot & Sheldon, 1997; Elliot & Church, 1997); and self-esteem decline, feeling less in control of their personal life, and feeling less satisfied with life (Elliot & Sheldon, 1997). Past research has examined the fear of success in women (Sherman, 1988; Depner & O'Leary, 1976; Golden, 1988).

The fear of failure orientation has many theories regarding its origin. One theory, in regard to gender role, pertains to societies' outlook on success and failure (Horner, 1972). Other theories relate to the individual's affective response to failure (Conroy, Willow, Metzler, 2002) and anxiety levels regarding the fear of loss of significant others due to individual failure (Conroy et al, 2002; Golden, 1988). Further, research has reviewed positive regard and parenting strategies as possible theories concerning the origin of fearing failure (Birney, Burdick, & Teevan, 1969; McClellan, 1987).

The theory of fear of failure model arose from Need Achievement theory (Atkinson, 1957). In the 1950s and 1960s, fear of failure as a psychological theory originated out of Atkinson's achievement motivation research (Atkinson, 1957; 1964). Fear of failure was defined as an "avoidant motive which was aroused by debilitating anxiety" (Atkinson, 1957. p. 359). Individuals who demonstrate fear of failure are unsure they will be able to be successful (Covington & Omelich, 1991), and do not believe in their capacity to avoid failing at their endeavors. Further, those who experience fear of failure often attach negative and painful consequences to the act or experience of failing at a given task or goal (Shultz, 1999). This results in a motive "to avoid situations where one may fail due to anticipatory shame and humiliation because the individual was fearful of failing" (Conroy, et al, 2007, p. 238). Conroy et al. (p. 239), define fear of failure as "a tendency to appraise threat and feel anxious during situations that involve

the possibility of failing." As a result, these individuals often avoid or attempt to avoid situations where failure was a possibility (Conroy, et al.) and may opt to avoid goals in which failure was an option (Shultz). Such individuals are frequently depressed, anxious, confused or angry; they also lack confidence, and may have low self-esteem or marital conflict (Sherman, 1988, p. 97).

Fearing failure has been argued as being a significant contributor when identifying the causes and responses to failure (McGregor, 2003). It has been associated with a decrease in goal attainment, an increase in avoiding tasks, and a decrease in enjoying chores or duties (Conroy, 2001). Being avoidant towards goal attainment has been associated with several outcomes. These include lowered satisfaction in academics and a decrease in self-esteem and feeling satisfied about life (Elliot & Sheldon, 1997). A decrease in academic achievement was also a significant outcome of fearing failure (Elliot & Church, 1997). Research has identified several health risks associated with a fear of failure (Fox, 1994). Specifically, there was an increased risk in heart attack, diabetes, arthrosclerosis, high cholesterol, reduced immune function and an increase in peptic ulcers (Fox). An example identified by Fox was the increase in cholesterol levels for medical students following major exams that are a result of their chronic worry, fear, and feelings of self-doubt.

Fear of failure was identified as often being a motivator for individuals to improve performance (Conroy et al., 2002). Experiencing fears of failing can assist to motivate some individuals in achieving higher levels of performance (Conroy et al.). For example, some individuals that experience fear of failure become motivated to practice and/or study harder to avoid failure. These individuals often experience high levels of

anxiety, which in turn can be highly debilitating. This anxiety can actually prevent some individuals from attaining their maximum potential to achieve academic, career or personal goals (Conroy et al.).

Fearing failure may be divided into two separate and broad categories. The two categories are those that relate to failing on an interpersonal level and those fears that pertain to failing in education goals or scholarly pursuits (Golden, 1988). The two categories are oftentimes related. For example, persons who fear failure in their place of employment may also fail in their personal lives (Golden).

Fear of failure can be an avoidant motive that induces some individuals to achieve great goals. Often, students will avoid failure in academics or other educational settings to prevent shame from failing (Elliot & Thrash, 2004). Students will utilize mastery approach goals to avoid failure (Bartels & Magun-Jackson, 2009). Research has determined that students that experience elevated achievement needs will incorporate performance-approach goals as well as mastery-approach goals. However, students that experience elevated fears of failing will attempt to establish objectives or aspirations that are geared towards avoiding tasks that may demonstrate their incompetence and will utilize those goals that avoid mastery or performance (Bartels & Magun-Jackson; Conroy, 2004; Conroy & Elliot, 2004; Thrash & Elliot, 2002; Elliot & McGregor, 1999; Elliot & Church, 1997; Elliot & Sheldon, 1997). Further, fear of failure can be identified as being negatively related with cognitive strategy adaptation (Bartels & Magun-Jackson).

Fear of failure was correlated with the incorporation of approach avoidant motivation (Bartels & Magun-Jackson, 2009). This in turn affects the quality of self-

regulated learning (SRL) for those individuals that approach learning with approach-avoidant motivation. SRL incorporates the use of learning techniques of rehearsal, elaboration, organization, and the use of critical-thinking skills (Bartels & Magun-Jackson) as a means of encoding information to comprehend the material to be learned (Pintrich, 1999; Weinstein & Mayer, 1986). Metacognitive strategies are typically employed as a means of monitoring individual comprehension and reflecting and regulating individual thinking and cognitions (Sterling, Howard, Staley, & DuBois, 2004; Zimmerman, 2002). There are negative associations with metacognitive strategies as well (Bartels & Magun-Jackson). Further, investigations have determined fear of failure was significantly related to a failure to "metacognitively self-regulate" (p. 462). Therefore, individuals with fear of failure may have difficulty in self-regulated learning, which could directly factor into a history of continued failure (Heckhausen, 1975; Bartels & Magun-Jackson).

Murray (1938) hypothesized that some individuals have an innate drive for "infavoidance" as a need. Infavoidance can be explained as "a motivator for some individuals to refrain from action because of fear of failure" (p. 192). The link between a need for achievement to the need for infavoidance, Murray theorized, is that a person's individual failures take away from the achievements attained (1938).

Failure can be a threatening and anxiety-provoking event because individuals have often begun to associate failure with negative consequences. Conroy et al. (2007) have identified five undesirable outcomes associated with fearing failure. These five consequences are (1) feeling embarrassed or shamed, (2) having a diminished self-worth, (3) experiencing uncertainty about your future, (4) the loss of interest of those important

to the individual, and (5) fear that relevant significant others are angry or upset (Conroy, et al., 2007; Conroy, 2001; Conroy, Poczwardowski, & Henschen, 2001; Conroy et al., 2002). As a result, those individuals that believe failure leads to consequences will be more apt to view situations of evaluation as a threatening event (Conroy, et al., 2007).

Researchers in the 1970s determined that fear of failure and fear of success are actually two similar components of one motive (Jackaway & Teevan, 1976). Specifically, researchers argue that many similarities in the theories and definitions exist between the two motives. Additionally, there was overlap in how these two motives are measured in scoring systems of assessments. The underlying factor between fear of failure and fear of success was hypothesized as possibly being fearful of social rejection. This finding was found to be more significant in women than in men. Achievement needs and affiliation needs were found to be more closely related in females rather than males (Jackaway & Teevan.

Measuring the level of anxiety for fearing failure and fearing success in women may be actually measuring the same source of anxiety in certain circumstances. Research has found that females have reacted negatively to accomplishments and achievements that conflict with more traditional gender roles (Depner & O'Leary, 1976). Women often experience fear as a result of going against traditional gender roles (Sherman, 1988). Studies have concluded that when viewing fear of success and fear of failing individually, researchers must account for sex role and the individual's life situation to ascertain that the fear of success may be demonstrated as fear of failure in another aspect of the person's life (Sherman). Researchers determined that going against traditional sex roles

can create internal conflict for women because of the internalized belief that they are not conforming to traditional feminine behaviors (Golden, 1988; Sherman; Shaver, 1976).

Past studies have determined that individuals that are high in fear of success experience nervousness when receiving successful responses or feedback (Pappo, 1972; Shaver, 1976). These individuals often have difficulty in concentration, are overly concerned with receiving feedback or having competition, and are very anxious when they perceive they are being evaluated. Further, these persons often attribute personal successes to chance, luck, or a situation rather than their abilities. They expected to perform poorly, and were surprised when learning that they had performed well. These men and women had difficulty in taking credit for their successes. Shaver argues that fear of failure can create the same response in an individual as the fear of success response.

Horner (1968) determined that females with more conventional gender roles repeatedly expect to experience rejection in their social environments if they compete within an area that was perceived to be a field that has been traditionally masculine in nature. Similarly, males who engage in more traditionally feminine careers or activities may experience similar anxiety regarding societal perception. Males may experience more severe social rejection (Jackaway & Teevan, 1976). Jackaway and Teevan noted that women who are successful often have to experience social frowning because traditional sex roles often are in conflict with success.

Fear of failure has many underlying factors. Fear of failing in females has been argued as being an attribute to the aforementioned traditional sex roles (Sherman, 1988). Low self-esteem and low self-confidence have been determined as contributing factors for fear of failure (Sherman). Research has determined that those persons with higher

feelings of self-confidence and feelings of personal value develop and utilize more adaptive coping skills. These individuals are more likely to create alternatives when success was not initially attained. Further, these individuals tend to be more successful academically, demonstrate more persistence, exhibit more effort and have better coping skills when faced with difficult situations (Sherman).

Conversely, individuals with low self-confidence or feelings of self-worth often dwell on their perception of personal failures. These individuals have a tendency to ruminate over their own perceived deficiencies and have a more fatalistic and negative life view than those persons with higher feelings of self-belief (Martin, 2002). Extensive research has linked self-belief to accomplishment, monitoring of self, determination, and effort (Martin; Martin & Debus, 1998; Schunk, 1990; Marsh, 1990; Skinner, Wellborn, & Connell, 1990; Pintrick & Blumenfeld, 1985).

Another factor that has influenced fear of failure development is control. Control has been defined as the ability a person has to be successful and avoid failure (Martin, 2002; Connell, 1985; Skinner, 1996). Individuals with low feelings of control or outcomes often feel unable to be successful or avoid failure (Martin). This feeling of control correlates to the amount of persistence demonstrated, participation levels witnessed, and quantity of effort demonstrated by the individual. Not surprisingly, individuals that feel "less control tend to be lower in their achievement mastery motivation, competence evaluation, teacher's ratings of competence, and autonomous judgment" (Martin, p.76).

A dangerous motivational combination, which has appeared in some individuals, consists of high fear of failure, low control, and low belief about self (Martin, 2002). This

mix of variables can be especially harsh to individuals when performance was required or expected. Persons with this type of motivational cocktail felt high levels of anxiety and displayed a negative outlook when faced with an event requiring performance. These individuals are often pessimistic and experience trepidation, fear, dread and anxietal symptoms (Martin).

Another identified dangerous amalgamation has been the fail accepter (Martin, 2002, p. 76). The fail accepter is identified as a person who has low fear of failing, but has low self-confidence or self-belief and low feelings of control (Martin). This individual could be described as having learned helplessness (Abramson, Seligman, & Teasdale, 1978). These individuals have ascertained that they will fail and have accepted the failure. The major difference between the fail accepter and the dangerous motivational combination person is the lack of fear regarding failure. These individuals may be pessimistic, but they experience little anxiety and may have given up (Martin). Incidentally, in research, Martin found that failure accepters were not represented in the research studies (Martin, 1998; 2002). This was likely because failure accepters did not participate in the research study and likely had not been attending classes.

Fear of failure has been identified as contributing to the maladaptive personality characteristic known as perfectionism (Conroy, et al., 2007). Past research has defined the term perfectionism as a striving for flawlessness (Hewitt & Flett, 2002). Perfectionism was typically considered to be a negative characteristic because those with characteristics of perfectionism often have detrimental and adverse consequences stemming from the perfectionistic qualities (Conroy et al.; Hewitt & Flett). Fear of failure

can also be a crucial motivator that causes the development of perfectionism (Conroy, et al.).

Past research has identified three forms of perfectionism and has determined the linkage between these types and fear of failure (Hewitt & Flett, 1991b; Conroy et al., 2007). Socially prescribed perfectionism involves perfectionism that occurs when a person suffers the necessity to attain perfection due to high standards established by significant others (Hewitt & Flett, b). Depression and perfectionism have demonstrated significance in correlational research related to socially prescribed perfectionism (Hewitt, Flett, & Ediger, 1996; Cox, Enns, & Clara, 2002; Hewitt & Flett, 1991a, 1993), anxiousness (Antony, Purdon, Huta, & Swinson, 1998; Saboonchi & Lundh, 1997), eating disorders, (Hewitt, Flett, & Ediger, 1995), suicidality (Hewitt, Flett, & Turnbull-Donovan, 1992, and poor response to changing situations (Blankstein & Winkworth, 2004). These individuals fear being negatively evaluated, which creates a strong motive for circumventing failing (Neumeister, 2004).

The second form of perfectionist behavior was other-oriented perfectionism. This is perfectionist behavior that involved the creation of unrealistic goals for other individuals and the expectation that the person will be perfect. This results in stringent evaluation of performance for perfection (Hewitt & Flett, 1991b). This was also more external in motivation; specifically, individuals judge other persons through the use of their own high perfectionist standards as opposed to their personal individual performance (Conroy, et. al, 2007).

Self-oriented perfectionism was the creation of idealistic or impractical, often unattainable or unrealistic, goals for the individual for his/her own self (Hewitt & Flett,

1991b). The individual was often harsh or critical of his/her own performance or behaviors (Hewitt & Flett, b). The individual who exhibits self-oriented perfectionism has been related to destructive results, including suicidality (Hewitt, Newton, Flett, & Callander, 1997; Hewitt, Flett, & Weber, 1994), the eating disorder anorexia (Hewitt et al., 1995), depression (Flett, Hewitt, Blankstein, & Gray, 1998; Hewitt & Flett, 1991a), rumination over events (Besser, Flett, & Hewitt, 2004), burnout (Gould, Tuffey, Udry, & Loehr, 1997), dissatisfaction with personal performance and emotionally maladaptive responses to feedback regarding failure (Besser et al., 2004).

Fearing failure has been examined in regard to emotions or feelings (Conroy, 2001). An individual experiences feelings or emotions when change was perceived in his/her environment (Lazarus, 1991). These changes are seen as impactful to the individual's ability to attain or achieve goals, and can be actual and real or false and imaginary (Lazarus). However, the individual must appraise, either on a conscious or unconscious level, how the changes will influence his/her goal attainment. Anxiousness or fear related appraisals include assessment of relevant change, determination if change aids or hinders goal attainment, and identification of the content of an actual goal (Lazarus). Emotions can be specified and appraised as a core relational theme (CRT) of specific emotions (Lazarus).

Theories regarding the development of fear of failure have identified the experience of shame as being a significant contributor (McGregor, 2003). Shame behaviors are avoidant (McGregor) and can be considered as the negative censure that we feel for our own self (Lazarus, 1991). Self-reproach occurs when the self is evaluated and falls short of the desired standards against which the self was evaluated (Lewis, 1992).

Lack of success can create shameful feelings of incompetence and emotions (McGregor). Past research has suggested that the origin of childhood shame regarding failure stems from parental reactions to failing behaviors (McGregor; Andrews, 1998).

Parenting styles are an area that must be reviewed when discussing fear of failure (McGregor, 2003). As a motive, fear of failure has been identified as being able to be regulated by the self and can be impacted by evaluations from parental figures (McGregor). The fears of failing avoidance motive can be argued to begin formation in early childhood (McClellan, 1987). Parental treatment of children has contributed to the development of fears of failing. Past studies have identified parental influence to be significantly related to the onset of fear of failure (McGregor). Research has established boys who have a mother with high fears of failing often place elevated values or principles regarding success and achievement on their sons; however, these mothers typically have beliefs that the sons cannot attain the achievement goals (Smith, 1969). Parents that punish failure, but react in a neutral manner to success and achievements, have been found to create children that are high in fears of failing (Birney et al., 1969). Additionally, parents with high quantities of fears of failing are a predicting factor for children also having fears of failing (Elliot & Thrash, 2002). Fears of failing are transmitted intergenerationally from parent to child. Researchers have determined that a specific parenting style, love withdrawal, mediates the fear of failure relationship (Elliot & Thrash). In particular, love withdrawal from a mother was found to be a mediator between fearing failure from a mother to a child. However, love withdrawal from a father figure has not shown to be a mediator for this relationship with the child fearing failure (Elliot & Thrash). Even though fearing failure was deemed a motivation regarding

competency, there was a component of relational features, as well. The relational feature has been theorized as likely being present due to fear of being potentially abandoned and having love withdrawn when failing has occurred (McGregor). Additionally, the relational relationship was significant because fear of failure is linked with shame (McGregor). Researchers argue that those individuals who demonstrate a high fear of failure are educated for social cue awareness regarding failure. However, these individuals are typically unaware of cues regarding their personal successes (Elliot & Thrash). Success was given little thought and importance in the individual's self-evaluation, almost as if it was irrelevant or does not exist. Conversely, failure was viewed by the individual as significant and bearing impact, which has negative effects on the evaluation of the self by the individual. This created anxiety and other emotional responses that inhibited cognitive function and planning (Elliot & Thrash).

Performance failure appraisal inventory. The Performance Failure Appraisal Inventory (PFAI) was created as a measurement for fear of failure on a multidimensional level (Conroy, 2001; Conroy et al., 2002; Conroy et al., 2003). The PFAI is a motivational-relational-cognitive appraisal system associated with fears of failing (Conroy et al., 2002). Initially, Lazarus' cognitive-motivational-relational theory of emotion was applied to construct fear of failure as a multidimensional model (Conroy, Poczwardowski, & Henschen, 2001). The model contends that there must be two separate processes to occur for an individual to develop fear of failure (Conroy et al., 2001). The first process occurs when an individual perceives that failure was possible or likely to occur or anticipates that failing has occurred. The second process occurs when the individual perceives that adverse consequences occur when failure was present in a

situation (Conroy et al., 2003). The researchers contend that a measure of fear of failure should assess how strongly the individual believes that negative outcomes can transpire if the individual perceives they are not being successful (Conroy et al., 2003).

The PFAI was developed to measure beliefs that an individual has about certain and specific adverse effects of failing (Conroy, 2001; Conroy et al., 2002). The PFAI includes fears of: (1) embarrassment and shame experience; (2) diminishment of one's self-worth feelings; (3) feeling uncertain about the future; (4) perception that significant others have lost begun to lose interest; and (5) belief that significant others will be angry or upset.

The original long-version of the PFAI initially had 89-items that measured 10 separate appraisals associated with fear of failure. The shortened version has 25-items and has demonstrated a superior substantive foundation (Conroy et al., 2003). The 25-item PFAI includes five measures for lower-order fears of failing. These five measures of fear of failing include: Fears of Devaluing One's Self-Estimate (FDSE), Fears of Experiencing Shame and Embarrassment (FSE), Fears of Having an Uncertain Future (FUF), Fears of Important Others Losing Interest (FIOLI), and Fears of Upsetting Important Others (FUIO) (Conroy et al., 2007; Conroy et al., 2002).

The PFAI begins each question item on the instrument with either of two possible beginnings, When I am failing... or When I am not succeeding..., and is ensued with a following adverse effect of failing (Conroy et al., 2007). The instrument allows participants to rate their belief regarding each consequence of failure transpiring on a measurement that ranges from -2 (*do not believe at all)* to 0 *(believe 50% of the time)* to +2 (*believe 100% of the time*). To rescale items from one to five required a constant of +3

to be added to the responses. Responses averaged for items on individual scales allowed for the scaled scored to be calculated, with one question reversed for scoring on the FUF scale (Conroy et al.).

The five scales demonstrated acceptable internal consistency levels, temporal stability levels, and patterns of theoretical expectations with other researched constructs. These other relevant constructs include self-talk, anxiety about performance, goals regarding attaining achievements, appropriate motivations, and the emotional state of an individual prior to performing (Conroy et al., 2007; Conroy, 2004; Conroy et al., 2002; Conroy et al., 2003).

The PFAI allows for performance avoidance goal orientation (Conroy, 2001). PFAI scores have been positively correlated to trait anxiety and performance goal orientation. The PFAI identified that 76.5 percent of individuals perceive themselves to be underachievers (Conroy, et al., 2002).

Gender role conflict.

History of gender role conflict. The Feminist Movement of the 1960s and 1970s assisted in creating the theory of gender role conflict. Females were encouraged to seek new roles and responsibilities different than "finding a husband and bearing children" (Friedan, 1963, p. 15-16). Women were encouraged to determine their professional and personal identities as opposed to being defined by traditional society that was primarily male-dominated (Friedan).

The phenomenal events, including beliefs about women expecting equal pay for equal work and completing men's work during World War II, assisted in changing the representation of masculine images (O'Neil, 1981a). These situations redefined the

American ideal of manliness and masculinity (O'Neil, a). Further, these events broke societal norms and created change in the masculine image within the United States. While the change was considered acceptable and timely by some American males, others became angry and defensive in their behaviors. These negative emotions have been found to lead to distress and violent actions (O'Neil, a; Good & Mintz, 1990; Lash, Copenhaver, & Eisler, 1998).

During the last 25 years, the results of traditional gender-role norms in society have been studied to learn the importance and the consequences created by societal norms (Heppner, 1995). Conflict can be argued to be a result of these societal gender role norms (Heppner). Biology does not determine gender roles for males (O'Neil, 1990). Rather, masculinity was often identified by social rules (O'Neil). Male gender role conflict has arisen as men attempt to preserve gender roles that society mandated to be desirable (Good, Wallace, & Borst, 1994). Research in the past sought to resolve the relationship between early social interactions and gender roles and their impact on emotional display (Bardwick, 1971; Maccoby & Jacklin, 1974; Astin, Parelman, & Fisher, 1975). However, some researchers have argued that cultural views of appropriate versus inappropriate masculine and feminine gender roles cannot be resolved due to the lack of overall societal advancement (Brooks, 1990).

The 1970s Feminist Movement was responsible for the realization that strict gender roles for men could cause oppression to develop (O'Neil, 1981a). This insight arose through the education regarding the need to eliminate sexism against women. Gender role conflict was initially theorized when O'Neil researched female sexism, leading to studies on nonsexist masculinity (O'Neil, a). O'Neil initially began research on

the psychology of men, specifically diverse sex roles, the socialization of males, and the values of men. In 1981, O'Neil and contemporaries (O'Neil & Good, 1997) initiated the Gender Role Conflict Scale (GRCS). However, it was 1986 before the scale was completed and published (O'Neil et al., 1986).

Gender role concerns are a worthwhile research topic for counseling psychologists (O'Neil, 1981b). O'Neil et al. (1986) contend that societal tasks for males and females can create negative effects that require continued research and investigation. The impact on problems developing in careers, within relationships, and emotionally from gender-role issues should be essential for research in psychology (O'Neil, b; O'Neil, 1990; Mahalik, 2000). Researchers have noted certain interactions between certain personality styles and gender role conflict (Schwartz, Buboltz, Seeman, & Flye, 2004). Gender role conflict can be predicted by aggression, narcissism, histrionics, or dependency as personality styles (Schwartz et al., 2004). Further, personality style and gender role conflict overlap one another and intervene between variables related to gender role conflict, mental health issues, and therapy or mental health counseling (Tokar, Fischer, Schaub, & Moradi, 2000).

Researchers have begun to recognize gender-role as an important therapeutic concern when men come for counseling (Skovholt, 1978; Marino, 1979). More recently, understanding and recognizing female gender role conflict for treatment has been encouraged (Gleason, 1994; Korcuska & Thombs, 2003; O'Neil, 2008). Research has determined there are an assortment of interpersonal and intrapersonal issues which correlate to create firm and stringent masculine gender roles (Mahalik, 2000; O'Neil, 1990). Further, research has determined a high correlation between certain societal

problems of rape, family violence, and child sexual abuse with the presence of gender role conflict (Russell, 1984; Finn, 1986; Finkelhor, 1984).

Definition of gender role conflict. Gender role conflict has been explained as being a "psychological state in which socialized gender roles have negative consequences on the person or others" (O'Neil, Good, & Holmes, 1995, pp. 166-167). Gender role conflict is created when "rigid, sexist, or restrictive gender roles result in personal restriction, devaluation, or violation of others or self" (O'Neil et al., p. 167). Gender role conflict is identified as occurring when societal roles for genders begins to restrict, devalue, or violate rights of the self or other individuals (O'Neil & Good, 1997). O'Neil (1981a) further explained gender role conflict to be a collection of harmful or damaging events impacting the individual or others because of diverse but specific roles in which the person was expected to display or demonstrate. Specifically, gender role conflict occurs when individuals were subjected to negative consequences that resulted from societal gender roles (O'Neil et al., 1986).

Thompkins and Rando (2003) have found gender role conflict to exist behaviorally, cognitively, emotionally, and unconsciously. Gender role conflict can be projected towards other individuals or can be self-targeted. Gender role conflict may originate directly or indirectly towards an individual regarding his or her effort and inability to exhibit prohibited roles for gender (Thompkins & Rando). O'Neil and Good (1997) have established gender role conflict to be significant because it influences so many individuals in society. This influence was the reason that gender role conflict is important to understand as a psychological construct. Gender role conflict has been argued as ultimately able to restrict the capability to attain maximum potential as an

individual, and can severely limit potential for others near the conflicted individual (O'Neil, 1981b; O'Neil et al., 1986).

The construct of gender role conflict will continue to be a valid and useful research interest in the 21st century field of psychology. Gender roles have been explained as being "any expectation by society which has been put upon an individual because of their gender" (O'Neil, 1981a, p. 61). Male gender roles are not determined by biology (O'Neil, 1990). Rather, society has created gender roles that are considered to be masculine (O'Neil). Gender-role socialization has been identified as the manner that males and females develop and internalize the actions, beliefs, morals, ideals, and viewpoints created for their own gender by societal expectations (O'Neil, a). Specifically, society has influenced adults and children so that various attitudes and behaviors considered by society as either androgynous, masculine, or feminine are integrated into their own personality and repertoire of behaviors (O'Neil, a). Societal definitions of masculine and feminine can be argued as being either restrictive or opportunistic for male and female gender roles (Zamarripa, Wampold, & Gregory, 2003). Gender role conflict develops when gender-role preferences of an individual are different than those of socially expected gender roles (O'Neil et al., 1995). Gender role conflict originates when incongruence emerges between expectations from society and the individual's personal needs or wishes (O'Neil et al.). Traditional socialization for gender roles has been criticized as being too restrictive. Particularly, traditional gender-role socialization has been argued to create incomplete individuals because of the development of emotionally underdeveloped males and females who are overly dependent upon others (Obsatz, 1997).

Most civilizations maintain masculine and feminine expectations regarding behaviors and beliefs for their inhabitants. Often, well-meaning caregiving individuals, both male and female, impose these traditional expectations of behaviors or beliefs (Pollack, 1999). These expectations are in fact gender roles, which are often restrictive in nature. The gender roles often stress the importance of self-reliance and the need to restrict emotionality, originating from conventional male ideology. These gender-restrictive rules can be argued as creating boys that suffer from emotional issues (Pollack). In this argument, parents can actually worsen restrictive male emotions by minimalizing the pain felt by young boys and by expressing disapproval of unmanly behaviors (Osherson, 1986). There are some individuals that instead choose to refrain from adherence to gender expectations (Thomas, 2005). Those societies with restrictive or inflexible ideals regarding conventional gender roles do not allow individuals to demonstrate autonomy in actions because of conflict with the societal conventional roles for gender (Thomas). Being inflexible can be argued as creating issues for those individuals who do not adhere to the societal standards for gender roles (Thomas). Studies in history have recognized that in the majority of societies, freely expressing gender roles considered unconventional was regularly undesirable or unacceptable (Rebecca, Hefner, & Oleshansky, 1976).

Negative consequences can occur with gender role conflict. Gender role conflict often creates gender-role strain, which can be defined as physically or mentally debilitating stress occurring from experiencing conflicting gender roles (O'Neil, 1981a). It can cause anger, or other feelings of intense emotion, towards those individuals believed to be creating the restriction in gender role (O'Neil, a). Adhering strictly to

stereotypical masculinity can result in the creation of gender role stress or conflict (O'Neil et al., 1986; Eisler & Skidmore, 1987). This can be argued as men experiencing pain or stress when situations threaten their masculine feelings (Good & Mintz, 1990; Lash, Copenhaver, & Eisler, 1998). Individuals who fail to communicate or express their anger or intense emotions may develop anxiety, depression or other negative psychological effects, including low feelings of self-esteem or self-worth (O'Neil, a).

Sexism has been identified as a person being discriminated against because of biological sex, gender role, or sexual orientation (O'Neil, 1982). Men with gender role conflict experience the effects of sexism more than males without conflict within their gender roles (O'Neil). The Masculine Mystique and fear of being considered feminine in men may contribute to gender role conflict development (O'Neil, 1981a). Societal standards define optimal masculinity, or the Masculine Mystique, as basically a learned set of beliefs or values absorbed early in childhood. The term Fear of Femininity stems from the Masculine Mystique. These learned beliefs identify any type of womanly behavior, feeling, or cherished principle as substandard, further leading to superior feelings regarding women (O'Neil, a). The certainty that feminine traits are undesirable or inferior can create discrimination and/or prejudice against individuals who display femininity (O'Neil, 1981b).

Six patterns have emerged from gender role conflict, originating from either socialization of gender roles, the Masculine Mystique, or Fear of Femininity (O'Neil, 1981b). These six are: Restrictive Emotionality, Obsession with Achievement and Success, Homophobia, Health Care Problems, Restrictive Sexual and Affectionate Behaviors, and Socialized Control, Power, and Competition Issues. Individual males have

differences in their degree of gender role conflict due to the influence from these six patterns. Therefore, individual gender role conflicted males will demonstrate differences from other men having gender role conflict (O'Neil, b). O'Neil (1982) identified these six patterns as not being the only ways that gender role conflict can affect individuals; nonetheless, these patterns are most commonly witnessed with men exhibiting gender role conflict. Each of the six patterns will be more fully described in the subsequent sections.

The first component of gender role conflict was Restrictive Emotionality (O'Neil, 1981b). Restrictive Emotionality has been described as the inability or fear of expressing individual emotions or finding it difficult to use words to communicate sentiment or feelings (O'Neil et al., 1986). Restrictive Emotionality includes the discomfort that occurs when subjected to another person's emotional demonstrations or expression (O'Neil et al.). It can be argued as denying others the right or opportunity to convey individual feelings or emotions (O'Neil, 1982), which can possibly lead to fewer opportunities for self-disclosure within interactions (O'Neil, b). Restrictive Emotionality was consequential resulting from societal rules, which has instructed males that it was inappropriate to express feelings or emotions (Goldberg, 1977). Fear of Femininity and the Masculine Mystique are theorized as significantly contributing to the development of Restrictive Emotionality for men with conflict in their gender roles (O'Neil, b). Further, Restrictive Emotionality can be argued as one factor that influences how the communication styles for men and women are dissimilar (O'Neil, 1982). This can influence problem-solving and intimacy issues within personal relationships. Additionally, Restrictive Emotionality has been theorized as creating perceptual

differences that can negatively impact interpersonal relationships (Nichols, 1975). A male's incapacity or reluctance to display feelings can also impact relationship beliefs negatively. Problems or difficulties, such as aggression, anger, abuse, can arise within relationships due to lack of disclosure or communication (O'Neil, b). The part of gender role conflict known as Restrictive Emotionality has been correlated with depressive feelings, paranoid tendencies, insensitivity to others interpersonally, and psychotic beliefs (Good et al., 1996).

The second gender role conflict pattern to be discussed was Obsession with Achievement or Success (O'Neil, 1981b). This feature of gender role conflict was exhibited through obsession or preoccupation with their job or employment, achievement, success, and status, which was actually ways to confirm his manliness (O'Neil, 1982). Males with gender role conflict have been hypothesized as being fearful of being considered feminine, which is evidenced through a preoccupation with attainment, achievement, and success. Therefore, to be considered exceedingly successful was a means of verifying and demonstrating that they are masculine and not feminine. Gender conflicted men with high levels on this pattern embrace masculine traits. These men want to exhibit status, power, achievement, wealth, and competition in order to be considered as highly masculine and not feminine. Unfortunately, gender role conflicted men can develop poor interpersonal relationships, particularly if they feel as though their personal accomplishments or triumphs are being threatened or are suffering (O'Neil).

The third theoretical component of gender role conflict was Homophobia (O'Neil, 1981b). Homophobia was identified as a "discriminatory belief system towards or against homosexuals stemming from learned negative and damaging myths and stereotypes"

(Morin and Garfinkle, 1978, p. 29). Homophobia was typically an aspect that relates back to a male's fear of being considered feminine (O'Neil, 1982). Men with conflict in their gender roles are often inflexible with rigid views (O'Neil). This inflexibility can cause homophobia to develop. Men who are homophobic have been suggested as likely being afraid of femininity as well (Levinson, Darrow, Klein, Levinson, & McKee, 1978). Persons who demonstrate homophobia often experience problems within interactions with same-sex friends (O'Neil). Homophobic individuals demonstrate character traits which incorporate rigidity in sexuality and thoughts, being status conscious, and being authoritarian in their interactions with others, all which can be harmful within interpersonal relationships (Morin & Garfinkle, 1978).

The fourth pattern of gender role conflict is Health Care Problems (O'Neil, 1981b). Men who experience fears of being considered feminine may be incapable of acknowledging the possible vulnerability that would accompany should they become ill and/or injured (O'Neil, 1982). Thus, these men may ignore or discount symptoms of their body that could signal a disease or problem that requires medical attention. Gender conflicted males believe they are to be physically powerful or indestructible, which may be the catalyst for ignoring their physical bodily symptoms. Gender role conflicted men often passively cultivate health problems by failing to change a bad diet, not exercising enough, or failing to supervise tension successfully (O'Neil). Research has determined traditional male gender roles can shorten life expectancy for men because of the influence on unhealthy eating and exercise habits (Harrison, 1978).

The next theoretical component of gender role conflict is Restricted Sexual and Affectionate Behavior (O'Neil, 1981b). Males with gender role conflict are restrictive in

their sexual and loving behaviors, and they have difficulty in expressing affection for fear of breaking societal beliefs regarding normal behaviors (O'Neil, 1982). Males with gender role conflict demonstrate problems in recognition of the distinction between sex and affection in their personal behaviors. The origin of restrictive sex and affection in personal behaviors was believed to stem from rigidity of the Masculine Mystique, male gender socialization, and difficulties in expressing characteristics that have traditionally been considered as feminine due to a fear of deviating from what society believes to be socially accepted rules and standards (O'Neil).

O'Neil's (1981b) final theoretical component of gender role conflict is Socialized Control, Power, and Competition. The gender role conflicted male's fear of being thought of as feminine is responsible for the origin of this component (O'Neil, 1982). This component was directly linked to the level of self-concept developed within a man. Boys are encouraged to be competitive, full of power, and more controlling than girls due to conventional norms in society. Research has hypothesized that boys mature with needs to be superior that stem from being socialized at an early age. These social misperceptions teach boys to grow up believing men should be more powerful than women (O'Neil).

Gender role conflict has been factor analyzed for the six patterns (O'Neil et al., 1986). From factor analysis, four specific factors have emerged regarding gender role conflict (O'Neil et al.). The first factor, Success, Power and Competition, is a measure regarding the excessive importance placed on controlling others, accomplishment and attainment, success in the career, authority, and influence. It measures how males with gender role conflict struggle for individual gain against other persons. It can also

calculate how men who have gender role conflict attempt being superior over other individuals (O'Neil et al.).

Restrictive Emotionality is the second factor identified by O'Neil et al. (1986). Restrictive Emotionality has been identified as that uncomfortable feeling experienced when emotions are expressed by others. Restrictive Emotionality has been described as the experience of finding it difficult to show or discuss feelings of a personal nature. Restrictive Emotionality continues to be the same factor and has not changed from the original theoretical model (O'Neil et al.).

The third factor is Restrictive Affectionate Behavior Between Men. This factor is capable of determining discomfort levels experienced by men having gender role conflict when having to express individual thoughts or feelings with others, particularly other males (O'Neil et al., 1986). Additionally, the factor can also measure how difficult it is for the male with gender role conflict to touch other men. Finally, this factor examines how the gender role conflicted male avoids displays of caring expressions towards other males. It developed by combining the patterns of restrictive sexual and affectionate behaviors, health care problems, and homophobia (O'Neil et al.).

The final factor to be reviewed, Conflicts between Work and Family Relations, (O'Neil et al., 1986) examines various complexities regarding balancing employment, education or school, relationships with family, being stressed and working too much, not utilizing or having appropriate play or leisure time, and subsequent related health problems (O'Neil et al., 1986, 1995). It was oftentimes created in the gender role conflicted male as a result of being obsessed with attaining success and accomplishments (O'Neil et al., 1986).

Past research has examined many differential interactions that occur among the four factors and the six theoretical patterns of gender role conflict (O'Neil, 2008). The factors and patterns often interrelate to generate various distinct behaviors in different individuals (O'Neil, 1982). Studies have demonstrated that even though two individuals may both experience gender role conflict, their behaviors may not necessarily be similar to one another (O'Neil, 1982). However, research has determined that gender role conflict has at times influenced relationships and beliefs regarding relationships more than other situations (O'Neil, 2008). One example occurs in gender role conflicted males who are very competitive, desire power, and are controlling (O'Neil et al., 1995). These individuals often experience problems in their interpersonal relationships within their homes, jobs, or in common public (O'Neil et al.). Problems that transpire are often the result of maladaptive beliefs regarding relationships (O'Neil et al.). Issues within interpersonal relationships often develop because the gender role conflicted male has excessive needs for control, competition, and power. He considers openly communicating his needs to others as a sign of personal weakness or showing powerlessness and lack of control. Interpersonal relationships have been hypothesized as being untidy or disorganized or having the tendency for being shallow and seemingly phony, even in optimal circumstances (O'Neil, 1981a). In the worst case scenario, men exhibiting gender role conflict are abusers within their poor and unproductive relationships (O'Neil, a). Gender role conflict creates many obstacles that can negatively impact interpersonal relationships including being unhappy within the relationship, problems in the employment environment, inadequate closeness, and being physically or sexually abusive (O'Neil et al.).

Restricted Emotionality was noted as being frequently exhibited in gender role conflicted males who experience problematic relationships (O'Neil, 1981b). Research has suggested males learn initially in childhood to ignore personal feelings, creating Restrictive Emotionality (O'Neil, 1982). Restrictive Emotionality does not allow for the ability to distinguish individual feelings, leading to conflict within personal relationships (O'Neil, b). Unhealthy interpersonal associations with other individuals can occur due to poor boundaries created by the gender role conflicted male (Sileo, 1996). Healthy interpersonal relationships require those involved to be able to disclose their personal selves, confide, be trusting, and show their weaknesses to the others in the relationship in order for that relationship to be able to succeed and flourish (Sileo). Research has identified several issues that arose from gender role conflict including problems within marriages (Cramer, 2002), dissolved marriages (Mackey, Diemer, & O'Brien, 2000), and abusive relationships (Rando et al., 1994). Additionally, gender role conflict has been found to correlate with the social problems of sexually aggressive behaviors, being hostile to females, and accepting the falsehood that rape can be a justifiable behavior (Rando, Rogers, & Brittan-Powell, 1998).

Another facet of gender role conflict, part of the factor Conflict Between Work and Family Relations, which requires additional research, was the component of the male-female relationship. Research has determined that the aspect of Conflict Between Work and Family Relations can influence relationships (Good et al., 1995; Sharpe & Heppner, 1991). It can also impact romantic associations, and correlates positively with having poor self-esteem feelings, being anxious and depressed (Sharpe & Heppner).

Gender role conflict was identified as occurring in four distinct levels (O'Neil, 1990; 2008). These levels have been known to coincide or overlap with another level (O'Neil, 1990). The four levels are capable of impacting the cognitive, affective, behavioral and unconscious parts of a person (O'Neil, 1990). These four levels can also be restrictive due to the ability to manipulate the external representation in a gender role conflicted man (O'Neil, 2008). Each of the four levels is capable of interaction to create conflict within male gender roles. However, each level will not be the same for each particular man (O'Neil et al., 1995). Stereotypical ideas and feelings about males and females are capable of creating harmful cognitions, which comprises the cognitive component of gender role conflict. The affective component for gender role conflict was comprised of negative beliefs regarding male or female gender roles. The behavioral element of gender role conflict contains the individual who has gender role conflict and examines how they behave, respond, and deal with other individuals. The final component of gender role conflict was the unconscious, which was comprised of repression of conflict, and was not known consciously by the person. However, the unconscious, even while repressed, has the power to manipulate or sway emotions, cognitions, or contact on interpersonal levels (O'Neil et al.).

Past research in gender role conflict. Gender role conflict studies in the past have typically been divided into four distinctive groups: psychological well-being, interpersonal interactions, therapy, and multiculturalism. These groups and gender role conflict research are summarized in the subsequent sections.

Research has determined that a person can be at risk psychologically for injury from gender role conflict (Blazina & Watkins, 1996). Blazina and Watkins determined

that men who are high in gender role conflict typically have higher incidence of mental health problems and alcohol or drug abuse. Also, certain types of gender role conflict, particularly those where males display elevated scores on Restrictive Emotionality and Success, Power, and Competition, are prone to exhibit psychological problems. Studies also found that demonstrating high gender role conflict makes an individual less likely to request assistance or aid for mental health problems (Blazina & Watkins).

Researchers have further established gender role conflict to be significantly correlated in a negative manner for a male's capability to process feelings of others and his capacity for processing his individual emotions (Sheppard, 1994; Fischer & Good, 1995). Males who have been found to demonstrate elevated rankings on Restrictive Emotionality; Restrictive Affectionate Behavior Between Men; and Success, Power, and Competition exhibit depressive symptom tendencies (Sheppard). Studies have found that elevated areas on Restrictive Emotionality, Restrictive Affectionate Behavior Between Men; Success, Power, and Competition; and Conflict Between Work and Family Relations can be predictive of males who experience problems with conversing about their own personal feelings (Fischer & Good).

High scores indicating gender role conflict related positively to having elevated levels of guilt (Thomson, 1995). The psychological problems of anxiousness and depressive tendencies have also correlated in a positive manner with gender role conflict; however, feelings of confidence, self-worth, and familiarity within a relationship have been determined as correlated in a negative manner with gender role conflict (Sharpe & Heppner, 1991). Studies found feelings of individual lack of worth, or lack of self-confidence, anxiousness, and depressive tendencies relate significantly on the subscales

of Restrictive Emotionality; Restrictive Affectionate Behavior Between Men; and Conflicts between Work and Family Relations (Sharpe & Heppner). Familiarity in a relationship, otherwise known as intimacy, was significant on the factors of Success, Power, and Competition; Restrictive Emotionality; and Restrictive Affectionate Behavior Between Men. Further, researchers found that males with increased levels on the above factors of gender role conflict were incapable of experiencing true intimate contact in a significant interpersonal relationship (Sharpe & Heppner). Other researchers agreed and reported males with gender role conflict can damage personal self-esteem and debilitate the capacity for developing and experiencing intimacy within interpersonal interactions (Mahalik, Locke, Theodore, Cournoyer, & Lloyd, 2001). Additionally, relationship satisfaction was determined to not be necessarily related to gender role conflict (Mahalik et al., 2001). Males who exhibited gender role conflict demonstrate more difficulty in processing or understanding emotions and are fearful of being intimate with others (Fischer & Good, 1997).

Research has found that if a woman perceives her significant other to be gender role conflicted, then the levels of fulfillment and contentment within the relationship, in addition to well-being, can be influenced (Rochlen & Mahalik, 2004). Rochlen and Mahalik determined that females who report they perceive their male significant other as having gender role conflict were prone to demonstrate more depressive and anxietal symptomology. This study evaluated a woman's awareness regarding gender role conflict to her personal well-being and levels of contentment with her significant relationship. Those females who perceive their male significant others as attaining less on the two

factors of Success, Power, and Competition and Restrictive Emotionality are prone to report elevations for satisfaction regarding personal relationships (Rochlen & Mahalik).

Studies have determined that specific mental health disorders are positively correlated to gender role conflict. Positive correlations have been determined among gender role conflict and depressive feelings, obsessive-compulsive disorder, paranoia, psychoticism, and interpersonal insensitivity (Good et al., 1995). Elevated scores on Restrictive Emotionality; Success, Power, and Competition; and Conflict Between Work and Family Relations factors are good predictors of mental health issues (Good et al.). Other research agreed by reporting that individuals with mental health issues demonstrated elevated scores on Restrictive Emotionality and Restrictive Affectionate Behavior Between Men when compared to a sample of individuals with no mental health diagnoses (Van Delft & Birk, 1996).

Gender role conflict was determined to influence certain mental health protective defenses, or defense mechanisms (Mahalik, Cournoyer, DeFranc, Cherry, & Napolitano, 1998). Specifically, males with tendencies to be highly rigid typically regard being powerful, competitive and successful as desirable personal attributes. These men are prone to rarely demonstrate overt expressions of warmth, caring, or feelings, which are demonstrative of having undeveloped and disturbed psychological defense mechanisms (Mahalik et al.). Males with these characteristics will often be reserved in displaying their feelings or emotions overtly. Further research has determined that males with an elevated score on Success, Power, and Competition and Restrictive Emotionality often employ defensive methods that can cause negativity towards others (Mahalik, DeFranc, Cournoyer, & Cherry, 1997).

Numerous studies have identified the detrimental consequences of gender role conflict in association with interpersonal relationships. Gender role conflicted males encounter impactful situations for their interpersonal interactions (Campbell & Snow, 1992). Research has determined negative correlations among gender role conflict and how it impacts warmth and closeness within personal interactions (Sileo, 1996). As scores on Restrictive Emotionality; Restrictive Affectionate Behavior Between Men; and Success, Power, and Competition factors get higher, warmth and closeness in males lessens (Sileo). Other researchers have agreed finding that elevated scores of gender role conflict are a damaging correlation for warmth and closeness within relationships (Chartier & Arnold, 1985). Having elevated ego strength with a combination of decreased gender role conflict necessitates the best possibility of warmth and closeness within a relationship (Arnold & Chartier, 1984). Gender role conflict can negatively predict certain interpersonal actions within relationships, and has been related to damaging interpersonal actions, including being distrustful, being detached, and being hostile (Mahalik, 1996). Gender role conflict was prone to occur when elevated scores are present on the factors of Restrictive Emotionality; Restrictive Affectionate Behavior Between Men; and Success, Power, and Competition. Further, an elevated score on the factor of Conflict Between Work and Family Relations produced feelings of being compliant or submissive, friendly, or hostile (Mahalik). Elevated levels of warmth and closeness often relate to less restriction in expressing feelings (Fischer & Good, 1995).

A study by Robinson and Schwartz (2004) has reviewed the impact of gender role conflict in males on their cognitions and emotions about the position and privileges of females, and also about their opinions concerning African-Americans. The research

found males who demonstrated elevated scores on the factor of Restrictive Affectionate Behavior Between Men are typically likely to support more conventional feelings and thoughts about females. Caucasian males from the United States who are limited in their ability to be expressive in their affection towards other males, and are likely to embrace being successful, powerful, and competitive, are more likely to demonstrate damaging ideas and thoughts about African-Americans (Robinson & Schwartz).

The impact of gender role conflict has been investigated in regard to marital satisfaction. Elevated scores of gender role conflict have been shown to impact matrimonial fulfillment in a negative manner (Campbell & Snow, 1992). Individual gender roles within relationships have influenced or determined the sort of marriage experience that was shared by the couple (Mintz & Mahalik, 1996). Specifically, men with elevated results on the factor of Success, Power, and Competition are typically in a more conventional domestic role than males who scored less on the factor (Mintz & Mahalik). A possible explanation for this occurrence is that males with gender role conflict have more difficulty in developing closeness and warmth in their interpersonal relations (Fischer & Good, 1995; Sharpe & Heppner, 1991). The factor of Restrictive Emotionality has been found to predict levels of intimate behaviors, with elevated levels of warmth and closeness being foreseen by lesser scores on the factor of Restrictive Emotionality (Fischer & Good). The factors of Restrictive Emotionality; Restrictive Affectionate Behavior Between Men; and Conflicts Between Work and Family Relations correlated with levels of warmth and closeness within relationships (Sharpe & Heppner). In particular, as the gender role conflict factor increased, the degree of warmth and closeness declined.

Gender role conflict has been researched in regard to being hostile towards women (Chartier et al., 1986) and assaulting women sexually (Rando et al., 1994; Rando, McBee, & Brittan, 1995). Elevated scores of gender role conflict are significant predictor's of hostility towards women (Chartier et al.). Myths about sexual attack and rape, as well as being accepting and hostile towards females, correlated with elevated scores on the factors of Success, Power, and Competition issues; Restrictive Emotionality; and Restrictive Affectionate Behavior Between Men (Rando et. al, 1994, 1995). Men who are prone to sexual aggression have been found to exhibit elevated scores on Restrictive Emotionality and Restrictive Affectionate Behavior Between Men, as opposed to males who did not demonstrate sexual aggression (Rando et al., 1994). Conversely, research determined that gender role conflict was not notably correlated for men to be determined as not aggressive or men who are prone towards aggression in a sexual manner (Rando et al., 1995). The interactions among gender role conflict and being harassed on a university campus found that males having elevated scores of gender role conflict are typically more lenient in regards to harassment (Kearney, Rochlen, & King, 2004.).

Gender role conflict has been studied in regard to violence by males against women (O'Neil, 1992). O'Neil identified males who exhibit lower scores of gender role conflict are not typically as violent as are males who have elevated scores of gender role conflict. Men who have gender role conflict sometimes are violent towards women as a way to exploit their personal authority or display their dominance (O'Neil, Owen, Holmes, Dolgopolov, & Slastenin, 1994). Males who are violent towards females have been found to be partial to topics that are powerful, controlling, successful, and restrict

emotions (O'Neil & Harway, 1997). O'Neil and Harway have suggested men who are violent towards females do so when feeling that their significant other was a threat to their ability to be successful, powerful, or competitive. Unfortunately, these males are incapable of communicating their threatened feelings in an appropriate way to their significant other. Research has also determined that elevated degrees of gender role stress were more likely to result in more incidents expressing irritability, being angry, and experiencing jealous emotions (Eisler et al., 2000). Further, elevated gender role stress was also a predictor of an increase in the probability of aggressive behaviors.

The interaction between males with elevated levels on the Masculine Gender Role Stress (MGRS) Scale and circumstances where masculinity and gender were relevant has been examined (Moore & Stuart, 2005). Men with elevated scores on the MGRS scale demonstrated elevated occasions of being angry, having negative attributions regarding meaning by others, and being verbally aggressive in circumstances regarding masculine gender-relevance (Moore & Stuart). Males who adhere strongly to traditional gender role customs may be predisposed to assess situations regarding the importance or insignificance of endorsing inappropriate gender role beliefs. Researchers theorized that being violent against women occurs when a male appraises circumstances as being a threat or stressor to his classification of and his capacity to endorse his conventional masculinity as a gender role (Eisler et al., 2000). Therefore, a man with gender role conflict can evaluate tension, which can create thoughts or cognitions or emotional and physical responses, which can intensify the possibility of violent behaviors (Moore & Stuart).

Research suggested that higher possibilities of violent behaviors by males with elevated scores of gender role conflict can occur as a result of: learning to be defensive; fear of being emasculated; feelings, which include being angry, feeling guilty, hating the self, anxiousness; feeling threatened in regard to personal masculinity, and their controlling and powerful behaviors (O'Neil & Nadeau, 1999). Violent behavior against females by men has been theorized as originating from contributions from overall society, which included the traditional veneration of men who demonstrate those types of behaviors, institutional disproportionate of power distribution among males and females, and recent societal norms in society about expected behaviors and roles for males and females (O'Neil & Harway, 1997).

Socialization for gender roles should be considered as important in regard to aggression towards women. According to O'Neil and Harway (1997), misogynist beliefs about females, as well as unidentified and constrained feelings, are likely contributions to male aggression against females. Further, male-female different interaction styles within relationships, including different ways to communicate, tolerance of mental mistreatment or violence, not understanding the development of being socialized, past violence or abuse in the domestic home, and being fearful of the opposite sex, are all likely contributors to future violent behaviors against females (O'Neil & Harway).

The study of male-male interpersonal relationships has been studied significantly less within the psychological discipline. However, research has found that gender role conflict can manipulate or control relationships between males as well as relationships between males and females (Horhoruw, 1991). Gender role conflict correlated negatively with the ability of a man to have nearness and warmth with other men as friends

(Horhoruw). The incapability to have relationships with other men within male relationships occurred primarily on the three factors of Restrictive Affectionate Behavior between Men, Restrictive Emotionality; and Success, Power, and Competition issues (Sileo, 1996).

Researchers have also examined gender role conflict and the necessity to inquire for assistance in specific matters, including seeking psychotherapy or mental health counseling. Males with elevated scores of gender role conflict are not as apt to ask for assistance relating to mental health concerns as those males who have lower scores of gender role conflict (Wisch, Mahalik, Hayes, & Nutt, 1993). Another study found that men seeking help was negatively related to elevated scores on the factors of Restrictive Emotionality and Restrictive Affectionate Behavior Between Men (Good, Dell, & Mintz, 1989). Males who demonstrated elevated scores of gender role conflict were prone to prefer unconventional mental health methods, which describe communal or joint techniques as opposed to customary and typical counseling methods. It can be hazardous for men with gender role conflict to evade assistance with mental health issues due to the fact that gender conflicted males have a higher possibility for an increase in mental health pain and anguish (Good et al., 1995).

Men with gender role conflict who begin therapeutic treatment require evaluation and treatment from mental health experts with the capability to recognize and understand the parameters surrounding gender role conflict (O'Neil, 2008). Mental health professionals who treat gender role conflict in men should be able to comprehend and evaluate gender role conflict as a mental health issue and recognize the feelings that exist (Wisch et al., 1993). The mental health professional should be cognizant and

understanding of the role that gender role conflict has impacted upon the man's relationships, including employment, interpersonal, and emotional (O'Neil, 1981b; 2008). Therapists must be attentive and cognizant of stereotypical beliefs and the consequences that impact the relationships of a gender conflicted man (O'Neil, b). One theoretical endorsement was using interpersonal psychotherapy with males who have gender role conflict (Mahalik, 1996). The reason for the use of interpersonal psychotherapy is because this theoretical model of therapy was able to focus on recognizing and changing interpersonal patterns that are damaging, harmful or maladaptive. Interpersonal psychotherapy can balance a gender role conflicted male's controlling needs as well as affectionate needs (Mahalik).

Multiculturalism is an important aspect of the psychological counseling field. Gender role conflict and research in multicultural topics have provided valuable research about minority cultures and their experience with gender role conflict. Studies into gender role conflict have been completed with Caucasian, middle class men who have a post-secondary education (Stillson, O'Neil, & Owen, 1991), which can be argued as being limited in dimensions and deficient in complexity (Tolson, 1977). Recent investigations have examined the effects of gender role conflict upon diverse American minority groups. Males who are diverse in racial and cultural customs have been theorized as encountering gender role conflict in distinct and diverse ways (Stillson et al.).

Caucasian gender role thoughts and feelings are typically more conventional than the attitudes of African-Americans (Finn, 1986). Research has determined there are similar comparisons between how African-American males, Latino-American males, and

Caucasian males exhibit importance on the factors of Success, Power, and Competition; Restrictive Emotionality; and Conflicts Between Work and Family Relations (Stillson et al., 1991). Caucasian males, African-American males, and Latino-American males demonstrate significant decrease in employment stress and elevated physical damage (Stillson et al.). However, differences were noted in regard to how Asian-American men demonstrated gender role conflict within interpersonal associations. Asian-American males with gender role conflict were determined to exhibit difficulties with acculturating to Western traditions (Kim, O'Neil, & Owen, 1996). The researchers were not able to conclude those males with various Asian heritages encounter differences as they undergo acculturation or experience gender role conflict. Similarly, Mexican-American males with gender role conflict exhibit less acculturation, but elevated instances of machismo or excessive masculinity (Fragoso, 1996). The pressure of a Mexican-American man was a stable predictor of acculturation, gender role conflict, and excessive masculinity. Particularly, as masculinity, or machismo, increases in Mexican-American males, there are increases in the amount of gender role conflict. Elevated scores of gender role conflict and the presence of machismo are also predictors of strain, anxiety, and depressive feelings (Fragoso).

The importance of ethnic and cultural identities on male gender role conflict has been studied, in particular with regard to African-Americans (Wade, 1996). African-Americans who display gender role conflicts usually are in the stage of racial identity that is externally defined. African-Americans who are encountering the internally defined racial identity stage typically experience fewer incidents of gender role conflict. Males who are able to consider their racial identity on the basis of feelings are less likely to

exhibit gender role conflict than the males who determine their ethnic identify based on externally external facades (Wade). It has also been determined that Russian-American males exhibit gender role conflict (O'Neil et al., 1994).

Respect for multiculturalism is a necessity for therapeutic success to occur with men who exhibit gender role conflict. The counselor or psychotherapist improves the probability of successful outcomes within counseling through recognition and acceptance regarding the impact that gender role conflict has created upon men from diverse cultural backgrounds. Gender role conflict problems can be influencing or camouflaging concerns related to ethnic or cultural identities (Wade, 1996).

Past research in gender role conflict with females. Researchers in gender role conflict theory have hypothesized that females with perceived different expectancies about their personal gender role behaviors may develop role conflict (Fallon & Jome, 2007; Allison, 1991; Wetzig, 1990). The use of the Gender Role Conflict Scale (GRCS-F) with females has been less extensive in research investigations. The GRCS-F was created when permission was requested to change the pronouns on the GRCS to feminine from masculine (Borthick, 1997) in order to study females during a doctoral dissertation (Borthick; Borthick Knox, Taylor, & Dietrich, 1997). Because there are fewer usages of the GRCS-F, the construct has not yet been operationally well-defined in the research literature (O'Neil, 2011). There have been complex questions raised about how gender role conflict may be experienced for women. Using the GRCS-F to assess the level of female gender role conflict, an argument can be made that females are likely to feel and experience some of the same feelings and patterns produced by male gender role conflict (O'Neil).

The Gender Role Conflict Scale-Female version (GRCS-F) has been factor analyzed, and it was concluded that factor structures that can be considered comparable to that of the male factor structure found in male GRCS (Borthick et al., 1997). In research using the GRCS-F, important gender differences were noted on some of the subscales. The subscales of Restrictive Emotionality, Success, Power, & Competition, and Restrictive Affectionate Behavior Between Men, showed significant sex difference as males report considerably more gender role conflict than do females (Borthick et al., 1997; Schwartz, Higgins, & He, 2003; Silva, 2002; Eicken, 2003; Harnishfeger, 1998; Newman, 1997; Zamarippa, et al., 2003; Hanson & Yanico, 2003; Magovcevic & Addis, 2005). Eicken (2003) identified an exclusion to the above with no sexual difference between males and females on the subscale of Restrictive Emotionality being determined. One study found women to have greater variance on the subscale of Restrictive Affectionate Behavior Between Women than males (Korcuska & Thombs, 2003); however, this study identified males as having high incidence of Restrictive Emotionality, which was indicative of greater emotional expressiveness.

Research determined that the subscale of Conflicts Between Work/School and Family Relations reliably demonstrated no significant sex/gender difference (Korcuska & Thombs, 2003; Borthick et al., 1997; Silva, 2002; Harnishfeger, 1998; Newman, 1997; Zamarippa et al., 2003; Hanson & Yanico, 2003) in six separate research investigations. This may suggest that the subscale of Conflict Between Work/School and Family Relations lacks construct validity (Good et al., 1995). However, two studies determined that females indicate higher levels for gender role conflict on the subscale of Conflicts

Between Work/School and Family Relations than their male counterparts (Schwartz, et al., 2003; Eicken, 2003).

Self-efficacy.

History of self-efficacy. Self-efficacy has become a significant construct in psychological research and literature since its inception by Albert Bandura in 1977 (Maddux & Stanley, 1986). The theory of self-efficacy was derived in part from Miller and Dollard's (1941) theory of social learning and imitation. The social learning and imitation theory by Miller and Dollard refused the idea of "associationism" as a behavioral concept (Pajares, 2002). The theory lacked "creation of novel responses or the processes of delayed and non-reinforced imitation" (Pajares, as found online).

The social learning theory of Julian B. Rotter further studied expectancies regarding individual success in specific events or activities (Rotter, 1954, 1982; Rotter, Chance, & Phares, 1972). Rotter examined the expectancy that an individual will demonstrate success while performing specific actions (Rotter, 1954, 1982). Rotter was inspired by previous research by Lewin, Dembo, Festinger, & Sears (1944) regarding aspiration levels that occasionally assess success expectancy (Rotter, 1954, 1982, Rotter et al.).

This theory initiated the way for Bandura and Walters (1963) to write *Social Learning and Personality Development*, which featured the psychological principles of vicarious reinforcement and observational learning. However, further research during the 1970s led Bandura to identify that a significant component was omitted from traditional and established learning theories, as well as his own social learning theory (Pajares, 2002). Bandura (1977a) identified an important component that had been missing with

the publication of his article on self-efficacy. This missing component was identified as self-beliefs (Bandura, a; Pajares).

Self-beliefs were identified as those beliefs that an individual has about his/her capabilities and their ability to perform in specific ways or manners in order to accomplish or achieve personal goals (Bandura, 1977a). These self-beliefs were further identified and renamed as "self-efficacy" (Bandura, a). The term self-efficacy allowed for the differences between outcome expectancies and expectancies for success (Kirsch, 1986).

Definition and theory of self-efficacy. The theory of self-efficacy was initiated by Albert Bandura in 1977. Bandura defined self-efficacy to be "the conviction that one can successfully execute the behavior required to produce outcomes" (1977a, p. 193). Self-efficacy can also be defined as the individual beliefs that a person has regarding their capabilities for performing in events that influence their lives (Bandura, 1994). Self-efficacy theory was further explained as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Bandura asserted that personal self-efficacy beliefs established individual personal feelings, thoughts, motivations, and behaviors (Bandura, 1994). Beliefs about personal self-efficacy supply the basis for individual motives, achievement, and personal happiness, safety, interests, and comfort (Bandura, 1986).

Bandura (1994) posited having healthy and positive self-efficacy beliefs can augment individual achievement and welfare in a variety of instances. The theory of self-efficacy theorized that behavioral and emotional modification arose as a result of the

altering of a person's own beliefs regarding his/her proficiency or efficacy (Bandura, 1977a, 1982, 1986). Bandura (a, 1982) proposed that self-efficacy was capable of mediating behavioral modifications through the use of cognitions. Human functioning was influenced by the personal self-efficacy beliefs in that "people's level of motivation, affective states, and actions are based more on what they believe than on what was objectively true" (Bandura, 1997, p. 2). The behaviors exhibited by individuals are often the result of their beliefs about their personal capabilities as opposed to their actual aptitudes and competences (Pajares, 2002). This was because the individual personal perceptions of self-efficacy often influenced how a person utilizes the information, facts, and abilities that they possess. Understanding the significance of self-efficacy beliefs assisted in understanding how some people's actual performance or behaviors are vastly different from their actual capabilities or skills. Prediction of individual achievement for success was improved by examining the personal self-efficacy beliefs of the person as opposed to their past accomplishments, success, education or knowledge, aptitudes, or skillfulness (Pajares).

Self-efficacy theory suggested that an individual can demonstrate two different expectations regarding his/her ability to master or cope with situations or environments (Maddux & Stanley, 1986). First, the individual can exhibit "an outcome expectancy" (p. 250). The outcome expectancy was an idea that certain behaviors may or may not direct to a specific result or conclusion. The second expectation was called "a self-efficacy expectancy" (p. 250). The self-efficacy expectancy was an individual's conviction that he or she is or is not competent to achieve or execute a necessary action or behaviors (Maddux & Stanley). Self-efficacy expectancy was believed to be the most significant in

impacting how behaviors are initiated as well as the perseverance and determination when an individual was feeling frustrated or has fears of failing. Additionally, instruments used to assess self-efficacy expectancies are considered to be good at predicting the initiation of behaviors and diligence at pursuing the behaviors (Maddux & Stanley).

Knowledge regarding self-efficacy expectancies has been theorized as coming from four distinct resources (Maddux & Stanley, 1986). These four resources include: performance or enactment experiences, vicarious experiences, verbal persuasion, and emotional or physiological arousal. These four resources have varying ability to manipulate over the self-efficacy expectancies. The most influential on self-efficacy expectancies was performance or enactment experiences. Performance or enactment experiences can be defined as past experience by a person that was clearly successful or was an undeniable failure (Maddux & Stanley). The second most influential in self-efficacy expectancies was that of vicarious experiences. Vicarious experiences can be identified as such learning experiences as modeling, imitation, and observational learning. The influence on vicarious experiences was dependent upon variables such as perception of resemblance or likeness between the person that was being observed and the observer, the amount/number and diversity of the person that was being observed, and the perception of power of the person that was being observed (Maddux & Stanley). Verbal persuasion and emotional arousal are less significant as a source for self-efficacy expectancies. Variables such as "expertness, trustworthiness, and attractiveness of the source" have been determined to be important influences on verbal persuasion (p. 253). Self-efficacy was affected by emotional arousal if individuals relate negative emotions or

feelings with bad behavior functioning, being incompetent or failing (Maddux & Stanley).

Self-efficacy beliefs are theorized as influencing individual behaviors, thoughts, feelings, and motivations through four specific "processes" (Bandura, 1994, p. 71). These processes are affective processes, cognitive processes, motivation, and selection processes. Affective processes can be defined as those methods to regulate the emotions, feelings, and that can elicit an emotive experience or outcome. During stressful or challenging events or circumstances, a person's belief in his/her ability to cope will significantly influence the level of worry, pressure, and depressive-type symptoms that he or she will feel. In turn, those internalized beliefs about personal self-efficacy to cope also influenced the motivational levels of the person. The person who was able to manage stress and anxiety through his/her perceptions of self-efficacy can reduce distressful feelings and thoughts. However, the individual who felt incapable of controlling disturbing thoughts or situations will feel high levels of stress, worry, and demonstrate anxietal symptoms because they often focus on their deficits for managing stressful experiences. Further, these individuals may worry about situations that are threatening and agonize about events that may not even occur. This was a demonstration of inefficacy of thought that creates stress for themselves and impairment in their personal ability to function effectively. An individual with personal perceptions of self-efficacy regarding his/her ability to cope with stressful situations will not avoid circumstances that cause stress or anxietal symptoms. Instead, the person with robust self-efficacy beliefs will attempt challenging and stressful new hobbies, jobs, or interests (Bandura).

The cognitive processes, as defined by Bandura (1994), are the thought procedures that assist in the acquiring, organizing, and utilization of knowledge. Betz and Hackett (2006) stated that self-efficacy was not a trait theory; instead, self-efficacy should be viewed as a cognitive assessment or evaluation of the future accomplishments or abilities of an individual. Personal self-efficacy beliefs influence thought processes in many ways. Most of the behaviors by humans are controlled by planning for important goals that are deemed significant and important to the person (Bandura). However, most goals are subjected to personal assessment of self-aptitudes and abilities. Therefore, the higher that the individual perceived his or her self-efficacy, the more elevated personal goals and aspirations develop. Additionally, the individual was also more committed to his or her goals and personal aspirations (Bandura). This was evidenced by the rehearsal and construction of anticipated scenarios. Those individuals with high self-efficacy envisioned a situation or setting that was successful with encouragement and support. But, those with low self-efficacy beliefs envisioned a failed scenario and will focus on events that can go awry. According to Bandura, having feelings of self-doubt creates a challenge to attain success.

The motivation process is involved in activating action (Bandura, 1994). Motivation can be identified as the pathway to accomplishment and achievement and can vary in the level of energy, potency, determination of exertion of energy. Motivation was often self-regulated and created through human cognition. Personal beliefs of self-efficacy greatly impacted the regulation of self and motivation. Motivation for individuals was often related to planning and anticipation or "forethought" which can direct their behaviors. Further, individuals created ideas about individual abilities and

envisaged various results for the visualized behaviors. This created goal setting opportunities for individuals in which they plan means to attain their goals (Bandura).

Selection processes are identified as those pursuits or circumstances that are chosen by an individual that shape his/her personal lives and status (Bandura, 1994). Personal ideas about self-efficacy can impact the individual's life due to the form of decisions, interests, and surroundings chosen by the person. This is because individuals often bypass those circumstances, pursuits, and hobbies that are perceived as being outside of their personal competence or qualifications. However, an individual likely assumed responsibilities or tasks that he or she believes themselves qualified to handle. These life selections or choices created various life pathways for the individual based upon his/her distinctive aspirations, capabilities, and societal contacts and group interactions. This was achieved because the societal impact created in specific situations or settings can influence awareness, skills and abilities, and values for some length of time following the event that utilized the beliefs regarding personal self-efficacy (Bandura).

Past research in self-efficacy in engineering. Self-efficacy has been identified as a predictor for occupational investigation and educational training for students (Dawes et al., 2000). Therefore, having lower feelings of self-efficacy can limit exploring certain jobs and training. Research in the field of engineering has identified self-efficacy as a significant predictor for student success (Rittmayer & Beier, 2009). Studies have acknowledged that self-efficacy is a significant variable for students studying to be engineers, specifically for their diligence and determination, interest levels, and success and accomplishments (Schaefers et al., 1997; Hackett et al., 1992; Lent et al., 2003).

Students identified as being high in self-efficacy are typically more driven to be successful and more likely to attain personal objectives or goals, such as making higher grades to attain success (Bandura, 1997; Lynch, 2010).

Marra and Bogue (2007) found a significant correlation between the variables of self-efficacy and perseverance for both males and females (as cited by Jones, Paretti, Hein, & Knott, 2010). High self-efficacy levels in students are indicative of having motivation to exert effort to attain their target objectives (Bandura, 1997; Lynch, 2006). In addition, students with high levels of self-efficacy are more likely to demonstrate resilience when facing problems in their educational studies (Bandura). Studies have identified students with high self-efficacy regarding their ability to be engineers are more likely to persevere with their studies than are students who have low self-efficacy regarding engineering (Britner & Pajares, 2006). Those students with high self-efficacy regarding engineering have also been found to be improved performers compared to individuals with low self-efficacy for engineering. Because self-efficacy can be a predictor of scholastic and intellectual performance that was actually higher than an individual's actual abilities or past success and accomplishments (Bandura), having high self-efficacy feelings regarding engineering can be a predictor for success as an engineer (Rittmayer & Beier, 2009).

The *gender gap* (Rittmayer & Beier, 2009) in engineering has been attributed to personal self-efficacy levels (AAUW, 2008). Past studies have identified that self-efficacy regarding capabilities as an engineer, or other science, technology, or mathematics (STEM) field, exhibit significant gender discrepancies (Dawes et al., 2000; Schunk & Pajares, 2002; Rittmayer & Beier). This research has also identified that those

individuals with high self-efficacy regarding their abilities as engineers will likely be more successful in the field of engineering and other STEM fields (Rittmayer & Beier; Schunk & Pajares). The term *confidence gap* has been created as an explanation for the gender differences in self-efficacy perceptions for engineering and other STEM fields (Sadker & Sadker, as cited by Rittmayer & Beier, 2009). According to studies, the confidence gap is in existence between males and females, even though there are often similar achievements, including academic performance (Pajares, 2005; Watt, 2006). One study hypothesized that the fewer numbers of females and minority individuals in engineering and scientific fields can be directly linked to having lower amounts of perceived self-efficacy (Hyde et al., 1990).

Past studies have examined the connection between self-efficacy and the field of engineering and other STEM disciplines. Male college students were found to be more self-efficacious regarding their abilities in math than females (Lent, Lopez, & Bieschke, 1991; O'Brien, Martinez-Pons, & Kopala, 1999; Hackett & Campbell, 1987). This significantly contributed to the consideration of careers that would utilize mathematics and science abilities (Lent et al., 1991; Post, Stewart, & Smith, 1991; Hackett & Betz, 1989; Hackett & Campbell, 1987). Males were also determined to have increased self-efficacy for mathematical abilities and better math training, which is directly influential on personal self-efficacy beliefs, for jobs in science and interest in a career that is associated with science (Lapan, Boggs, & Morrill, 1989). In a related study, eighth-grade male students were identified as being more likely to continue into careers in engineering or science fields than were females (Mau, 2003). Math self-efficacy is considered one of the most significant predictors of persisting into an occupation in either engineering or

science (Mau). Mathematics has been identified as a "critical filter" that often prepares or eliminates students interested in engineering or other STEM fields as occupations (Betz & Hackett, 1983; Dawes et al., 2000).

Beliefs for both men and women students studying engineering identified factors such as being understood, gaining knowledge in their education, and being helped as more significant for females than males (Hutchison, Follman, Sumpter, & Bodner, 2006). Males and females both stated that being compared on performance had a significant bearing on individual self-efficacy feelings. However, the occurrence was considered to be a positive experience for males, while females reported the experience to be a negative event (Hutchison-Green, Follman, & Bodner, 2008).

Vogt (2008) found a significant relationship between the amount of faculty contact and communication with levels of student personal self-efficacy. The study examined 713 students in the field of engineering and learned that self-efficacy, self-confidence, and accomplishment were significantly related to the level and quantity of faculty interactions. Another study found challenges, such as feeling excluded and not fitting into the engineering program, were detrimental to self-efficacy for female engineering students (Marra, Rodgers, Shen, & Bogue, 2009). Self-efficacy can be considered a significant contributor for influencing occupational interests (Dawes et al., 2000). Because engineering and other technological fields utilize skills and abilities in both mathematics (Dawes et al.; Betz & Hackett, 1983) and science (Andre et al., 1999), self-efficacy is a noteworthy indication for success as an engineer (Rittmayer & Beier, 2009).

Interventions to improve the self-efficacy of students studying engineering have been devised and executed (Jones et al., 2010). One method to improve self-efficacy for engineering and other STEM related fields is to increase and expand performance outcomes (Rittmayer &Beier, 2009). This can be accomplished through improving mastery experiences as they are important for predicting self-efficacy levels (Britner & Pajares, 2006; Bandura, 1997). Ways to improve mastery experiences include structuring activities to comprise "proximal goals" (p. 2) and maximizing the mastery experience by giving information and encouraging the student in order to assist them with enhancing self-efficacy (Rittmayer & Beier). Another way to improve the mastery experience was by incorporating assignments that are hands-on into the class curriculums and adding activities to improve the ability to self-regulate. Finally, Rittmayer and Beier suggest class assignments should be a challenge to the student; however, the assignments should not be unworkable.

Another way to improve self-efficacy, according to Rittmayer and Beier (2009) was through the use of vicarious experiences as a performance outcome. Role models are an important way to provide vicarious learning experiences, particularly when the student perceives a similarity between the role model and his/her own self. One way was to provide invitations to superior engineering students and professionals into the classroom. This allowed the students the opportunity to work with advanced engineering professionals or other students to enhance vicarious learning. Another way to encourage vicarious experiences was through assigning group tasks to a group of students with similar abilities (Rittmayer & Beier). Self-efficacy was improved when a student was

able to examine and study the success of prominent and important others, especially with female students (Zeldin & Pajares, 2000).

Social persuasion can be another way to improve performance outcomes, and thereby, improve self-efficacy for students (Rittmayer & Beier, 2009). Providing helpful encouraging comments or feedback to students, particularly when provided by a prominent individual, such as teachers or parents, can increase self-efficacy. Positive encouragement and advice was most valuable when the student had abilities and some self-confidence in those abilities, and believed he or she could achieve personal accomplishment (Rittmayer & Beier). Female self-efficacy was particularly susceptible to improvement through the use of social persuasion (Zeldin & Pajares, 2000). Ways to improve self-efficacy for engineering students through the inclusion of social persuasion included providing comments that were real, constructive, helpful, and suitable because students recognize fake acclaim (Rittmayer & Beier). Being successful as an engineer requires being effortful. Therefore, encouragement provided to students should include the message to persevere, even when there are problems or difficulty. Another way utilized in the study was to ask the parent of a student to be supportive of the student's interest in engineering; this was especially important for females. Additionally, education should be provided regarding how important engineering and other STEM fields are to students and their families. It is important to especially point out that engineering is not a career for men only; instead, women and girls are valuable as engineers as well. This can be done through the incorporation of additional and supplementary engineering events and activities (Rittmayer & Beier).

Engineering self-efficacy is further affected by the performance outcome of physiological reactions (Rittmayer & Beier, 2009). The self-efficacy of a person was influenced by his/her understanding of his/her emotions and bodily conditions, or physical states, when preparing for tasks and during presentation or function. Improved self-efficacy was a result of calmness and composure as opposed to feelings of nervousness or worry during task performance. To reduce anxiousness or apprehension, instructors talked with students about the anxiety related to mathematics and science, and also explained to the students that they are capable of controlling physiological responses. Additionally, teaching students to incorporate techniques for reducing anxiety, including deep breathing and learning to visualize as a skill, were effective. Also useful was to teach students how to practice relaxing as an anxiety-reducing activity. Finally, the instructor provided encouragement to the student to pay attention and focus on his/her required tasks as a means to decrease fear and apprehension, which may improve anxiety about assignments and projects (Rittmayer & Beier).

Career self-efficacy.

History of career self-efficacy. The concept of career self-efficacy was initiated in 1980 by Nancy Betz and Gail Hackett as collaboration to identify how Bandura's self-efficacy theory could be applied to the topic of career development and assessment (Betz & Hackett, 2006). The researchers at the time had experience investigating the lack of women pursuing math and science careers and the career development of women. Additionally, one of the researchers, Gail Hackett, was a career counselor with a background in social learning theory. Betz and Hackett discussed the impact of applying

Bandura's self-efficacy theory (1977a) to study the lack of women in the fields of science and technology, and to gain insight regarding women's career training and education.

Hackett and Betz (1981) initially applied the theory of self-efficacy to the career field as a way to examine the ongoing concerns in the career training for females. The researchers were concerned with determining how many careers were dominated by men, including jobs in engineering, mathematics, and science (National Science Foundation, 1984; Humphreys, 1982; Pfafflin, 1984) and the lack of identification for women's capabilities and aptitudes in career domains (Fitzgerald & Crites, 1980; Farmer, 1976). The hypothesis proposed that diverse gender-role socializations in society create differences in men and women; specifically, the differences can be identified according to Bandura's four sources of information regarding efficacy (Betz & Hackett, 1986; 2006). These four resources for information about efficacy include vicarious learning or modeling; accomplishments regarding performance; emotional arousal, including states of physiology and affect; and verbal persuasion (Bandura, 1997). The researchers further hypothesized that the career choice and development for women would be influenced by the sex/gender differences found because of the individual expectations of self-efficacy (Betz & Hackett, 1986). Self-efficacy theory created a means to identify influential facets or factors that impact career choice for women (Betz & Hackett, 2006). While the initial purpose of the study using Bandura's (1977a) self-efficacy theory was to understand how women had developed career-wise, the theory expanded to include universal career development and the career development of particular groups (Betz & Hackett, 2006). The career development research on specific groups in regards to self-efficacy included studies with senior adults (O'Brien Cousins, 1997); individuals with a disability (Luzzo,

Hitchings, Retish, & Shoemaker, 1999); female offenders (Chartrand & Rose, 1996); and individuals of color (Flores & O'Brien, 2002; Byars & Hackett, 1998; Hackett & Byars, 1996; Gloria & Hird, 1999; Tang, Fouad, & Smith, 1999). Further, Betz and Hackett (2006) argued that almost all people can be identified as having areas of behavior in which they perceived themselves as lacking, or having low self-confidence, regarding their capabilities. These perceptions of incompetence constrain career choices and diminish achievement in attaining desirable career opportunities.

The name "career self-efficacy" was designated by Betz and Hackett (1986) as a general term to identify self-efficacy expectations regarding the many varied behaviors that lead to the choice of a profession or occupation. An important focus of the research was to determine key elements of career behavior, such as performing and persisting in career activity, and the kind of career choices available for consideration (Betz & Hackett, 1986). When considering career self-efficacy expectancies, the beliefs that an individual has about his or her "career-related behaviors, educational and occupational choice, and performance and persistence in the implementation of those choices" are very significant (Betz & Hackett, 1997, p. 383). The expectations of career self-efficacy can be identified in the person's assessment of his/her capability to execute specific chores or assignments and his/her performance, which was identified as the term "efficacy expectation" (Hackett & Betz, 1981). The term "outcome expectation" refers to the beliefs that the individual has regarding any outcomes from his/her actions or behaviors (Hackett & Betz).

Betz and Hackett (1986) concluded career self-efficacy, combined with a measurement of career interest and gender, can be a significant predictor of career

options. Assessment of ability, which had been determined to be a significant predictor variable in established vocational theory, was found not to be significant. Instead, the study determined a significant relationship between self-efficacy and interests. However, Betz and Hackett determined that career self-efficacy was an important and independent contributor when accounting for gender differences in traditional and non-traditional career choice.

Similarly, an additional investigation supports the findings that career self-efficacy can identify career choice and behaviors. Layton (1984) determined, through comparing a self-efficacy paradigm for career training and education for women against a locus of control paradigm, that there was a difference in self-efficacy. In particular, self-efficacy for women regarding traditional female jobs was significantly greater than the non-traditional career self-efficacy. There was also a moderate correlation between the self-efficacy differences and the variety of career (traditional versus non-traditional) under consideration. Layton determined that the self-efficacy paradigm was overall a superior model to the locus of control paradigm. Career self-efficacy for non-traditional jobs was found to be the highest predictor variable, surpassing career abilities and interest, for predicting of a non-traditional college major choice.

Wheeler (1983) also determined self-efficacy was useful in determining career choice. In this research, a self-efficacy paradigm for career choice was evaluated against an expectancy-valence paradigm. The expectancy paradigm hypothesized career decision-making depends on the interrelation between individual job significance and how available the employment outcomes are that are being contemplated. There was similarity between the expectancy paradigm and the outcome expectancy construct

theorized by Bandura (1982). Wheeler's study defined career self-efficacy by listing 17 different employment jobs which ranged from a traditional male job to a traditional female job. These were operationalized according to perception of match ability and perception regarding the difficulty of being successful. Both career self-efficacy and occupational valence were found to be significant in identifying occupational preference. However, perceived career self-efficacy, as identified as the perception of match ability, had higher predictive significance for occupational choice than did career valence. Studies indicated career self-efficacy has higher predictor significance than valence in identifying career choice. Results determined that both career self-efficacy and career valence should be included as paradigms for career choice. Because Wheeler's expectancy-valence paradigm is so similar to Bandura's construct of outcome expectancies, the conclusion can be made that Bandura's theory can be applied to career development and research.

The construct of self-efficacy is not considered to be "a trait concept" (Betz & Hackett, 2006, p. 6). Instead, self-efficacy should be recognized as being an assessment of self-knowledge or insight regarding the individual ability to perform in the future. Consequently, the construct of self-efficacy requires measurement alongside some form of behavioral activity (Bandura, 1997; 2005). Bandura (2005) states, "The efficacy belief system was not a global trait but a differentiated set of self-beliefs linked to distinct realms of functioning" (p. 1). This can be translated to mean that to assess a specific behavior, the area of significance or interest must first be cautiously described and identified before proceeding with measurement (Betz & Hackett). Therefore, the term "career self-efficacy" was actually a catch phrase for individual views and ideas of self-

efficacy with regard to potential career-associated behaviors to be identified or hypothesized. Self-efficacy perceptions can only be assessed in regard to a particular area or behavior. If research was to be conducted on an area where there was no suitable measurement or assessment developed for determining self-efficacy perceptions, then the investigator would describe the area or field, particularly in regard to specific fundamental behaviors, to enable assessment of self-efficacy within that particular behavioral area (Betz & Hackett). Therefore, applying self-efficacy theory to career development and decision-making was unlimited in theory. However, when creating additional self-efficacy applications for career activities, the investigator must be capable of cautiously defining the new behavioral area and must have familiarity and expertise in the creation and appraisal of scale item development (Betz & Hackett).

An example of the necessity to specify the fundamental behaviors, or behavior domain, before assessing self-efficacy was the preliminary undertaking to research career decision making (Taylor & Betz, 1983). At the onset of assessing self-efficacy for career decision-making, the researchers had several options to define competency in regard to making quality career choices. However, the theory of career maturity, developed by Crites (1978), was chosen. Crites' theory of career maturity was comprised of five aptitudes for defining competency in career decision-making. These five areas of competency and aptitude include self-appraisal, goal selection, planning, problem-solving, and occupational information. Taylor and Betz created items to assess the five areas of competency and submitted the items to "the confidence response continuum by which Bandura originally defined self-efficacy" (p. 7). Following this procedure, established item analysis was utilized to choose the items best suited for each subscale,

which resulted in the creation of the Career Decision Self-Efficacy Scale (Betz, Klein, & Taylor, 1996; Taylor & Betz, 1983).

The social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994, 2000) expanded and included many of the dimensions of Bandura's research on self-efficacy to understand career development. Social cognitive career theory was viewed as an investigative and beneficial construct that can assist in gaining knowledge about career choice and behaviors (Betz & Hackett, 2006). The social cognitive career theory (Lent et al., 1994, 2000) expanded the theory of social learning theory by Bandura (1977b). The social learning model (Bandura, 1977a) was expanded to incorporate self-efficacy as the foundation of the theory, which then prevailed to be known as the social cognitive theory (Bandura, 1986, 1997).

Social cognitive career theory (Lent et al., 1994, 2000) provided a support structure for career training and education, career choice, career accomplishment, and a way to explain the interrelationships between education and vocation. Social cognitive career theory emphasized the correlation between self-efficacy and other "social cognitive variables" along with the association among other socio-environmental related variables (Brown, 1999, p. 12). Brown stated that the socio-environmental related variables can include relationships with family, sex/gender, cultural and society, race/ethnicity, societal or communal relationships, and politics. Chen (1997) determined that allowing the self to integrate with the environment has been hypothesized as an opportunity for an individual to perceive being in charge of his/her individual career choice and behaviors. This perception of power in turn can increase the individual self-efficacy expectation for making career decisions.

The core construct of social cognitive theory, despite the expansions and additions, continued to be self-efficacy (Bandura, 1997). This was related to social cognitive career theory because it also included related concepts of "outcome expectations, interests, and sources of efficacy information" (Betz & Hackett, 2006, p. 5). Social cognitive career theory also expanded on previous research on self-efficacy and had similar foundations in theory and experiential practice (Betz & Hackett). Further, social cognitive career theory can be identified as a specific type of the social cognitive theory (Bandura, 1986, 1997) that assists with exploring and understanding career development and behaviors (Betz & Hackett). Specifically, social cognitive career theory incorporated several variables that are proposed as influential in determining the goals and behaviors related to career choice (Lent et al., 1994, 2000). Social cognitive career theory included variables such as "self-efficacy expectations, outcome expectations, and interests" (Betz & Hackett, p. 8). Nevertheless, the constructs of "self-efficacy" or "career self-efficacy" cannot be identified in social cognitive career theory if specific behavioral areas are not acknowledged. Additionally, variables including "outcome expectations" or "interests" cannot be operationalized without identification and specification of behavioral "domains" (Betz & Hackett, p. 9).

Past research in career self-efficacy. The research that initially began in the 1980s examining how the theory of self-efficacy (Bandura, 1977a) could be applied to career development for females has expanded to include exploration with many specific groups and generalized career development (Hackett & Betz, 1981). The investigations of career self-efficacy examined the relationship between variables including gender (Bonett, 1994; Quimby & O'Brien, 2004; Campbell & Hackett, 1986; Hackett, 1985;

Hackett, Betz, O'Halloran, & Romac, 1990; Lapan & Jingeleski, 1992; Post-Kammer & Smith, 1986), ethnicity (Alliman-Brissett, Turner, & Skovholt, 2004; Gushue, Clarke, Pantzer, & Scanlan, 2006; Rasouli, Dyke, & Manter, 2008), population age (Turner & Lapan, 2002; O'Brien Cousins, 1997), and education (Gallavan, 2003; Pajares & Graham, 1999; Bozgeyikli, Bacanli, & Doğan, 2009; Tang, Pan, & Newmeyer, 2008; Quimby & O'Brien, 2004).

Career self-efficacy has been examined in regard to ethnicity to determine how career development was impacted by ethnic identity (Gloria & Hird, 1999). Studies have identified that racial and ethnic minorities do not necessarily benefit from the current theories pertaining to career development (Leung, 1995; Gloria & Hird). The reason for the lack of benefit may be due to the barriers faced. These barriers, including economic hardships and racial discrimination (Brown, Brooks, & Associates, 1996), restrict the career development for racial and ethnic minorities (Leung). Gloria and Hird identified that racial and ethnic minorities are more prone to having lower career decision-making self-efficacy and higher incidence of trait anxiety than their Caucasian counterparts. Because the world of professional work was directly governed and controlled by predominantly Caucasian employees (Helms & Piper, 1994), those racial and ethnic minority individuals may not feel accepted in the employment labor force even though the individual may have the necessary capabilities or skill needed to perform in a successful manner (Gloria & Hinds).

Rasouli, Dyke, & Mantler (2008) determined that migrant women were assessed regarding their self-efficacy beliefs for language and career management skills. The investigation identified that not only were the actual language and career management

skills significant in career adjustment for the immigrant women, but perception of the skills (i.e., career self-efficacy beliefs) was a significant factor in career status. Results indicated those immigrant women with low beliefs regarding personal self-efficacy were most often disappointed and frustrated with their employment and career status. These women were often not employed or were employed in careers that were beneath their education and training. However, the immigrant women with high levels of career self-efficacy were often employed in a desirable job and expressed satisfaction with their individual employment position and career development (Rasouli et al.). Because low self-efficacy in career expectancy can decrease achievement and work accomplishment (McWhirter, Torres, & Rasheed, 1998), recognition of career self-efficacy barriers or problems was significant to career development (Gushue et al., 2006).

African-American adolescents have been determined to be unprepared to enter in the labor force when compared to those of different racial and cultural groups (Alliman-Brissett, et al., 2004). In years past, African-American adolescents were often not granted the opportunity to pursue training and education for career development. However, in today's society, there is a plethora of opportunities for education and occupational training for young African-American juveniles (Walsh, Bingham, Brown, & Ward, 2001). Unfortunately, despite the opportunities available, many adolescent African-Americans are not benefiting from the available resources (Walsh, et al., 2001). One theory, the racial identity theory (Helms, 1990), hypothesized that the identification of being an African-American as a minority group member, could influence these juveniles to have decreased education and career expectancies than those juvenile adolescents from mainstream society (Gainor & Lent, 1998). A recent study identified adolescents of

African-American ethnicity perceive their parental support for career self-efficacy differently based upon gender (Alliman-Brissett et al.). Female African-American adolescents were determined to be self-efficacious regarding career opportunities when perceiving emotional support from their parents. Career self-efficacy for male African-American adolescents was predicted by the career-associated modeling demonstrated by their parents.

A study examining the career decision-making self-efficacy for Latino/a high school students determined there was a relationship between vocational identity and career self-efficacy (Gushue et al., 2006). The investigation indicated those Latino/a students who have a clear idea of personal aptitudes, purpose, aspirations, and interests are more likely to be confident in their ability to accomplish tasks related to career objectives. Conversely, the research found that the greater number of perceived obstacles by a Latino/a student was significantly related to a lack of identified career identity (Gushue et al.). The perception of obstacles, or barriers, can include institutionalized racism or racial and ethnic discrimination (Lent et al., 1994). Gushue et al. argued career self-efficacy and the number of perceived barriers may be the reason many Latino/a students do not explore employment options during career development.

Career self-efficacy has been studied across age ranges. Senior adults have been studied in regard to career self-efficacy and activity levels (O'Brien Cousins, 1997). Career development has been identified as beginning in childhood as a vigorous process which is always changing and continues throughout the life span (Super, 1990). Elementary school children have been studied in regard to their career decision-making self-efficacy, and results found career development was significantly related to career

self-efficacy, even in children (Bozgeyikli et al., 2009). Adolescent populations have been identified as a significant area of interest for investigation in career self-efficacy because adolescence is the time when many juveniles are exploring career development. Often, adolescents are gaining education about different careers through school guidance programs (Turner & Lapan, 2002). Adolescents with positive beliefs regarding their capabilities and skills, or positive career self-efficacy, have been identified as more confident in learning how to seek and obtain employment, understand the role between employment and education/learning, and gain knowledge regarding career development (Lapan, Gysbers, Multon, & Pike, 1997; O'Brien, Dukstein, Jackson, Tomlinson, & Kamatuka, 1999; Turner & Lapan). These findings directly related to the career development theory, social cognitive career theory (Lent et al., 1994; 2000). The social cognitive career theory presented a means to understand the way that the perception of support from a parent and the self-confidence that an adolescent gains from participating in widespread supervised curriculums for career education can create positive career development (Turner & Lapan).

Luzzo, Funk, and Strang (1996) included interventions intended to improve career self-efficacy and decision-making by having participants view an 8-minute videotape. The intervention was passive as opposed to active, but the study incorporated the use of emotional arousal, vicarious learning, and verbal persuasion. The study was a means to retrain research participants with a low level of self-efficacy, or confidence level, that the reason for their failures relating to career decision-making and employment was lack of effort. The results determined those participants with an external career locus of control increased career decision-making self-efficacy. However, those participants with an

internal locus of control for career decision-making self-efficacy showed no significant improvement following the retraining intervention (Luzzo et al.).

Women and career self-efficacy. Once believed to be a circumstantial variable, gender has now been identified as a significant characteristic that influences career counseling (Sullivan & Mahalik, 2000). Career self-efficacy was initiated as a means to study the socialization effects of sex roles in regard to developing careers of females (Hackett & Betz, 1981). Specifically, Hackett and Betz wanted to identify if part of the dominance of men in many careers, including mathematics, science, and engineering, was related to lack of self-efficacy by females for those careers (Humphreys, 1982; Pfafflin, 1984; National Science Foundation, 1984). Additionally, Hackett and Betz wanted to identify if the reason that women were being underrepresented in many careers was related to their individual abilities and skills (Fitzgerald & Crites, 1980; Farmer, 1976). This examination of gender differences in self-efficacy was initially conducted in regard to traditional male and traditional female jobs (Betz & Hackett, 1986; Hackett & Betz). This initial investigation examining self-efficacy and gender found no significant differences in "overall occupational self-efficacy" (Betz & Hackett, p. 281). However, when identifying whether the occupation was a traditional occupation, significant differences were determined for males and females. Self-efficacy for male occupations was found to be equal for both traditional men's and traditional women's jobs. Female self-efficacy expectations were found to be significantly higher than the males' traditional job/occupation, but female self-efficacy was lower than the males' when identifying non-traditional jobs or occupations (Hackett & Betz; Betz & Hackett). It must be noted that despite the found differences, no actual significance was noted in regard to

gender for actual ability, as was determined by a measurement of math and English ACT scores for males and females (Hackett & Betz). This research study identifying the gender differences in career self-efficacy was the first of many studies to examine the role of career self-efficacy in the career development of women.

A significant finding regarding career self-efficacy has been the perceptions of women regarding interests and career pursuits in regard to employment in male-dominated occupations (Bonett, 1994). Bonett contends that females may limit pursuit of some career activities because they perceive that they do not have the abilities or skills needed to be adept in certain occupational aptitudes. Men have been identified as perceiving themselves as competent and able to engage in either traditionally masculine or traditionally feminine jobs or occupations (Hackett & Betz, 1981). Females were found to have decreased self-efficacy expectancies than did males in regard to traditional male jobs (Bonett). This finding can be explained because females are prone to misjudge their capabilities and skills negatively, while males are more likely to make correct appraisals of their abilities (Betz & Hackett, 1986). Results indicated that females were found to have high self-efficacy ratings for traditional women's occupations, but the ratings were not significant for employment that was considered to be a traditional masculine job (Hackett & Betz). Males were found to be less prone to pursue occupations that are traditionally feminine in nature, likely due to traditional women's jobs typically having lower salaries and lower distinction or prestige, which makes these jobs less desirable to males (Bonett). Low career self-efficacy has been found as an indicator of a significant psychological barrier for female career decision-making, career choice,

employment accomplishment, and determination in making decisions related to occupation (Sullivan & Mahalik, 2000).

Self-efficacy for career development has identified that women who have higher career self-efficacy for decision-making are typically more devoted to planning their careers and are more ambitious (Chung, 2002). Agentic behaviors, or self-efficacy beliefs, are the expectancies that a woman has about her capabilities and skills in engaging in career and educational facilitation (Ancis & Phillips, 1996). Betz and Hackett (1987) suggested that a person's tendencies to act in a way that creates, as opposed to only responding to, education and career opportunity is a significant feature to the progress of career development for women. Agentic behaviors can be considered skills that can assist a female in her education and career advancement, and the individual differences found in the career development of women may be attributed to the difference in agentic behavior (Ancis & Phillips). These behaviors are also called *behavioral agency*, when discussed in regard to occupational development, because the term identifies specific activities or behaviors and skills or aptitudes that are necessary to enhance the education or vocation of a person.

Scheye and Gilroy (1994) have determined women who select a college career that was once considered as non-traditional have career self-efficacy equal to that of males. This was reached when examining college students who had selected a major in engineering or science (Lent et al., 1984; 1986). Self-efficacy expectancy and success in academics was investigated along with level of perseverance in male and female science and engineering students. Results determined that the students with higher grades displayed significantly higher levels of self-efficacy. These students also were more

likely to persist and stay in their declared college major (Lent et al., 1984; 1986). Those females who selected a college degree program that is traditionally male will likely have higher levels of efficacy expectancy than do other females (Scheye & Gilroy, 1994; Lent et al.. 1984; 1986). Females who attended a same-sex high school or college were identified as having higher levels of non-traditional perceptions of career self-efficacy, specifically when citing that they had an important and dominant male teacher at school, compared to those who had female teachers or who went to a co-educational school (Scheye & Gilroy).

Since career self-efficacy has been determined to be so imperative to the career development of women, research interventions to increase career self-efficacy for women are being evaluated. Females who participated in a career group devised to improve career self-efficacy and decision-making were found to be higher in their levels of self-efficacy, even up to six weeks following the study (Sullivan & Mahalik, 2000). Women in the career group also demonstrated improvements in occupational investigation and dedication to their occupation. Sullivan and Mahalik utilized a group format to explain the process of career choice and to improve career decision-making self-efficacy as a facilitation to improve female career development.

Another intervention was used to determine if a short-term research training program could enhance career self-efficacy for females (Bakken, et al., 2010). The intervention was established to increase the career self-efficacy of biomedical female scientists. Women employed as biomedical researchers are greatly underrepresented in the field. Self-efficacy in this field has been determined as influenced by the environment where training occurs. The women who participated in the self-efficacy intervention

workshop were shown to have increased research/career self-efficacy following training designed to enhance investigative techniques as a career skill in biomedical sciences. Educational interventions utilized to enhance or improve self-efficacy sources through the use of "domain-specific learning experiences" (p. 168) can be considered successful and valuable for improving research as a career skill for self-efficacy (Bakken, et al.).

Hypotheses for Study One

The focus of the present research study was on the relationship between fear of failure and career choice in women. Specifically, the interaction between the variables will be examined to determine if there was a relationship between fear of failure, self-efficacy and career choice in engineering students.

Hypotheses for Fear of Failure

Fear of failure will be significantly different in female engineering students as compared to male engineering students in the following hypotheses:

Hypothesis A. Female engineering students will demonstrate significantly higher fear of experiencing shame and embarrassment in front of others than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis B. Female engineering students will exhibit significantly lower beliefs about their capabilities than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis C. Female engineering students will display significantly higher fears regarding their futures than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis D. Female engineering students will exhibit significantly higher fears that important others have lost interest than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis E. Female engineering students will display significantly higher fears that important others will be upset with them than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Justification for fear of failure hypotheses. Fear of failure is often the result of having fears of not achieving or attaining a goal (Sherman, 1988). Females entering into a field that is traditionally male may experience fear of failure (Baker et al., 2007; Sherman). This fear of failure for females may be the result of fearing that they will not be successful in the engineering field because society traditionally has not encouraged their interest in math and science classes (Papastergiou, 2008; Sherman).

Sherman (1988) found a significant relationship between fear of failure and sex-roles. Fear of failure was linked to low risk-taking, low self-esteem and decreased feelings of self-confidence. Additionally, low self-efficacy has been found to be related to fear of failure (Sherman; Elliot & Sheldon, 1997; Martin, 2002).

Hypotheses for Self-Efficacy

Self-efficacy will be significantly higher in male engineering students than female engineering students as evidenced in the following hypotheses:

Hypothesis A. Male engineering students will exhibit significantly higher expectations about their future career as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis B. Male engineering students will exhibit significantly higher beliefs about their future success as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis C. Male engineering students will demonstrate significantly higher personal beliefs about their capabilities as a future engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis D. Male engineering students will exhibit significantly higher beliefs about feeling included as part of the group than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis E. Male engineering students will display significantly higher beliefs about their ability to cope with difficulties than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis F. Male engineering students will exhibit significantly higher beliefs about their skills in mathematics than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Justification for self-efficacy hypotheses. The field of engineering has long been considered the domain of males with significantly fewer women choosing engineering as a career (Robinson & McIlwee, 1989; Sherman, 1988; Papastergiou, 2008; Lane, 1999; Hill, 1997). Studies have shown that males are often encouraged to pursue education in math and science fields by their parents (Papastergiou; Sherman). Because of the lack of encouragement to pursue math and science by society and family, low self-efficacy and self-confidence may occur for females (Papastergiou). Further, beliefs regarding personal

self-efficacy may significantly impact engineering as a career choice for females in a negative manner (Papastergiou; Rittmayer & Beier, 2009).

Study Two

Literature Review

Studies have shown that females who enter into non-traditional careers are often viewed more negatively (Heilman et al., 1988; Lenney et al., 1983). The number of males who dominate the field of engineering is evidence that females are a minority (Baker et al., 2007). Hill (1997) has determined that women consistently receive far fewer undergraduate degrees in engineering within the United States. The reasons for fewer females in the engineering field are diverse, including low self-efficacy, low self-confidence, and parental involvement (Papastergiou, 2008; Sherman, 1988). Self-efficacy has been identified as important for job prediction of students (Dawes et al., 2000). The reason self-efficacy was acknowledged as a predictor of future employment was because higher self-efficacy in students promotes employment investigation into fields and careers that might have been otherwise overlooked (Dawes et al.; Rittmayer & Beier, 2009).

Gender as a predictor for success in the field of engineering has been predominantly examined in regard to self-efficacy (Hyde et al., 1990; Lent et al., 1991; Hackett & Campbell, 1987; O'Brien et al., 1999). Gender has long been identified as a significant indicator for job selection (Gardner & Discenza, 1988; Carlson, 1967; Arvey, 1979). The current research seeks to determine if the gender of mock applicants into an engineering program, male and female, will influence student participants' ratings of their ability and success as a future engineering student.

Gender along with Job Applicant Rating and Selection

Significant investigations have been completed to examine the effect of gender when being evaluated for job selection (Gardner & Discenza, 1988; Juodvalkis, Grefe, Hogue, Svyantek, & DeLamarter, 2003; Steinpreis, Anders, & Ritzke, 1999; Carlson, 1967; Sheets & Bushardt, 1994; Marlowe, Schneider, & Nelson, 1996; Arvey, 1979; Cash, Gillen, & Burns, 1977; Snyder, Bersheid, & Matwychuk, 1988). In this section, gender bias is evaluated to determine if it plays a significant role in applicant selection and hiring for employment. For the present research, the hypotheses examined if traditionally named applicants for males and females applying to an engineering program were rated similarly for entry into the male-dominated field of engineering. Specifically, the hypotheses evaluated if study participants appraised applicants into an engineering degree program differently based upon traditionally male and female names, with those applicants having similar grade point averages, similar math and science scores in past high school courses, comparable scores on the ACT examination, and parallel skills and personal values. The following section explored the reasons in which individuals are judged to be more competent as potential applicants based upon their gender as opposed to their personal skills and qualifications. Several theories were explored including gender roles in society, gender stereotyping, biases and expectations based upon gender, as well as the attribution theory.

Gender bias is a topic that previous investigations have shown to be a significant issue in job selection and promotion (Cole, Field, & Giles, 2004). Gender has been identified as the one of the most significant personal demographics when identifying the reason why certain individuals are selected for employment, even when competing with

other applicants having similar personal qualifications (Pratto & Bargh, 1991; Zikmund, Hitt, & Pickens, 1978; Glick, Zion, & Nelson, 1988). Studies have found that when hiring for a traditionally male employment position, men are often more likely to be hired than similarly qualified women who are also applying for the job (Heilman, 1995). A woman applying for a job may be the victim of stereotyping into a "feminine category... (accurately or inaccurately)" (Cole et al., p. 605) and may be evaluated as lacking the training, education, and skills of a man who was also applying for the job. A meta-analysis examined 19 different research experiments with 1,842 research participants and determined that the mean effect for the gender of applicants on job hiring was four percent (Olian, Schwab, & Haberfeld, 1988). This finding explained the reason for some of the variance in hiring recommendations of applicants with similar qualifications; applicant gender was significant for recommendation for employment (Olian et al.).

The topic of gender bias in job selection has been a pressing issue in our society for decades. This should not be surprising considering biases against women in society. Because females are considered a legally protected group, biases can place employment organizations in jeopardy of legal ramifications for discrimination as well as deny the employer the opportunity to utilize significant talent from female applicants (Cole et al., 2004). The 1964 Civil Rights Act, Title VII, made it illegal to discriminate against a potential job candidate on the basis of his/her national origin, sex, race, or religion (Arvey, 1979). Unfortunately however, employment selection based on gender continues to be an issue in many organizations and businesses. The United States Department of Labor's Office for Federal Contract Compliance Programs (OFCCP) is responsible for enforcing the Executive Order 11246 as well as other laws responsible for prohibiting

"employment discrimination by federal contractors" (PR Newswire, 2007, p. 2). This government agency is responsible for monitoring any contractor with the federal government to guarantee equality in employment hiring and selection with no discriminatory practices. According to the PR Newswire (p. 3), the OFCCP Deputy Assistant Secretary, Charles E. James, Sr., has stated "The Labor Department is committed to ensuring that individuals seeking employment with federal contractors and subcontractors are hired, promoted, and compensated fairly, without regard to their race, sex, ethnicity, disability, religion or veteran status...the department is serious about eliminating systemic discrimination." A recent example of gender bias in hiring has been evidenced by recent civil lawsuits against Pilgrim's Pride Corporation for discrimination in employment based on gender and ethnicity. The company was found to have participated in discriminatory hiring practices against women in regard to gender and against men in regard to ethnicity (PR Newswire).

Gender bias is present in all types of employment and careers. Gender discrimination has been evidenced in the field of psychology, particularly in academia, even though female academicians were prone to reject the presence of the gender bias in their psychology departments (Steinpreis et al., 1999). While psychology is one of the fields that graduate a significant proportion of women, approximately 58 percent, with PhD degrees (Alper, 1993), academia in psychology is often considered to be male-dominated (Steinpreis et al.). Women as professors are prone to experience lower status in the academic institution, preliminary discrepancy in appointments, gender differences in promotion, salary, and tenure (Liss, 1975; Morrison & Von Glinow, 1990; Northcraft & Gutek, 1993). Additionally, females in academia are likely to experience barriers

including feelings of isolation, lack of support from administration, lack of support from peers, the necessity of often having to maintain equilibrium or balance between personal career and the responsibility of childcare, and lower income (Northcraft & Gutek; Morrison & Von Glinow). Moreover, women professors, when compared to male professors with equal experience, have been found to have a lower probability of becoming an associate or full professor (Tesch, Wood, Helwig, & Nettinger, 1995; Sonnert & Holton, 1996).

The reason for gender bias in hiring is complex. Gender roles have been examined to determine the influence on hiring selection, and can be identified as specific roles that are an integral aspect of society at large (Bernerth, 2005). Gender roles can be defined as "shared beliefs and expectations about the appropriateness and inappropriateness of the actions of men and women" (Eagly, 1987, p. 24). Studies have identified gender roles are comprised of two central dimensions: the communal and the agentic (Eagly and Karau, 2002; Eagly). The communal dimension of gender roles are usually designated to describe females and include such traits as being affectionate, helpful, kind, and emotionally expressive. The agentic dimension was commonly used for the description of men. This dimension included personal attributes such as assertiveness and being able to control the environment. The agentic male is self-assertive, self-efficacious, and independent (Eagly; Eagly & Karau, 1991, 2002). Males are defined by society as having attributes such as independence, self-reliance, self-confidence and self-sufficiency (Eagly; Eagly & Karau, 2002).

Gender stereotypes are defined as the generalizations made by a significant quantity of society that make a distinction between males and females (McCauley, Stitt,

& Segal, 1980). These generalizations are stable over time and consist of individual beliefs about masculine and feminine characteristics and behaviors. Martell (1991) identified that masculine characteristics refer to conduct that is dominant, independent, and competitive. Feminine characteristics are viewed as being dependent, nurturing, and being concerned with the community. These gender stereotypical beliefs have not been shown to indicate genuine sex distinctions; however, research has identified that the beliefs still have a strong effect on the ideas and appraisals of others, which is significant for job selection (Deaux, 1984). These stereotypes included beliefs or ideas regarding (1) what abilities each gender possesses and (2) what jobs are more appropriate for each gender (Juodvalkis et al., 2003). Gardener and Discenza (1988) have identified many jobs require different qualifications for the job applicant based upon his/her gender. Stereotypes are commonly used tools that individuals use when there is a large amount of information being presented. The stereotypes simplify and organize the information for us to process (Vander Zanden, 1981). Further, Vander Zanden states that stereotypes should be considered as "...unreliable generalizations that we make about people either as individuals or as groups" (p. 141). Also, employee selection was often very subjective during the decision-making procedure, which can increase the possibility that stereotypical beliefs will influence the hiring of a new employee (Arvey, 1979).

Stereotypes for males are identified as agentic, or more task-oriented, which makes men more suitable for jobs in most work settings (Eagly, 1987). Stereotypes for females included the need to nurture others and be "socio-emotional", which depicts women to be lacking in qualifications for jobs in task-oriented work settings (Eagly). Past investigations have demonstrated discrimination against women who attempt to succeed

in stereotypical male jobs, such as being in a management position (Schein, Mueller, Lituchy, & Liu, 1996). Studies have identified females will be passed over for employment in management, even when having identical qualifications as their male applicant counterpart (Cejka & Eagly, 1999). The reason for discrimination in hiring is due to those interviewers' perception that females lack the characteristics, performance, and conduct that would be considered necessary in management jobs. Women are believed to be lacking in these traits; therefore, the women would be perceived as less suitable for the job (Cejka & Eagly)

Gender-role stereotypes and communication styles were examined to determine the effects of three communication styles (Gallois, Callan, & McKenzie-Palmer, 1992). The three types of communication styles include aggressive, assertive, and non-assertive styles. Applicants were rated highest by interviewers when demonstrating an assertive style of communication. Regardless of the gender of the applicant, an assertive applicant scored more highly than the non-assertive or aggressive applicants. Non-assertive male applicants were rated less positively than female non-assertive applicants. However, males who communicated in an aggressive manner were more likely to be hired during job selection than those male applicants who were non-assertive (Gallois et al.). Women who defy the expected societal gender stereotypes may be perceived as trying to take on a male role, and are penalized socially (Juodvalkis, et al., 2003). Parsons and Liden (1984) explained that when stereotypes involving gender are in conflict with the stereotypical stressors of a certain job, those individuals applying are rated less desirably than when there was a match between the job applicant and the job (Glick, 1991; Parsons & Liden). Female applicants also tended to receive lower ratings in their functioning compared to

men (Arvey & Campion, 1982), and have less likelihood of being hired or receiving offers for employment (Mau & Kopischke, 2001; Olian et al., 1988). Interestingly, research has shown employment applicants will identify a business to be unattractive if the interviewer was a woman (Taylor & Bergmann, 1987).

When examining gender role beliefs, studies have determined males to be less apt to note and more prone to disregard knowledge that did not conform to their personal gender beliefs (Ridgeway, 1997). Past studies have demonstrated there may be different expectations for the same job for men and for women (Gardner & Discenza, 1988). Lower ratings for those who applied for gender inconsistent positions may be a result of the lack of individuation information (Locksley, Borgida, Brekke, & Hepburn, 1980). Raters tended to use gender stereotypes to fill in the gaps about job applicants when there was not enough relevant information present (Judovalkis et al., 2003). This was very important when resumes are being rated to select individuals for a job interview, but there was limited information about the job applicant (Bodenhausen & Lichtenstein, 1987).

Gender bias and stereotypes also occurred for individuals within groups (Biernat & Kobrynowicz, 1997; Cole et al., 2004). Individual members of a group that have been labeled are seen as exhibiting more of some attribute than individuals in a similar group. Ironically, research has determined that because stereotypes or labels are identified more promptly by other groups, the individual person being stereotyped in reality may have less of the attribute necessary for documentation (Biernat, 2003). In other words, according to Cole et al., if a job required assertiveness as a prerequisite, a man would need only a low level of assertiveness to be judged as being assertive. However, a woman would have to exhibit a much higher level of assertiveness to be judged as possessing this

trait at an acceptable level. The evaluator who rated both applicants would require less evidence of assertiveness for the male applicant to be considered as meeting the minimal job criteria. Conversely, a woman would have to display more assertiveness to be viewed as meeting the minimal qualifications for the job criteria (Cole et al.).

One study examining personality traits necessary for task-oriented occupations found gender stereotyping was more likely when personality characteristics are considered a necessity for the employment position (Glick et al., 1988). If one applicant was considered to have the traits necessary for the job, then that person would be considered more qualified for the position. The problem, according to Glick et al., occurred when gender enters the scenario. When both a man and woman, each possessing comparable personality characteristics applied for the same job, the man would be more likely to be chosen. One study identified that men and women working as sales associates, with equal skills and abilities were evaluated differently due to the perception that the sales arena was masculine or feminine (Arvey, Miller, Gould, & Burch, 1987). Athey and Hautaluoma (1994) argued that the job candidate's level of education moderates the interrelation between the decision to hire and gender stereotyping for certain jobs. Juodvalkis et al. (2003) identified there are more women than men in jobs with lower status. Job candidates who have lesser training and education typically are viewed as suitable in occupations that are conventionally viewed as womanly or feminine in nature. Hence, women are employed in careers that are viewed as inferior in condition or rank. It would seem logical that if a woman job candidate wanted to increase her chances for success, then she would promote herself and her skills during the job interview process. Studies indicated women who do self-promote, show assertiveness, or

display dominance during interactions with an evaluator receive more negative ratings. These females are also viewed as lacking in influence, competence, and knowledge (Juodvalkis, et al.). In academia, peer review is often used as a hiring tool (Steinpreis et al., 1999). Steinpreis et al. have found that both male and female professorial reviewers in academia were more likely to endorse the hiring of a male coworker as opposed to a female applicant who was equal in qualifications. This study examined whether the gender of the name on curriculum vitae was influential in the hiring of a new faculty member as well as tenure recommendations. The results demonstrated that the research, teaching, and service contributions of the man as an applicant were rated more favorably than the comparable female applicant. The research participants were more likely to hire male job candidates for higher entry ranking positions than female candidates with equal or similar qualifications (Steinpreis, et al.).

Another aspect of gender stereotyping should be considered when examining the interaction of job selection and gender. Relocation for employment was found to be a significant contributor for employment opportunities, training, and advancement (Allen, Eby, Douthitt, & Noble, 2002; Brett, 1982). The concept of employment mobility has been identified as important to job selection. Allen et al. examined the belief by employers and recruiters that applicants who are capable and willing to relocate are more desirable. One stereotypical belief by employers was the assumption that if an applicant was female, she would be less likely to consider relocating for her career. Female employees received a smaller quantity of offers to relocate because the assumption by employers is that a female employee would be less likely to consider geographic relocation (Eby, Allen, & Douthitt, 1999). Ironically, Eby et al. have determined there

were no significant discrepancies for males and females in the rate of accepting a job opportunity in another area. One plausible reason for the stereotypical belief that women would not move to a new area for their career is the idea that females are more dedicated to their families, and they are less loyal to work than male employees, while male employees are viewed as less dedicated to their family life and more loyal to their employment (Cook, 1994). Employers may believe that being dedicated to a family and job can be scrutinized in a "either/or" scenario. Specifically, employees who have families are possibly viewed as being less dedicated to the job than an employee with no familial responsibilities (Allen et al.; Powell, 1990). A woman's career has been identified as negatively impacted when becoming a parent because of the perception by employers was she is no longer as committed to the business or employer (Swiss & Walker, 1993). Research also indicated spouses of employees who relocate may experience career damage. Employers of women may be hesitant to offer relocation opportunities or offer positions to women who required relocation for fear that her husband will be resistant to the move (Flynn, 1995; Ricklin, 1991; Allen et al.). Because employers may incorrectly feel or believe that a woman as an employment candidate may not be able to satisfy the geographical necessities of her career, these stereotypical attitudes could be a factor in the reason for negative ratings of female applicants, even though the woman agrees that she would be able and willing to relocate (Allen et al.).

The contemporary theory of psychology, attribution theory, has been used as an explanation for attributions made by reviewers regarding employment screenings for job candidates (Phillips & Phillips, 1994). Attribution theory endeavored to reveal the reasons that people allocate, or "attribute" motives for actions or behavior (Heider, 1944;

Kelley, 1973). In using the attributional theory, Phillips and Phillips tried to ascertain the reason that evaluators selected specific job candidates over others. Evaluators were found to make more negative evaluations of an employee's performance if they feel that behavior could be attributed to internal origins, such as poor demonstration of effort or motivation. However, the employee was given a better, more positive evaluation if the evaluator attributed past poor performance to external causes, such as a death in the family. The relationship between the gender of evaluators and job applicants was examined with the evaluator attributions and selection decisions in order to ascertain if attribution theory was relevant to applicant selection and gender. Results determined that if the applicant and the reviewer were of the same gender, the person evaluating would be more likely to attribute past poor performance at previous jobs to external factors; thus, the employee candidate would receive a higher rating. The study also determined that if the genders of the employee candidate and the reviewer were of dissimilar genders, the reviewer attributed the poor past performance to internal origins or reasons, which would negatively impact the job candidate (Phillips & Phillips).

Gender congruence has been shown to have other positive effects on both interviewer and interviewee (Saks & McCarthy, 2006; Phillips & Phillips, 1994). One study examined the effects of gender along with interview questions, which included discriminatory queries to identify the reactions of applicants. The investigation determined that when gender was the same for both the person interviewing and the person being interviewed, more positive questions were typically asked by the interviewer (Saks & McCarthy). The result was that females typically reacted less negatively to potentially discriminatory questions during the interview process, when the

interviewer was also a woman. Similarly, men also displayed less negative reactions when asked possible discriminatory questions if the interviewer was a man. These results indicated that being congruent in gender during the interview process can be a positive factor, but the outcome also was indicative of existing gender bias for both the interviewer and the person being interviewed (Saks & McCarthy).

Hypotheses for Study Two

The current research was focused on the impact that gender plays on job selection and rating of potential applicants into an engineering program. These hypotheses examined the experimental aspect of the research project; specifically, how gender is a predictor of the beliefs regarding success of a person studying to be an engineer.

Hypothesis one for job selection and rating. The rating of applicants based on scores related to engineering skills will be significantly different between male and female applicants.

Justification for hypothesis one. Studies have shown women are often viewed less favorably when applying for non-traditional employment than are their male counterparts, even with equivalent qualifications (Heilman, Martel, & Simon, 1988; Lenney, Mitchell, & Browning, 1983). Engineering is a male-dominated career that has significantly fewer females employed than males (Robinson & McIlwee, 1989; Sherman, 1988; Papastergiou, 2008; Lane, 1999; Hill, 1997). Because of past investigations demonstrating that women who choose employment in a non-traditional career are often considered less competent (Heilman et al.; Lenney et al.), this research will attempt to determine if applicants to an engineering program, having traditionally male or traditionally female names and varying scores on skills including problem-solving

capabilities, math and science scores, technological knowledge, and analytical aptitudes, will predict if students feel the named student applicant would be efficacious and successful as an engineer.

Hypothesis two for job selection and rating. The overall rating of applicants as successful as future engineers will be significantly different between male and female applicants.

Justification for hypothesis two. The field of engineering has significantly more males than females being trained as future engineers (National Science Foundation, 2008, 1997; Hill, 1997). The need to increase and retain women into the field of engineering has been identified as important (Werner & Denner, 2009) because women receiving bachelor's degrees in engineering have decreased in the past decade (Rosser & Taylor, 2008). Since females are often viewed as less desirable than their male equivalents when they submit applications for nonconventional jobs, even when both sexes have equal training, education, job experiences, and credentials (Heilman et al., 1988; Lenney et al., 1983), the current research was endeavoring to ascertain if the success of an applicant into an engineering program can be predicted based upon traditionally male or female names provided in a scenario that also has differing levels of engineering skills identified for each mock applicant.

Hypotheses for gender role conflict and applicant selection. Gender role conflict in males and females will significantly impact how applicants of different genders are viewed and rated for their skills and capabilities as future engineers in the following hypotheses:

Hypothesis A. Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis B. Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis C. Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis D. Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis E. Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis F. Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis G. Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis H. Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis I. Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis J. Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis K. Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis L. Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis M. Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis N. Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis O. Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis P. Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Justification for gender role conflict and applicant selection hypotheses. Gender role conflict was the result of the violation or devaluation of one's rights due to restrictive gender roles (O'Neil, 1981). Gender role conflict can be defined as "a psychological state in which socialized gender roles have negative consequences on the person or others" (O'Neil & Good, 1997, p. 10). Because engineering has traditionally been considered a male dominated field, females may feel uncomfortable entering into men's territory. These feelings are a result of inflexible gender roles that devalue those who do not adhere to traditional gender role expectations (Thomas, 2005). Females choosing to enter into engineering as a career choice may be viewed by males as not adhering to the traditional gender role expectations for career choice. Past studies have determined that males are often viewed more desirably than their female counterparts, particularly in jobs such as engineering, which are traditionally male-dominated (National Science Foundation, 2008, 1997; Hill, 1997), and will be given favor over females, even when both sexes have equivalent schooling, education, occupational knowledge, and qualifications (Heilman et al., 1988; Lenney et al., 1983). The current research was examining if gender role conflict was a contributing factor for predicting the

skills and abilities for mock applicants with traditionally male or female names entering into an engineering program.

CHAPTER TWO

METHOD

This section provides a summary of the methodology utilized for this study. It includes the following sections: Participants, Instrumentation, Procedure, and Data Analysis.

Participants

The current study recruited volunteer participants from various engineering courses at Louisiana Tech University. Approximately 250 undergraduate students were recruited for participation. It was intended that this study would have equal numbers of male and female participants with diverse ethnicities represented in the participant sample. The participants were predominantly between the ages of 18 to 24 years of age, but non-traditionally aged participants were also included. Research participants represented varying relationship types and the goal was to include diversity in sexual orientation also.

The recognized ethical guidelines established by the American Psychological Association (APA) were adhered to when interacting and selecting participants (APA, 2002). This study collected data utilizing the institutional research guidelines as approved by the University Human Use Committee (see Appendix A) at Louisiana Tech University.

Participation extra credit was granted to participants at the discretion of each course professor. Anonymity was assured to participants. Informed consent was obtained prior to testing (Appendix B). Participant data were viewed only by the researcher to maintain confidentiality. The research data obtained in this study were used as aggregate group information, and no individual information was reported.

Instrumentation

Study One

Demographic questionnaire. The demographic questionnaire (Appendix C) consisted of seven items designed to gather data on standard demographic information of the participants. The demographic questionnaire included questions such as current age, sex/gender, ethnicity/race, and current educational level. Additionally, the grade point average (GPA) was asked of each participant. The demographic questionnaire also asked questions regarding sexual orientation and current relationship status to gather data for the present study.

Performance failure appraisal inventory. The Performance Failure Appraisal Inventory (PFAI; Conroy, 2001; Conroy, Willow, Metzler, 2002) is a 25-item multidimensional measure of cognitive-emotional-relational appraisals associated with fear of failure (Conroy et al., 2002). The PFAI (Appendix G) originally was a 41-item inventory that has been made into two shorter versions, including a 25-item and a 5-item version (PFAI-S). The present study used the 25-item inventory. The PFAI identifies five aversive consequences that are associated with fear of failing (Conroy, 2001). Each item on the PFAI begins with either of two question stems, When I am failing... or When I am not succeeding… which is followed by a perceived failure consequence that is potentially

aversive to the individual (Conroy et al., 2003). The PFAI includes five undesirable consequences of failure. These are the following: Fears of Experiencing Shame and Embarrassment (FSE), Fears of Devaluing One's Self-Estimate (FDSE), Fears of Having an Uncertain Future (FUF), , and Fears of Important Others Losing Interest (FIOLI), and Fears of Upsetting Important Others (FUIO) (Conroy et al., 2007; Conroy, 2001). Responses for the PFAI are on a five-point Likert-type scale ranging from *do not believe at all* (-2) to *believe 100% of the time* (+2).

The PFAI has demonstrated good construct validity and a high-degree of cross-validity due to its hierarchical model of scoring (Conroy, 2001; Conroy et al., 2002; Conroy et al., 2003) based on simultaneous factorial invariance analyses in separate samples. External validity was considered strong against similar and different constructs (Conroy; Conroy et al., 2002; Conroy et al., 2003). The PFAI has also been determined to exhibit strong differential stability, factorial invariance (LFI), and latent mean stability (Conroy et al., 2003). The latent variable differential stability has been determined to be better than conventional criteria (e.g., .70) and ranged from .80 to .96; while test-retest reliability ranged from .65 to .92 (Conroy et al., 2003). The PFAI has internal consistency, as determined by Cronbach's alphas which range from .74 to .81. The two subscales Fear of Experiencing Shame and Embarrassment (FSE) and Fear of Having an Uncertain Future (FUF) both have been determined to have Cronbach's alpha of .80. The subscale Fear of Upsetting Important Others (FUIO) demonstrated a Cronbach's alpha of .78. The Fear of Important Others Losing Interest (FIOLI) subscale was determined to have an alpha of .81. The lowest alpha was found to be .74 for the subscale of Fear of Devaluing One's Self-Estimate (FDSE).

Gender role conflict scale. The Gender Role Conflict Scale (GRCS; O'Neil et al., 1986) is a 37-item self-report scale (Appendix E). Female participants take the Gender Role Conflict Scale-Female version (Appendix F). Participants respond to items on a 6-point Likert-type scale ranging from (1) strongly disagree to (6) strongly agree. The four subscales of the GRCS were determined through factor analysis. The four subscales are Success, Power, and Competition, Restrictive Emotionality, Restrictive Affectionate Behavior between Men, and Conflicts between Work and Family. The subscale of Success Power and Competition (SPC) is made up of 13-items measuring the importance that a person has in regard to power above other individuals, rivalry with other individuals, and success, accomplishment, or achievement. Restrictive Emotionality (RE) subscale consists of 10-items that measure disclosure of the self and difficulties when having to express individual feelings and emotions. The GRCS subscale Restrictive Affectionate Behavior between Men (RABBM) was made up of 8-items that measure the level of distress or uneasiness that was experienced when it was necessary to express emotion with a person of the same gender or sex. The final subscale, Conflicts Between Work and Family (CBWF) is comprised of 6-items which measure the distress created on an individual when the job or schoolwork intrudes upon his/her domestic existence.

The four factors that comprise the GRCS have been identified as explaining 36 percent of the total variance (O'Neil et al., 1986). Internal consistency, as determined by using Cronbach's alpha in past studies on gender role conflict, has been found to be between the range of .75 to .85 (O'Neil et al.). O'Neil et al. has identified that reliability, using four-week test-retest comparison, ranges from .72 to .86 for each subscale. The GRCS has been identified as having acceptable concurrent validity, as concluded by

Good et al. (1995). The concurrent validity was evaluated in comparison to the Personal Attributes Questionnaire (Spence & Helmreich, 1978).

Longitudinal assessment of engineering self-efficacy. The LAESE is a longitudinal measure of self-efficacy (Appendix H) for engineering undergraduate students [Assessing Women and Men in Engineering, (AWE), as retrieved on April 18, 2011]. The LAESE has items which identify several aspects of self-efficacy. The instrument is a means to categorize how role models are influential on how students learn and make choices about their occupations and career choices (AWE, 2011). The LAESE also is a means to determine the self-efficacy of students in "barrier situations" and assess the desired conclusion from their study of engineering. The questionnaire also determines information about the student's beliefs and expectancies regarding the "work load" or labor exertion. The survey inquires about the various strategies used to cope by the engineering student when facing difficulty or problematic circumstances or events. The instrument further asks about the occupational investigation being utilized by the engineering student for exploring different jobs and careers (AWE).

The LAESE was created as a way to determine the changes in self-efficacy for engineering male and female undergraduate students (AWE, 2011). Any student who is majoring in engineering can be tested using the LAESE. The LAESE is best administered when the new school year (academic year) begins. This will allow for the longitudinal comparison of information and statistics from each school term to the new school term or year, if using the instrument as a longitudinal measure. The LAESE has been assessed and validated for the use with men and women engineering students. The questionnaire

has been validated; therefore, items on the questionnaire are not to be changed or modified. To do so would likely invalidate the questionnaire (AWE).

The LAESE is comprised of roughly 60-survey items and typically requires about 15-minutes for completion (AWE, 2011). The LAESE uses a Likert-type range scale to determine the self-efficacy of individuals studying engineering (Marra et al., 2004). Items on the LAESE focus on the assessment of self-efficacy, confidence levels, and expectancies regarding outcome, which are all variable influential in successfully being an engineer major (AWE). The survey includes questions to identify the engineering participant's ways of managing when faced with hard, complicated, or problematic situations. The survey also provides a means to determine the participant's self-belief and self-confidence in performance in crucial educational and scholastic endeavors. The LAESE data can be utilized for two ways. First, the LAESE information can be used to scrutinize the outcomes for the whole LAESE survey. Secondly, the LAESE can be used to analyze the subscale information that specifically assesses certain features or characteristics of self-efficacy (AWE).

The subscales are comprised of items that measure self-efficacy, the personal sense of belonging or feeling included, and the expectancies for outcomes (AWE, 2011). The LAESE has six subscales that are (1) engineering career success expectations, (2) engineering self-efficacy I, (3) engineering self-efficacy II, (4) feeling of inclusion, (5) coping self-efficacy, and (6) math outcome expectations. Each of the subscales has been analyzed and tested for reliability using the Cronbach's alpha. The reliability of an instrument or subscale of an instrument is considered to be acceptable if in the range between .70 and .90 (AWE). The LAESE has internal consistency, as determined by

overall Cronbach's alpha of reliability with ranges from .73 to .84. The six subscales of the LAESE have Cronbach's alpha scores ranging from .73 (Feeling of Inclusion subscale) to .84, which was determined to be in the two separate subscales of engineering career success expectations and math outcome expectations (AWE).

The LAESE subscales will now be identified with their Cronbach's alpha determination (AWE, 2011). The first subscale is called Engineering Career Success Expectations. This subscale is comprised of seven items. The alpha for reliability was determined to be .84. The second subscale is named Engineering Self-efficacy I, and it is comprised of five items. The reliability for the second subscale has been found to be .82. The third subscale is called Engineering Self-efficacy II. The third subscale consists of six items on the survey questionnaire. The Cronbach's alpha of reliability for the third subscale has been determined as being .82 (AWE).

The fourth subscale has been named as Feeling of Inclusion (AWE, 2011). This subscale has four items, and it has a reliability alpha of .73. The fifth subscale is called Coping Self-Efficacy, and it contains six items on the survey questionnaire. The alpha level for this subscale was .78. The sixth subscale is called Math Outcome Expectations. This subscale has a Cronbach's alpha level of .84, and it was comprised of three survey items (AWE).

The LAESE inventory was designed to assess and identify obstacles that hinder the progress of obtaining an engineering degree (Marra et al., 2004) in either males or females. Additionally, the LAESE was intended to ascertain how capable the individual feels when faced with these barriers that possibly deter success towards the degree in engineering The LAESE also was focused on measuring confidence and outcome

expectations since both have been shown to influence success in studying engineering. Further, the LAESE addresses the following additional aspects of self-efficacy in individuals who are studying engineering (a) outcomes expected from studying engineering, (b) student expectations about work load, (c) student process of choosing a major, (d) student coping strategies when faced with difficult situations, (e) career exploration, and (f) influence of role models on study and career decisions (Marra et al.).

Factor analyses have demonstrated acceptable construct validity (Marra et al., 2004). Content validity was ensured through external expert reviews during the development of the testing modules found in the LAESE scale (Marra et al.).

Study Two

Gender rating scale for engineering degree program. The researcher created two paragraphs to describe four hypothetical student applicants (male and female) into an engineering degree program (Appendix D). The mock applicants included two traditional male names and two traditional female names. The paragraphs described the capabilities and skills of each applicant, with particular emphasis on the corresponding skills and abilities that are required as an engineer. Specifically, the paragraphs included qualities that are necessary to be a great engineer (www. engineeringschools.com/engineer-top-10.html). The two male names, Michael and Matthew, are listed as being two of the most popular traditional names in the past 25 years for boys (www.baby-boy-names.org/last-25-years.htm as retrieved on January 11, 2011). The two female names, Jessica and Jennifer, are identified as being two of the most popular girls names in the past 25 years for girls (http://www.baby-girl-names.org/last-25-years.htm as retrieved on January 11, 2011).

Each mock applicant had information about his/her levels of problem-solving skills, logical thought processes, and abilities in technology and computer systems (Maddocks, Dickens, & Crawford, 2002; www.engineeringschools.com/engineer-top-10.html). Additionally, the mock applicant paragraphs had detailed information about the applicant's analytical aptitudes and ability to work as a team player. Moreover, the mock applicant paragraphs included information regarding the applicant's abilities regarding attention to detail and communication skills (Maddocks, et al.; www.engineeringschools.com/engineer-top-10.html). Finally, the mock paragraphs provided information about the applicant's scientific abilities and mathematical skills as indicative of intellectual knowledge and understanding (Maddocks, et al.)
The mock applicants were ranked by the research participants based on the mock paragraphs (Appendix D).

Lenney et al. (1983) and Heilman et al. (1988) explored how individual names can influence beliefs and views about a person. The study by Lenney et al. examined how the use of male versus female names could influence research participants to unfavorably evaluate hypothetical participants. Heilman et al. examined how the names of hypothetical male and female applicants to be a sports photographer for a national magazine could be manipulated to determine undervaluation of females. Study participants were asked to rate performance and ability of the potential applicants; however, the hypothetical applicants were both male and female in gender with equivalent performance ability. The varying difference was the individual names that exposed the individual gender (Heilman et al.).

Participants in the current study were asked to rate each mock applicant based on the information provided about his/her individual skills and capabilities in regard to the necessary qualities and attributes necessary to be an engineer (www. engineeringschools.com/engineer-top-10.html; Maddocks et al., 2002). The research participants were asked to rate each mock applicant on a Likert-type scale. The scale included questions that pertain to the perceived effectiveness of the mock applicant as a viable and successful engineer (Appendix D).

The questionnaire contained two components. Questions one to five are primarily concerned with the overall skills and capabilities necessary to be successful as an engineering student. A composite score was calculated to determine if each applicant has the necessary skills. Question six was an overall rating question to determine if the mock applicant would be viewed as successful in the engineering field as rated by the student participants. For scoring purposes, the participant responses for questions one through five were totaled for statistical analysis. Summative scoring was completed for questions one through five for each mock applicant. Question six was a question regarding the overall belief regarding the future success of the mock applicant as a future engineer, and no summation was necessary for scoring of each applicant.

The questionnaire included a manipulation check that asked participants about their opinions of the rating of the applicants. The questionnaire instructed applicants to please avoid changing their answers after completing the questionnaire rating mock students applying to the engineering program.

Procedure

The research project began once the dissertation proposal defense was approved by the doctoral student's (researcher) dissertation committee at a formal presentation defense. Next, an application for approval from the Louisiana Tech Institutional Review Board was sought for permission to conduct the research project. After securing permission from the Human Use Committee Review Board to complete the study, the researcher requested permission from the Associate Dean for Undergraduate Studies in the College of Engineering at Louisiana Tech, to approach engineering faculty. The researcher also requested permission from the Associate Dean to recruit engineering student participants by meeting with individual engineering faculty. Engineering faculty were asked permission for the researcher to enter into their individual classrooms to recruit undergraduate participants for the present study. Engineering faculty were asked of the possibility of providing a certain number of bonus points to their students when the research questionnaires were fully completed. The researcher agreed to provide a list to the engineering faculty, if applicable, of all of their students who participated in the current study and were eligible for the extra bonus points for their participation.

After receiving permission from the engineering professors to enter their individual classrooms to request student participants, the researcher provided consent forms and information about the current study to potential research participants. If the participants agreed to participate in the study, each participant was asked to read the consent form and indicate understanding and willingness to participate by checking the appropriate box. Next, the participants were asked sign the consent form and turn the signed consent forms back into the researcher. Research participants were assured of their

confidentiality regarding their individual responses. This assisted in improving the overall honesty and truthfulness of participant responses to survey questionnaires. The researcher provided the research questionnaires to those student participants in each classroom that choose to participate in the study. The participants were asked to return with their completed questionnaire at the next class session. The primary researcher was present at the next class session to retrieve the completed questionnaires from the student volunteers.

Participants were informed that individual responses would be collectively reported in a group format. This further assisted in attaining honest and truthful responses by the participants. Each participant was asked to answer the LAESE, the PFAI, a GRCS, a demographics survey, and the rating of mock engineering applicants into an engineering program. The individual participants had differences in the questionnaires based on the GRCS, which has both a female and a male version of the scale.

Following class, the research participant completed the questionnaire during his/her private free time. Each student that returned with a survey at the next subsequent class session was recommended for extra credit, if the engineering professor had agreed for extra credit to be awarded for student participation.

Data Analyses

The research data were collectively analyzed to determine relationships between fear of failure, gender role conflict, and self-efficacy regarding women in the engineering field. Further, data were analyzed to determine if traditional individual names can be predictive of beliefs regarding performance as an engineer. Data were analyzed through the use of several levels of statistical analysis. Descriptive statistics were computed for

both treatment groups (male and female). The instrument was analyzed in a classical framework including descriptive statistics and measures of internal consistency on a test and subtest level. Different statistical analyses were conducted to calculate differences between groups. Frequencies and percentages were calculated for educational level, ethnicity, and relationship status. Means and standard deviations were calculated for determining participants' current age and years of education. Internal consistencies, means, and standard deviations were computed for all instruments used in the study.

The hypotheses of the research study were analyzed utilizing analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA) [The ANOVA was used to determine and analyze for any gender differences.] An ANOVA was used to test for significant differences between the means of variables. The MANOVA was used as a measure to determine and analyze any gender differences determined to be related from the other analyses. A MANOVA can be utilized as a multivariate analog of an analysis of variance when there are multiple dependent variables (Morris, 2011).

Study One

Hypotheses for fear of failure. Fear of failure will be significantly different in female engineering students as compared to male engineering students in the following hypotheses:

Hypothesis A. Female engineering students will demonstrate significantly higher fear of experiencing shame and embarrassment in front of others than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis B. Female engineering students will exhibit significantly lower beliefs about their capabilities than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis C. Female engineering students will display significantly higher fears regarding their futures than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis D. Female engineering students will exhibit significantly higher fears that important others have lost interest than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Hypothesis E. Female engineering students will display significantly higher fears that important others will be upset with them than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Analyses of fear of failure hypotheses. In each hypothesis, the independent variable was gender, and the dependent variables are the scores on each subscale of the Performance Failure Appraisal Inventory. An ANOVA was utilized to determine if the level of fear of failure in females studying to be engineers was significantly higher than that of the male participants. Each subscale was analyzed with an ANOVA to determine if fear of experiencing shame and embarrassment in front of others, fear about skills and capabilities, fears about the future, fear that important others have lost interest, and fears that important others will be upset were significantly different between males and females.

Hypotheses for self-efficacy. Self-efficacy will be significantly higher in male engineering students than female engineering students as evidenced in the following hypotheses:

Hypothesis A. Male engineering students will exhibit significantly higher expectations about their future career as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis B. Male engineering students will exhibit significantly higher beliefs about their future success as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis C. Male engineering students will demonstrate significantly higher personal beliefs about their capabilities as a future engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis D. Male engineering students will exhibit significantly higher beliefs about feeling included as part of the group than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis E. Male engineering students will display significantly higher beliefs about their ability to cope with difficulties than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Hypothesis F. Male engineering students will exhibit significantly higher beliefs about their skills in mathematics than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Analyses of self-efficacy hypotheses. The independent variable in each hypothesis was gender, and the scores on the Longitudinal Assessment of Engineering Self-Efficacy (LAESE) subscales are the dependent variables for these hypotheses. The LAESE, which is a measure of self-efficacy regarding individual ability as an engineer, has six subscales. An ANOVA was used as the means to measure if self-efficacy for male engineering students was higher than that of females studying to be engineers on the scores of the six subscales. Each subscale was analyzed with an ANOVA to determine if there are differences between males and females in expectations about the future, beliefs about future success as an engineer, beliefs about capabilities, feelings of inclusion, beliefs about the ability to cope with difficulties, and beliefs about personal skills in mathematics.

Study Two

The hypotheses analysis included the use of a MANOVA during the statistical testing. The data were analyzed aggregately as a group to ensure confidentiality of the participants.

Hypothesis one for job selection and rating. The rating of applicants based on scores related to engineering skills will be significantly different between male and female applicants.

Analysis of hypothesis one. This hypothesis utilized a MANOVA for statistical analysis. This hypothesis was examined to determine if there are differences between ratings of the applicants, based on gender and the necessary skills essential to be an engineer, which were provided as potential mock engineering students to research participants. The dependent variables are the rating of each applicant based on the

traditional name provided and the skills and capabilities of the applicant. The independent variables are the gender of the respondent and the gender of the hypothetical engineering applicants.

Hypothesis two for job selection and rating. The overall rating of applicants as successful as future engineers will be significantly different between male and female applicants.

Analysis of hypothesis two. This hypothesis used a MANOVA to analyze the statistical data. The independent variables are the gender of the respondent and the gender of the hypothetical engineering applicant. The dependent variables are the overall rating of each hypothetical engineering student as being successful in the field of engineering based on gender of and the provided information about each applicant's skills and capabilities. Each research participant ranked the success of each applicant, based on the information provided, regarding their future achievement as an engineering student.

Hypotheses for Gender Role Conflict and Applicant Selection

Hypothesis A. Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis B. Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis C. Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis D. Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis E. Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis F. Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis G. Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis H. Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis I. Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis J. Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis K. Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis L. Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis M. Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis N. Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Hypothesis O. Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Hypothesis P. Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Analyses for gender role conflict and applicant selection hypotheses. These hypotheses used a MANOVA to analyze the statistical data. The independent variables are the gender of the respondent and the individual scores on the subscales of the Gender Role Conflict Scale. The dependent variables are the overall rating of each hypothetical engineering student as being successful in the field of engineering based on gender and

the provided information about each applicant's skills and capabilities. A MANOVA was utilized to determine if rating scores for males and females having gender role conflict would affect the rating of mock applicants applying to an engineering program. This rating was based upon the provided traditional names (both male and female) and provided the skills and capabilities to be a future engineer.

CHAPTER THREE

RESULTS

The current study investigated the relationships among fear of failure, gender role conflict, and self-efficacy in students studying to be engineers. The results found from the study data are presented in this chapter. First, descriptive information about the research sample and reliability coefficients for each scale are presented. This is followed by the results for each hypothesis.

Participants

Participants were student volunteers enrolled in undergraduate engineering classes at a mid-size southern university. From an initial sample of 250 participants, data were retained for analysis from the 220 participants who fully completed the survey. Of the 220 participants, there were 158 males (71.8%) and 62 females (28.2%). The mean age of participants was 20.75 years with a standard deviation of 3.64 years and a range of 17 to 38 years. The ethnicity of the sample was of 167 Caucasians (75.9%), 28 African-Americans (12.7%), seven Asian-Americans (3.2%), four Latino/Latina Americans (1.8%), two Native American (0.9%), and 11 Others (5%) who did not include their ethnic backgrounds. One participant (0.5%) did not include any response to the ethnicity question.

Male Participants

The male participants comprised 71.8 percent of the research sample. Male participants ranged in age from 17 to 38 years old, with a mean of 21.07 years (*SD* = 3.83). For the males, 124 were Caucasian (78.5%), 20 were African-Americans (12.7%), four were Asian-American (2.5%), two were Native Americans (1.3%), one was Latino (0.6%), and six identified as Other (3.8%). One male did not indicate his ethnicity (0.6%). The male participants included 48 freshman (30.4%), 29 sophomores (18.3%), 39 juniors (24.7%), 39 seniors (24.7%), and three who did not answer the question (1.9%).

Female Participants

The female participants ranged in age from 18 years to 26 years old, with mean of 20.25 years (*SD* = 1.85). There were 43 Caucasian participants (69.4%) who comprised the majority of the female sample. The other ethnicities identified were eight African-Americans (12.9%), three Asian-Americans (4.8%), three Latinas (4.8%), and five who identified as Other (8.1%). The female participants included 17 freshmen (27.4%), 18 sophomores (29%), ten juniors (16.2%), and 17 seniors (27.4%).

Study One

Internal Consistency Reliability Coefficients

The internal consistencies for the present study are listed in Table 3.1. The current study found the Performance Failure Inventory (Conroy et al., 2002) to demonstrate reliability ranges for the subscales from .73 to .83, which are within the acceptable range limits (DeVellis, 1991).

Table 3.1

Gender Differences

Variables	Males		Females		*F*	*df*	*p*	*α*
	M	*SD*	*M*	*SD*				
PFAI								
FSE	0.13	0.79	0.52	0.80	10.67	(1, 214)	.001	.82
FDSE	-0.43	0.89	0.22	0.87	23.44	(1, 215)	.000	.73
FUF	0.00	0.99	0.40	0.92	7.34	(1, 215)	.007	.75
FIOLI	-0.64	0.93	-0.67	0.96	0.04	(1, 214)	.850	.83
FUIO	-0.17	0.97	-0.11	1.00	0.14	(1, 213)	.708	.81
GRCS								
SPC	52.71	11.66	54.57	10.57	1.17	(1, 213)	.280	.78
RE	31.17	9.63	27.69	10.47	4.63	(1, 186)	.033	.81
RABBM/W	26.71	8.47	20.05	9.36	24.73	(1, 205)	.000	.83
CBWL	24.11	6.62	24.40	6.91	0.09	(1, 213)	.768	.83
LAESE								
CSE	35.63	7.65	36.60	4.04	0.77	(1, 185)	.383	.75
SE-I	22.96	5.93	24.32	3.68	1.42	(1, 109)	.237	.83
SE-II	31.57	8.11	31.82	3.52	0.05	(1, 203)	.818	.70
FOI	16.50	5.80	16.87	3.82	0.19	(1, 193)	.660	.57
CSE	29.99	7.32	29.53	4.09	0.20	(1, 200)	.654	.41
MOE	13.80	3.29	14.85	2.76	4.88	(1, 213)	.028	.69

Note: PFAI = Performance Failure Appraisal Inventory; FSE = Fears of Experiences Shame and Embarrassment; FDSE = Fears of Devaluing One's Self Estimate; FUF = Fears of Having an Uncertain Future; FIOLI = Fears of Important Others Losing Interest;

FUIO = Fears of Upsetting Important Others; FOF = General Fear of Failure; *GRCS* = *Gender Role Conflict Scale*; SPC = Success, Power, Competition; RE = Restrictive Emotionality; RABBM/W = Restrictive Affectionate Behavior Between Men/Women; CBWL = Conflict Between Work and Leisure; *LAESE* = *Longitudinal Assessment of Engineering Self-Efficacy*; CSE = Engineering Career Success Expectations; SE-I = Engineering Self-Efficacy I; SE-II = Engineering Self-Efficacy II; FOI = Feelings of Inclusion; CSE = Coping Self-Efficacy; MOE = Math Outcome Expectations; F = F ratio of ANOVA; df = degrees of freedom; p = probability, α = alpha coefficient of reliability

The current study found the Gender Role Conflict Scale (O'Neil, 1981a) to have internal consistency ranges from .78 to .83, which was considered within acceptable ranges (DeVellis, 1991). The subscales for the Longitudinal Assessment of Engineering Self-Efficacy (AWE, 2011) for the current study were determined to have internal consistencies from .41 to .83. The LAESE subscales of Feeling of Inclusion (α = .57) and Coping Self-Efficacy (α = .41) were found to have low reliability coefficients indicating low internal consistency of reliability and thus were not included in analysis.

Significant Gender Differences

Differences based on gender were assessed and are reported in Table 3.1. Significant gender differences were found in three of the subscales for the Performance Failure Appraisal Inventory, two of the subscales of the Gender Role Conflict Scale, and one subscale of the Longitudinal Assessment of Engineering Self-Efficacy.

The three subscales of the PFAI with significant gender differences were: Fears of Experiencing Shame and Embarrassment, $F(1, 214) = 10.67, p < .05$; Fears of Devaluing One's Self-Estimate, $F(1, 215) = 23.44, p < .05$; and Fears of Having an Uncertain Future, $F(1, 215) = 7.34, p < .05$. Two subscales of the Gender Role Conflict Scale had significant gender differences: Restrictive Emotionality, $F(1,186) = 4.63, p < .05$ and Restrictive Affectionate Behavior Between Men, $F(1,205) = 24.73, p < .05$. Only one subscale of the Longitudinal Assessment of Engineering Self-Efficacy demonstrated a significant difference, the Math Outcome Expectations, $F(1,213) = 4.88, p < .05$.

Descriptive Statistics

Table 3.1 summarizes the means and standard deviations for male and female participants on the variables in this study. Also included in Table 3.1 are the F ratio values for ANOVA assessing gender differences, the degrees of freedom for each subscale, and the probability for each subscale.

Correlations among Variables for Males and Females

Bivariate correlational analyses were conducted on all the variables in the study and the results of the analyses for the Performance Failure Appraisal Inventory (PFAI), Gender Role Conflict Scale (GRCS), and Longitudinal Assessment of Engineering Self-Efficacy (LAESE) are presented in Table 3.2 for males and females. There were significant correlations noted between the subscale Fears of Experiencing Shame and Embarrassment with the Gender Role Conflict Scale subscales of Success, Power, and Competition ($r = .36, p < .05$) and Conflicts Between Work and Leisure ($r = .37, p < .05$). This subscale also correlates negatively with the Coping Self-Efficacy subscale from the Longitudinal Assessment of Engineering Self-Efficacy ($r = -.22, p < .05$).

Table 3.2

Combined Correlational Matrix among Variables: PFAI, GRCS, and LAESE for Males and Females

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SPC	1.0	.26**	.22**	.33**	.36**	.34**	.24**	.22**	.22**	.37**	.09	-.06	-.09	-.11	-.12	.01
2. RE		1.0	.51**	.22**	.09	.11	.04	.15*	.07	.13	-.00	-.11	-.15	-.07	-.12	-.11
3. RAB			1.0	.02	-.05	.00	-.10	.12	.05	.01	.03	-.13	-.08	.08	-.07	-.19**
4. CBW				1.0	.37**	.31**	.25**	.24**	.16**	.36**	-.05	-.13	.02	-.04	.00	-.04
5. FSE					1.0	.55**	.60**	.54**	.46**	.86**	-.10	-.09	-.13	-.03	-.22**	.05
6. FDSE						1.0	.52**	.30**	.28**	.68**	-.14	-.14	-.16*	.01	-.23**	-.07
7. FUF							1.0	.38**	.42**	.77**	-.14	-.15	-.18**	-.09	-.23**	.09
8. FIOLI								1.0	.40**	.72**	-.06	-.15	-.12	-.14	-.13	.06
9. FUIO									1.0	.70**	.06	-.10	-.18*	-.00	-.10	.05
10. FofF										1.0	-.09	-.16	-.20**	-.06	-.23**	.06
11. ECSE											1.0	.59**	.24**	.22**	.69**	.30**
12. SE-I												1.0	.72**	.32**	.38**	.38**
13. SE-II													1.0	.12	.31**	.23**
14. FOI														1.0	.08	.01
15. CSE															1.0	.04
16. MOE																1.0

Note: PFAI = Performance Failure Appraisal Inventory; GRCS = Gender Role Conflict Scale; LAESE = Longitudinal Assessment of Engineering Self-Efficacy; SPC = Success, Power, Competition; RE = Restrictive Emotionality; RAB = Restrictive Affectionate Behavior Between Men/Women; CBW = Conflicts Between Work and Leisure; FSE = Fears of Experiencing Shame and Embarrassment; FDSE = Fears of Devaluing One's Self-Estimate; FUF = Fears of Having an Uncertain Future; FIOLI = Fears of Important Others Losing Interest; FUIO = Fears of Upsetting Important Others; FofF = General Fear of Failure; ECSE = Engineering Career Success Expectations; SE-I = Self-Efficacy I; SE-II = Self-Efficacy II; FOI = Feeling of Inclusion; CSE = Coping Self-Efficacy; MOE = Math Outcome Expectations

The subscale of Fears of Devaluing One's Self-Estimate from the PFAI was significantly related to the GRCS subscales of Success, Power, and Competition ($r = .34$, $p < .05$) and Conflicts Between Work and Leisure ($r = .31, p < .05$). The PFAI subscale of Fears of Having an Uncertain Future was significantly correlated with the GRCS subscales of Success, Power, and Competition ($r = .24, p < .05$) and Conflicts Between Work and Leisure ($r = .25, p < .05$) and with the LAESE subscales of Self-Efficacy II ($r = -.18, p < .05$) and Coping Self-Efficacy ($r = -.23, p < .05$).

Correlations among Variables for Males

The results for the bivariate correlational analyses conducted for the male participants are presented in Table 3.3. Significant correlations were found between the Gender Role Conflict Scale (GRCS), Performance Failure Appraisal Inventory (PFAI), and Longitudinal Assessment of Engineering Self-Efficacy (LAESE). Significant relationships were noted between the GRCS subscale of Success, Power, and Competition for male participants with the PFAI subscales of Fears of Experiencing Shame and Embarrassment ($r = .33, p < .05$), Fears of Devaluing One's Self-Estimate ($r = .33, p < .05$), Fears of Having an Uncertain Future ($r = .24, p < .05$), Fears of Important Others Losing Interest ($r = .22\ p < .05$), and Fears of Upsetting Important Others ($r = .27$, $p < .05$). The PFAI subscale Fears of Devaluing One's Self-Estimate was negatively correlated with the LAESE subscales of Engineering Career Success Expectation ($r = -.19, p < .05$), Coping Self-Efficacy ($r = -.27, p < .05$), and Engineering Self-Efficacy II ($r = -.20, p < .05$).

Table 3.3

Correlational Matrix among Variables: PFAI, GRCS, and LAESE for Males

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SPC	1.0	.26**	.30**	.32**	.33**	.33**	.24**	.22**	.28**	.37**	.05	-.11	-.12	.10	-.16	.02
2. RE		1.0	.46**	.25**	.15	.19*	.09	.15	.11	.18*	-.06	-.14	-.15	-.09	-.13	-.09
3. RAB			1.0	.07	.03	.23	-.01	.11	.13	.13	.04	-.09	-.09	.15	-.08	-.16
4. CBW				1.0	.29**	.25**	.18*	.24**	.11	.29**	-.03	-.16	.04	-.08	.03	.01
5. FSE					1.0	.50**	.60**	.62**	.48**	.87**	-.12	-.10	-.15	-.04	-.27**	.09
6. FDSE						1.0	.48**	.35**	.31**	.67**	-.18*	-.19	-.20*	-.04	-.27**	-.12
7. FUF							1.0	.42**	.44**	.77**	-.20*	-.20	-.23**	-.13	-.25**	.05
8. FIOLI								1.0	.38**	.75**	-.07	-.12	-.18*	-.10	-.20*	.05
9. FUIO									1.0	.70**	.04	-.16	-.25**	-.05	-.15	.00
10. FofF										1.0	-.13	-.18	-.26**	-.07	-.29**	.03
11. ECSE											1.0	.64**	.23**	.24**	.77**	.29**
12. SE-I												1.0	.75**	.35**	.46**	.39**
13. SE-II													1.0	.14	.31**	.21*
14. FOI														1.0	.09	.01
15. CSE															1.0	.06
16. MOE																1.0

Note: PFAI = Performance Failure Appraisal Inventory; GRCS = Gender Role Conflict Scale; LAESE = Longitudinal Assessment of Engineering Self-Efficacy; SPC = Success, Power, Competition; RE = Restrictive Emotionality; RAB = Restrictive Affectionate Behavior Between Men/Women; CBW = Conflicts Between Work and Leisure; FSE = Fears of Experiencing Shame and Embarrassment; FDSE = Fears of Devaluing One's Self-Estimate; FUF = Fears of Having an Uncertain Future; FIOLI = Fears of Important Others Losing Interest; FUIO = Fears of Upsetting Important Others; FofF = General Fear of Failure; ECSE = Engineering Career Success Expectations; SE-I = Self-Efficacy I; SE-II = Self-Efficacy II; FOI = Feeling of Inclusion; CSE = Coping Self-Efficacy; MOE = Math Outcome Expectations

The PFAI subscale Fear of Having an Uncertain Future was negatively correlated with the LAESE subscales of Engineering Career Success Expectation (r = -.20, p < .05), Coping Self-Efficacy (r = -.25, p < .05), and Engineering Self-Efficacy II (r = -.23, p < .05).

Correlations among Variables for Females

Bivariate correlational analyses were conducted for the female participants, and are presented in Table 3.4. Significant correlations were found between the subscales from the Performance Failure Appraisal Inventory (PFAI), Gender Role Conflict Scale (GRCS), and the Longitudinal Assessment of Engineering Self-Efficacy (LAESE). The GRCS subscale of Success, Power, and Competition was significantly correlated with the PFAI subscales of Fears of Experiencing Shame and Embarrassment (r = .42, p < .05) and Fears of Devaluing One's Self-Estimate (r = .32, p < .05). The GRCS subscale of Conflicts Between Work and Leisure had significant relationships with the PFAI subscales of Fears of Experiencing Shame and Embarrassment (r = .59, p < .05), Fears of Devaluing One's Self-Estimate (r = .49, p < .05), Fears of Having an Uncertain Future (r = .42, p < .05), and Fears of Upsetting Important Others (r = .27, p < .05). The PFAI subscale of Fear of Important Others Losing Interest was negatively correlated with the LAESE subscale of Feeling of Inclusion (r = -27, p < .05).

Table 3.4

Correlational Matrix among Variables: PFAI, GRCS, and LAESE for Females

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SPC	1.0	.33*	.15	.36**	.42**	.32*	.19	.21	.09	.34**	.26	.12	.08	.13	.06	-.09
2. RE		1.0	.56**	.14	.08	.08	.01	.14	-.00	.09	.09	.01	-.16	-.01	-.15	-.06
3. RAB			1.0	- .04	.03	-.16	-.14	.14	-.05	-.03	.07	-.20	-.05	-.11	-.14	-.16
4. CBW				1.0	.59**	.49**	.42**	.24	.27*	.55**	-.16	-.05	-.07	.06	-.01	-.19
5. FSE					1.0	.58**	.52**	.40**	.43**	.82**	-.16	-.22	-.13	-.06	-.08	-.21
6. FDSE						1.0	.55**	.28*	.22	.68**	-.13	-.17	-.11	.14	-.08	-.14
7. FUF							1.0	.29*	.40**	.72**	.02	-.01	-.02	.03	-.15	.10
8. FIOLI								1.0	.47**	.70**	.00	-.23	.13	-.27*	.12	.13
9. FUIO									1.0	.72**	.16	.10	.09	-.17	.12	.15
10. FofF										1.0	-.03	-.14	-.01	-.11	-.01	.01
11. ECSE											1.0	.18	.36**	.06	.18	.41**
12. SE-I												1.0	.52**	.09	.16	.31
13. SE-II													1.0	-.07	.36**	.40**
14. FOI														1.0	.01	-.17
15. CSE															1.0	-.01
16. MOE																1.0

Note: PFAI = Performance Failure Appraisal Inventory; GRCS = Gender Role Conflict Scale; LAESE = Longitudinal Assessment of Engineering Self-Efficacy; SPC = Success, Power, Competition; RE = Restrictive Emotionality; RAB = Restrictive Affectionate Behavior Between Men/Women; CBW = Conflicts Between Work and Leisure; FSE = Fears of Experiencing Shame and Embarrassment; FDSE = Fears of Devaluing One's Self-Estimate; FUF = Fears of Having an Uncertain Future; FIOLI = Fears of Important Others Losing Interest; FUIO = Fears of Upsetting Important Others; FofF = General Fear of Failure; ECSE = Engineering Career Success Expectations; SE-I = Self-Efficacy I; SE-II = Self-Efficacy II; FOI = Feeling of Inclusion; CSE = Coping Self-Efficacy; MOE = Math Outcome Expectations

Results for Hypotheses in Study One

Hypotheses for Fear of Failure

Fear of failure was analyzed using MANOVA on data from the Performance Failure Appraisal Inventory. Results indicate significant gender differences in the fear of failure variable, $F(5, 207) = 6.40$, $p < .05$; Wilk's $\lambda = 0.87$. ANOVA was used to analyze each subscale of the Performance Failure Appraisal Inventory. Each hypothesis for fear of failure was tested with ANOVA. The sum of squares, mean squares, degrees of freedom, and *F* ratios for ANOVA can be seen in Table 3.5.

Table 3.5

Analysis of Variance (ANOVA) for Fear of Failure Hypotheses in Study One Performance Failure Appraisal Inventory

Variable	*F*	*df*	*Sum of Squares*	*Mean Squares*	*p*
FSE	10.67	(1, 214)	326.99	326.99	.001
FDSE	23.44	(1, 215)	293.46	293.46	.000
FUF	7.34	(1, 215)	110.65	110.65	.007
FIOLI	0.04	(1,214)	0.79	0.79	.850
FUIO	0.14	(1, 213)	3.34	3.34	.708

FSE = Fears of Experiences Shame and Embarrassment; FDSE = Fears of Devaluing One's Self Estimate; FUF = Fears of Having an Uncertain Future; FIOLI = Fears of Important Others Losing Interest; FUIO = Fears of Upsetting Important Others

Note: F = F ratio of ANOVA; *df* = degrees of freedom; *p* = probability

Fear of failure hypothesis A. Female engineering students will demonstrate significantly higher fear of experiencing shame and embarrassment in front of others than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Results for fear of failure hypothesis A. This hypothesis stated female engineering students would have significantly higher fear of being embarrassed or shamed in front of others than their male counterparts. The results indicate this hypothesis was supported, $F(1, 214) = 10.67$, $p < .05$). Females do demonstrate higher fear of being embarrassed or shamed in front of other individuals than their male counterparts.

Fear of failure hypothesis B. Female engineering students will exhibit significantly lower beliefs about their capabilities than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Results for fear of failure hypothesis B. This hypothesis stated female engineering students would exhibit lower beliefs regarding their skills and abilities than male engineering students. Results indicate females are prone to higher levels of self-devaluation, or lower beliefs about their capabilities, than their male counterparts, $F(1, 215) = 23.44$, $p < .05$. This hypothesis was supported by the results.

Fear of failure hypothesis C. Female engineering students will display significantly higher fears regarding their futures than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Results for fear of failure hypothesis C. This hypothesis stated female engineering students would be more likely to have fears regarding their future than males.

This hypothesis was supported, $F(1, 215) = 7.34, p < .05$ by the results indicating females are more fearful of their future than their male counterparts.

Fear of failure hypothesis D. Female engineering students will exhibit significantly higher fears that important others have lost interest than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Results for fear of failure hypothesis D. This hypothesis stated females would have fears about their significant others losing interest in them personally. Results indicate no significant findings that female students experience more concern than male students that important loved ones in their life have lost interest in them, $F(1, 214) = 0.04, p = .85, ns$. Therefore, this hypothesis was not supported.

Fear of failure hypothesis E. Female engineering students will display significantly higher fears that important others will be upset with them than male engineering students, as evidenced by scores on the Performance Failure Appraisal Inventory.

Results for fear of failure hypothesis E. This hypothesis stated female engineering students would display greater fear that significant others would be angry or upset at them than their male counterparts. This hypothesis was not supported, $F(1, 213) = 0.14, p = .71, ns$, which indicates females do not have a higher fear than males of angering or upsetting their significant important others.

Hypotheses for Self-Efficacy

Self-efficacy, as measured by the Longitudinal Assessment of Engineering Self-Efficacy questionnaire, was analyzed using MANOVA. Results indicate no significance for the overall self-efficacy variable, $F(6, 28) = 2.03, p > .05$; Wilk's $\lambda = 0.87$ *ns*. Each

hypothesis for self-efficacy was tested with an ANOVA for the subscales of Longitudinal Assessment of Engineering Self-Efficacy. The sum of squares, mean squares, degrees of freedom, and *F* ratios for ANOVA can be seen in Table 3.6.

Table 3.6

Analysis of Variance (ANOVA) for Self-Efficacy Hypotheses in Study One Longitudinal Assessment of Engineering Self-Efficacy

Variable	*F*	*df*	*Sum of Squares*	*Mean Squares*	*p*
ECSE	0.77	(1, 185)	35.69	35.69	.383
SE-I	1.42	(1, 109)	41.33	41.33	.237
SE-II	0.05	(1, 203)	2.68	2.68	.818
FOI	0.19	(1,193)	5.49	5.49	.660
CSE	0.20	(1, 200)	8.64	8.64	.654
MOE	4.88	(1, 213)	48.52	48.52	.028

ECSE = Engineering Career Success Expectations; SE-I = Self-Efficacy I; SE-II = Self-Efficacy II; FOI = Feeling of Inclusion; CSE = Coping Self-Efficacy; MOE = Math Outcome Expectations

Note: F = F ratio of ANOVA; df = degrees of freedom; p = probability

Self-Efficacy Hypothesis A

Male engineering students will exhibit significantly higher expectations about their future career as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis A

Male engineering students were predicted to have higher beliefs about their future career than female counterparts. This hypothesis was not supported by the results, $F(1, 185) = 0.77, p = .38, ns$. Results indicate males are not likely to have better expectations regarding their future career in engineering than females.

Self-Efficacy Hypothesis B

Male engineering students will exhibit significantly higher beliefs about their future success as an engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis B

This hypothesis predicted males would have higher self-beliefs regarding their future achievement in engineering. Results indicate there was no support this hypothesis, $F(1, 109) = 1.42, p = .24, ns$. These results indicate males are not more likely to have better beliefs about their future success in their engineering career than female engineering students.

Self-Efficacy Hypothesis C

Male engineering students will demonstrate significantly higher personal beliefs about their capabilities as a future engineer than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis C

Results indicate there was no support for the hypothesis that males have significantly higher beliefs about their skills and capabilities as a future engineer, F(1,

203) = 0.05, p =.82, *ns.* Results do not support the hypothesis that males are more likely to believe that they are more capable to be an engineer than females.

Self-Efficacy Hypothesis D

Male engineering students will exhibit significantly higher beliefs about feeling included as part of the group than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis D

This hypothesis predicted male engineering students would be more likely to feel included in the group than their female counterparts. This hypothesis was not supported, $F(1, 193) = 0.19, p = .66$, *ns.* The results indicate males are not more likely to feel included in the group than their female counterparts.

Self-Efficacy Hypothesis E

Male engineering students will display significantly higher beliefs about their ability to cope with difficulties than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis E

Males were predicted to believe in their coping abilities when faced with problems more than their female counterparts. Results indicate males do not have higher beliefs regarding their coping abilities, $F(1, 200) = 0.20, p = .65$, *ns.* Therefore, this hypothesis was not supported by the results.

Self-Efficacy Hypothesis F

Male engineering students will exhibit significantly higher beliefs about their skills in mathematics than female engineering students, as evidenced by scores on the Longitudinal Assessment of Engineering Self-Efficacy.

Results for Self-Efficacy Hypothesis F

This hypothesis predicted males were more likely to believe in their mathematics skills and capabilities than their female equivalents. Results indicate males do have higher self-beliefs regarding their skills in mathematics than females, $F(1, 213) = 4.88, p < .05$. This hypothesis was supported by the results indicating males have better self-efficacy beliefs about their skills in mathematics than do their female counterparts.

Results for Hypotheses in Study Two

Hypothesis One

The rating of applicants based on scores related to engineering skills will be significantly different between male and female applicants.

Results for Hypothesis One

The first hypothesis in study two examines whether there was a difference in the rating of hypothetical engineering applicants for an engineering program based on the gendered name given to hypothetical engineering applicants. A Multivariate Analysis of Variance (MANOVA) was conducted to test this hypothesis because there are multiple independent and dependent variables. The multiple independent variables include the gender of the research participant respondent and the gender of the hypothetical mock engineering applicant. The multiple dependent variables are the ratings based on the

provided traditional name of each mock engineering applicant and the provided skills and capabilities of that applicant.

There were no significant results found to support hypothesis one. No significant multivariate interactions were noted between the rating of the mock applicants based on their gender and their hypothetical skills and capabilities as future engineers, $F(4, 213) = 0.72$, $p > .05$, Wilk's $\lambda = 0.99$, *ns*. Results for hypothesis one of study two are presented in Table 3.7. Since no significant results were found, it indicates that the research participants did not evaluate differently based on gendered name.

Table 3.7

Multivariate Analysis of Variance (MANOVA) for Hypothesis One in Study Two

	Value	*F*	Hypothesis *df*	Error *df*	Significance *p*
Wilk's λ	0.99	0.72	4.00	213.00	.580

Note: *F* = F ratio of MANOVA; *df* = degrees of freedom; *p* = probability

Hypothesis Two

The overall rating of applicants as successful as future engineers will be significantly different between male and female applicants.

Results for Hypothesis Two

The second hypothesis in study two predicted a significant difference in the rating of future engineering success due to gender. A Multivariate Analysis of Variance (MANOVA) was conducted to test this hypothesis because of the multiple independent and dependent variables. The multiple dependent variables in this hypothesis are the gender and the provided skills and capabilities of each hypothetical engineering student

applicant. The multiple independent variables for this hypothesis are the gender of the research participant respondent and the gender of the hypothetical engineering applicant. There were no significant results found to support this hypothesis. No main effects were found to support the hypothesis that the overall rating of applicants as successful future engineers could be predicted, $F(4, 213) = 0.81$, $p > .05$; Wilk's $\lambda = 0.99$ based on the provided information. Results for hypothesis two of study two can be viewed in Table 3.8.

Table 3.8

Multivariate Analysis of Variance (MANOVA) for Hypothesis Two in Study Two

	Value	*F*	Hypothesis *df*	Error *df*	Significance *p*
Wilk's λ	0.99	0.81	4.00	213.00	.518

Note: *F* = F ratio of MANOVA; *df* = degrees of freedom; *p* = probability

Hypotheses for Gender Role Conflict and Applicant Selection

Each hypothesis examining gender role conflict and applicant selection was tested with a Multivariate Analysis of Variance (MANOVA). The Wilk's lambda, F ratio, hypothesis degrees of freedom, and error degrees of freedom for MANOVA can be seen in Table 3.9.

Table 3.9

Multivariate Analysis of Variance (MANOVA)-Gender Role Conflict and Applicant Selection Hypotheses in Study Two

Hypothesis	Wilk's λ	*F*	Hypothesis *df*	Error *df*	*p*
Hypothesis A	1.00	0.28	2.00	150.00	.755
Hypothesis B	0.99	0.74	2.00	150.00	.481
Hypothesis C	0.98	1.73	2.00	134.00	.181
Hypothesis D	0.99	0.99	2.00	134.00	.374
Hypothesis E	1.00	0.09	2.00	144.00	.917
Hypothesis F	1.00	0.05	2.00	144.00	.949
Hypothesis G	0.99	0.49	2.00	150.00	.615
Hypothesis H	0.99	0.65	2.00	150.00	.522
Hypothesis I	0.92	2.41	2.00	59.00	.198
Hypothesis J	0.95	1.44	2.00	59.00	.245
Hypothesis K	0.99	0.31	2.00	48.00	.739
Hypothesis L	0.98	0.58	2.00	48.00	.564
Hypothesis M	0.92	2.61	2.00	57.00	.082
Hypothesis N	0.94	1.75	2.00	57.00	.182
Hypothesis O	0.93	2.38	2.00	59.00	.102
Hypothesis P	0.97	0.98	2.00	59.00	.381

Note: *F* = F ratio of MANOVA; *df* = degrees of freedom; *p* = probability

Gender Role Conflict and Applicant Selection Hypothesis A

Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis A

Results for this hypothesis do not support the prediction that males with higher needs for success, power, and competition will rate females lower in regards to their skills and abilities. This hypothesis was not supported, $F(2, 150) = 0.28, p > .05$; Wilk's $\lambda = 1.00$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis B

Males with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis B

This hypothesis predicted males with higher needs to be successful, powerful, and competitive would rate males to be more capable and skilled as a future engineer. Results indicate males with high needs for success, power, and competition did not rate males as more skillful and capable, $F(2, 150) = 0.74, p > .05$; Wilk's $\lambda = 0.99$, *ns*. This hypothesis was not supported by the results. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis C

Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis C

This hypothesis predicted that males having restricted emotions would rate females as being lower in skills and abilities. Results indicate this hypothesis was not supported, $F(2, 134) = 1.73, p > .05$; Wilk's $\lambda = 0.98$, *ns*. There was no indication that males with high scores on restrictive emotionality rated females as lower in skill and abilities. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis D

Males with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis D

Results indicate there was no support for the hypothesis that males with highly restrictive emotions will rate other males as having more skill and ability necessary to be a future engineer, $F(2, 134) = 0.99, p > .05$; Wilk's $\lambda = 0.99$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis E

Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis E

This hypothesis predicted that males demonstrating restrictive behaviors with other men would rate females as having lower abilities and skills that are necessary to be

a future engineer. Results indicate there was no support for this hypothesis, $F(2, 144) = 0.09, p > .05$; Wilk's $\lambda = 1.00$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis F

Males with higher restricted behavior with other men, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis F

This hypothesis predicted that males who are very restrictive with other men would rate males as being more capable and skilled as future engineers. Results do not support this hypothesis. Findings indicate this hypothesis was not supported, $F(2, 144) = 0.05, p > .05$; Wilk's $\lambda = 1.00$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis G

Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis G

Results indicate no support for the hypothesis that males having high conflict between their work time and their leisure activities will rate females as being lower in ability or skills needed to be a future engineer. This hypothesis was not supported, $F(2, 150) = 0.49, p > .05$; Wilk's $\lambda = 0.99$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis H

Males with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis H

This hypothesis predicted males with high levels of conflict between their work and leisure time would rate other males as being higher skilled and competent as future engineers. Results do not support the hypothesis that males with high conflict between work and play rate other males more favorably, $F(2, 150) = 0.65, p > .05$;Wilk's $\lambda =$, 0.99, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis I

Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis I

This hypothesis predicted females with high needs to be successful, powerful, and competitive would rate females as lower on their skill and ability to be a future engineer. Results do not support this hypothesis, $F(2, 59) = 2.41, p > .05$; Wilk's $\lambda =$ 0.92, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis J

Females with higher needs for success, power, and competition, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis J

Results indicate there was no support for the hypothesis female participants having higher needs to be successful, powerful, and competitive will rate males as having higher skills and abilities to be a future engineer, $F(2, 59) = 1.44, p > .05$; Wilk's $\lambda = 0.95$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis K

Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis K

Results for this hypothesis indicate females highly restricted in their emotional responses do not rate other females as having lower skills and aptitudes needed to be a future engineer. This hypothesis was not supported, $F(2, 48) = 0.31, p > .05$; Wilk's $\lambda = 0.99$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis L

Females with higher restrictive emotionality, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis L

This hypothesis predicted females demonstrating highly restrictive emotionality would rate males as having higher skills and abilities. Results indicate females with restrictive emotional responses do not rate males higher. This hypothesis was not

supported, $F(2, 48) = 0.58, p > .05$; Wilk's $\lambda = 0.98$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis M

Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis M

This hypothesis predicted females who are highly restricted with other women would rate females as lower on their skills and qualifications to be an engineer. This hypothesis was not supported by the results, $F(2, 57) = 2.61, p > .05$; Wilk's $\lambda = 0.92$, *ns*. Females with restrictive behaviors with other women were not found to rate other females as lower in skills and aptitudes. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis N

Females with higher restricted behaviors with other females, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis N

This hypothesis predicted females who display highly restrictive behaviors with other females will rate males to be more skilled and capable as future engineers. Results indicate females with highly restrictive behaviors with other females do not rate males more favorably, $F(2, 57) = 1.75, p > .05$; Wilk's $\lambda = 0.94$, *ns*. This hypothesis was not supported. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis O

Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate females lower on their skills and capability to be future engineer.

Results for Gender Role Conflict and Applicant Selection Hypothesis O

Results indicate no support for the hypothesis that females with high conflict between work and play would rate other females as being less qualified to be a future engineer, $F(2, 59) = 2.38, p > .05$; Wilk's $\lambda = 0.93$, *ns*. Results can be viewed in Table 3.9.

Gender Role Conflict and Applicant Selection Hypothesis P

Females with higher conflict between work and leisure, as evidenced by scores on the Gender Role Conflict Scale, will rate males higher on their skills and capability to be future engineers.

Results for Gender Role Conflict and Applicant Selection Hypothesis P

This hypothesis predicted that females having high levels of conflict between their work and their leisure time would rate males to be more skilled and able as engineers. Results indicate that this hypothesis was not supported, $F(2, 59) = 0.98, p > .05$; Wilk's $\lambda = 0.97$, *ns*. Results can be viewed in Table 3.9.

CHAPTER FOUR

DISCUSSION

The current research study was comprised of two different studies that each had separate hypotheses. In the first study, the relationships between fear of failure, gender role conflict, and self-efficacy were examined to determine interactions. Fear of failure and self-efficacy were also investigated to ascertain their impact on selecting engineering as a career. In study one, there were 11 hypotheses tested to determine if: (1) fear of failure would be significantly higher in female engineering students than their male engineering student counterparts and (2) male engineering students would have higher engineering self-efficacy than female engineering students.

The second study examined whether males and females would rate hypothetical potential applicants for an engineering program differently based upon the provided names that identified the gender of the applicant, instead of rating based upon an applicant's skills and abilities. This study also investigated if participants having high levels of gender role conflict would rate males and females differently as applicants into the engineering program. This study had 18 hypotheses that were individually tested to identify if: (1) the rating of applicants would be significantly different, based on the provided gender, skills, and capabilities of each mock applicant, in males and females, (2) the overall rating of engineering applicants as successful future engineers would be significantly

different between males and females, and (3) research participants having high levels of gender role conflict would rate males and females differently as mock applicants into an engineering program.

Chapter Four includes a general summarization of the study findings, interpretations for each hypothesis in each study, and the implications for the found significant results. This chapter also includes limitations of the current study and suggestions for future research areas.

General Summarization of Results

Past investigations have demonstrated that females frequently experience feelings of incompetency regarding their capability to be a successful engineer when compared to their male counterparts (Grandy, 1994; Rittmayer & Beier, 2009; Schunk & Pajares, 2002; Hyde et al., 1990). Fear of failure has been reported to be significantly correlated to low self-efficacy in women (Martin, 2002; Elliot & Sheldon, 1997; Sherman, 1988). Low self-efficacy in women has been found to be significantly related to career choice, particularly for females choosing to enter into engineering as an occupational path (Papastergiou, 2008; Rittmayer & Beier; Hyde et al.; Schunk & Pajares). Studies have also determined that females with low self-efficacy are less likely to choose engineering as an educational choice (Sherman; Elliot & Sheldon; Fox, 1994; Martin). Papastergiou has identified that females entering engineering often exhibit low self-efficacy regarding their skills to be an engineer. Female engineers are often considered to have gone against societal norms for entering the field of engineering for a career. Collectively, these findings emphasize the importance of considering the many factors impacting females who may decide to pursue engineering.

Negative relationships have been identified between females entering into non-traditional careers and how these females are viewed by society (Heilman et al., 1988; Lenney et al., 1983). Females entering into traditionally male-dominated careers may have negative beliefs regarding their competence level and judge themselves to be less proficient than their male counterparts (Lenney et al.; Heilman et al.). Women may be viewed less positively when applying for employment that is traditionally masculine than men with equivalent qualifications (Heilman et al.; Lenney et al.). Studies have ascertained that gender was significantly correlated to job selection in the past (Gardner & Discenza, 1988; Carlson, 1967; Arvey, 1979), and this issue may still require consideration today.

In the current research, study one found relationships among fear of failure, gender role conflict, and self-efficacy. These intercorrelations are discussed below. The results for the hypotheses in both studies one and two are presented for interpretation.

Discussion of Results in Study One

Demographic and Descriptive Data

Significant gender differences were noted when identifying relationships among fear of failure, gender role conflict, and self-efficacy. Males and females differed significantly on three of the six components for fear of failure: fear of encountering feelings of shame and/or embarrassment, fear of being devalued by one's own self, and fear of the future being undecided or uncertain. For gender role conflict, males and females demonstrated significant differences on two of the four factors: restriction of emotional expression and the restriction of affectionate behavior toward individuals of

the same gender. For self-efficacy, only having concerns regarding math expectations was found to be significantly different between males and females.

There were significant intercorrelations among aspects of fear of failing, gender role conflict, and self-efficacy. Responses indicate that participants who experience gender role conflict are likely to experience feelings related to fear of being a failure. These feelings are manifested by fearing that they will be embarrassed in front of other individuals or fear that their future will be unknown or unfamiliar. These participants are also fearful that their significant others will lose interest or become angry with them. The participants exhibiting gender role conflict are also likely to feel as though they are misunderstood and are not a good fit for societal standards, which may intensify their fears of being a failure. Because of the fear of failing and being embarrassed, these participants are more likely to exhibit restrictive behaviors and avoid situations where there is a potential for others seeing them in a situation that was less than perfect.

Participants having significant fears of failing were more likely to have negative personal beliefs about their self-efficacy for engineering. These participants experience fears that they will be incapable of coping with the stress associated with seeking an engineering degree. Fearful of being labeled as a failure, participants exhibiting high fears of failure experience anxiety and apprehension because they are fearful that they are not intelligent enough or capable of completing the education requirements necessary to complete the training to be engineer. These fears likely intensify their anxiety and worsen their ability to perform optimally in stressful or demanding situations.

Responses indicate that those participants who have higher beliefs about their skills and capabilities to be an engineer, or higher self-efficacy, have greater beliefs

regarding their ability to perform the education requirements for the engineering degree, particularly for the mathematics requirements. Because these participants are more confident about their capabilities, they experience less stress and are better able to cope with dilemmas or problems when such stressors do occur. The participants having higher self-efficacy are likely to respond more positively, even when facing negative situations or anxiety-provoking problems, because of their internalized belief in their self and their ability to cope effectively.

Fear of Failure Hypotheses in Study One

Interpretation of Fear of Failure Hypothesis A

The first hypothesis in study one predicted female engineering students would exhibit higher fear of experiencing shame and embarrassment in front of other individuals than their male engineering counterparts. This was analyzed by examining the results on the subscale Fears of Experiencing Shame and Embarrassment from the Performance Failure Appraisal Inventory. This hypothesis was tested to determine if significant results were found between the reported levels of fear of feeling shame and embarrassment in front others for female and male engineering students. Examination of the results shows support for this hypothesis. Results indicate female engineering students are more likely to experience feelings of embarrassment and shame if they demonstrate failure in front of others. Female engineering students will likely suffer more feelings of humiliation and discomfiture when their personal failures are witnessed by others, and they are more likely to feel that other individuals are aware of their personal failure experience. Female engineering students may be more likely to believe that, if they fail, then the doubt expressed by others regarding their performance was correct about their abilities and

competence. Female engineering students also may be more likely to worry what other individuals think about them should they demonstrate failing behaviors.

Interpretation of Fear of Failure Hypothesis B

This hypothesis predicted female engineering students would have lower self-beliefs about their skills and abilities than male engineering students. Results were analyzed from the subscale Fears of Devaluing One's Self-Estimate from the Performance Failure Appraisal Inventory. This hypothesis was tested to determine if significant results were found between the reported levels of fear of experiencing self-devaluation between female and male engineering students. Results indicate support for this hypothesis. Findings indicate female engineering students are less likely than males to value their own skills and abilities, which results in low self-efficacy feelings. Female engineering students are more likely to experience fear that they are not in control of the outcome of their performance because of their internalized self-devaluation. Female engineering students are more likely to experience fears that they are not smart enough to perform optimally as an engineer or are lacking the talent necessary to be successful as a future engineer than their male counterparts.

Past investigations have found similar results to indicate females are susceptible to feelings of low self-esteem and low self-worth regarding their personal abilities and skills, which influence their feelings regarding a career in engineering or other science and math fields (AAUW, 2008; Papastergiou, 2008; Dawes et al., 2000; Hyde et al., 1990). Past studies have also identified that having feelings of low self-efficacy was significantly related to fearing failure (Sherman, 1988; Elliot & Sheldon, 1997; Martin, 2002). Current research indicates fear of failure, or being unsuccessful in the field of

engineering, is a factor in creating feelings of low self-worth and self-efficacy. This augments Sherman's (1988) findings that fearing failure is significantly related to having feelings of low self-esteem and low self-worth. The current study results indicate females are more susceptible to experiencing fears of not being valued within the field of engineering. These fears are likely related to their personal feelings of self-worth and self-esteem, and more likely to worry about how others view their individual performance.

Interpretation of Fear of Failure Hypothesis C

Hypothesis C for fear of failure predicted female engineering students would have higher fears about their future success than their male equivalents. This hypothesis was tested by analyzing the Fears of Having an Uncertain Future subscale from the Performance Failure Appraisal Inventory. Results indicate support for this hypothesis that female engineering students experience higher fear relating to their futures as engineers than do male engineering students. Specifically, there were significant results indicating females experience higher fears that their future will be uncertain or will change as a result of their personal failure. Females who experience this fear also are likely to experience fear that failing will be instrumental in upsetting their future plans, and they will have to renegotiate their goals for the future. Because female engineering students may fear they are viewed less favorably as potential engineers, they may internalize this fear into concern about their success in the future, potential for advancement, and potential earnings as an engineer.

Interpretation of Fear of Failure Hypothesis D

This hypothesis predicted female engineering students would experience higher fear that significant others would lose interest in them than male engineering students. The results were analyzed from the subscale Fear of Important Others Losing Interest from the Performance Appraisal Failure Inventory. Findings indicate no support for this hypothesis. Female engineering students experience no higher levels of fear that significant others will become uninterested than their male counterparts. One potential reason for this result could be that these female engineering students are less concerned about having significant relationships at the present time because of the rigors and demands of seeking an engineering degree.

Interpretation of Fear of Failure Hypothesis E

Female engineering students were predicted to demonstrate higher levels of fear that important others would become angry or upset than their male equivalents in hypothesis E. This hypothesis was analyzed from the results of the Fear of Upsetting Important Others subscale from the Performance Appraisal Failure Inventory. Results indicate no support for this hypothesis. Female engineering students did not exhibit higher fears that their important loved ones would become displeased, disappointed, or enraged than their male counterparts. The reason for this lack of fear could be that female engineering students feel secure in their relationships and believe their significant others to be supportive of their decision to be engineer.

Self-Efficacy Hypotheses in Study One

Interpretation of Self-Efficacy Hypothesis A

Self-efficacy hypothesis A in study one predicted male engineering students would have higher expectations about their future careers as engineers than their female engineering student equivalents. The results were analyzed from the subscale Engineering Career Success Expectations from the Longitudinal Assessment of Engineering Self-Efficacy. Findings indicate no support for this hypothesis. Male engineering students did not exhibit higher hopes for their career futures than female engineering students. Because of the training necessary to be an engineer, female engineering students may feel just as optimistic about their future employment opportunities as do male engineering students.

Interpretation of Self-Efficacy Hypothesis B

This hypothesis predicted males would exhibit significantly higher beliefs about their future success as future engineers than female engineering students. Analysis of the subscale Self-Efficacy-I from the Longitudinal Assessment of Engineering Self-Efficacy was used to test this hypothesis. Results indicate no support for the hypothesis that male engineering students have elevated views regarding their potential achievement and success as a future engineer than female engineering students. One reason females may have higher beliefs about their future success as engineers was the use of mentoring programs and study groups to assist in preparing females in the skills and training necessary to be a successful engineer. These programs may assist in elevating beliefs about capabilities, which in turn improve beliefs about future success. Also, having successful female role models, which are prevalent for these female engineering students,

has been found to increase feelings of self-worth and reduce fears of failing (Smith, 2005). As the present study did not specifically address the presence of mentorship, future studies may be needed to address whether this is a factor in mitigating self-efficacy concerns.

Interpretation of Self-Efficacy Hypothesis C

The next hypothesis predicted males would have higher beliefs about their capabilities and skills, or feelings about self-efficacy, than female engineering students. The results from this hypothesis were analyzed from the Self-Efficacy-II subscale from the Longitudinal Assessment of Engineering Self-Efficacy. Results from this hypothesis found no support that males have higher feelings of self-efficacy than females.

Papastergiou (2008) identified self-efficacy to be significantly higher for males in the field of engineering than for females. Studies have also identified low self-efficacy among the female population to be directly linked to the number of females entering and being successful in the field of engineering (AAUW, 2008; Rittmayer & Beier, 2009), possibly because higher levels of self-efficacy increases job exploration into careers that would otherwise have remained unexplored. Females with low feelings of self-efficacy may not explore the career opportunity of being an engineer. The current research study does not confirm the past results. Overall, self-efficacy was not found to be significantly higher for male engineering students than for females studying to be engineers. The difference in the results from the current study from past research findings may be the outcome of sample diversity or disparity. This sample was predominantly males and females between the ages of 18 and 22, all of whom are current enrolled students in an undergraduate engineering program. Baumert et al. (1998), in a previous research

finding, utilized a younger population sample, with children as young as aged ten, which could account for the results discrepancy. Papastergiou's study used high school aged children as the research population sample, which was younger than the current study population, which may account for the disparity of results. Although the current research does not support past findings that male engineering students have higher levels of self-efficacy than female engineering students, past research should not be discounted as not significant.

Interpretation of Self-Efficacy Hypothesis D

This hypothesis predicted male engineering students would exhibit higher beliefs about feeling included within the group than their female engineering counterparts. Results were analyzed from the subscale of Feelings of Inclusion from the Longitudinal Assessment of Engineering Self-Efficacy. Findings indicate no support for this hypothesis that male engineering students would feel as though they are more included in the group than their female equivalents. Because of the availability of outside study groups and outside group projects, female engineering students are likely afforded more opportunities to interact within a group setting, which may lessen their feeling of being excluded. This may increase their personal feelings of belonging, which could be the reason for no significant findings for this hypothesis.

Interpretation of Self-Efficacy Hypothesis E

Hypothesis E predicted male engineering students would exhibit higher beliefs about their ability to cope than female engineering students. Results were analyzed from the subscale Coping Self-Efficacy from the Longitudinal Assessment of Engineering Self-Efficacy. There were no significant results for this hypothesis; therefore, this

hypothesis was not supported. The ability to cope effectively when facing difficult situations or problems is one aspect of self-efficacy. Good problem-solving skills are a necessity for coping with problematic situations and difficult obstacles. Grandy (1994) reported that males are often considered to be better problem-solvers than women. Females report belief that their capacity for problem-solving to be less effective than their male counterparts, which can lead to lower beliefs about how to effectively cope when facing a problem (Grandy).

Interpretation of Self-Efficacy Hypothesis F

This hypothesis predicted male engineering students would exhibit higher beliefs about their math skills than female engineering students. Results were analyzed from the subscale Math Outcome Expectations from the Longitudinal Assessment of Engineering Self-Efficacy. Findings support the hypothesis that male engineering students have higher beliefs about their capacity to be successful in mathematics than their female engineering counterparts. Results from this subscale indicate that males feel more certain than their female counterparts that being successful at mathematics will enhance their career and employment opportunities. Males were also more likely to believe that mathematics courses will assist in keeping their career options open for the future. Finally, males were more likely to feel that excelling at mathematics increases their feelings of personal self-worth and self-esteem. These findings corroborate past findings that identify females as having low self-confidence and a fear of failure regarding their mathematical skills (Sherman, 1988). Because mathematics has historically been viewed as a field of male dominance (Sherman), males may have in the past been encouraged to take mathematics classes, while females were not expected to pursue mathematics in school (Papastergiou,

2008; Sherman). Results indicate male engineering students have higher beliefs regarding their success in mathematics, which could increase their beliefs about their career opportunities for the future as well as their personal sense of self-worth.

Results for Hypotheses in Study Two

The following section discusses the results found in the second section of the current study. This section addresses the hypotheses related to the mock applicant scenarios and the rating based on the provided skills and capabilities and his/her provided name of the mock applicant, which was an indicator for gender of the mock applicant.

Interpretation of Hypothesis One for Job Selection and Rating

In study two, the first hypothesis predicted there would be a difference in the rating of hypothetical male and female applicants into an engineering program based upon their provided individual skills and capabilities. This hypothesis was tested to determine if a difference would be found on the rating of hypothetical applicants with only the name, and therefore gender, being changed for each applicant. This hypothesis was not supported by the results for the current study. Schein et al. (1996) found women are discriminated against if they pursue jobs that are stereotypically male. Past studies also indicated that females are often discriminated against because they are perceived as not having the characteristics necessary or the ability to perform in certain jobs, and females will be passed over for employment in some careers, even if they have identical qualifications as their male counterparts (Cejka & Eagly, 1999).

The current investigation did not find significant differences in the way the hypothetical applicants were rated by study participants, despite past research results that suggest there are differences in the ways that males and females are viewed and rated.

The current results may be the outcome of having intelligent and conscientious engineering student research participants who were capable of recognizing that gender was the only distinguishing difference between the mock hypothetical engineering applicants. A more diverse research sample may yield outcome results that are more similar to the results found by previous investigators. While the current investigation did not find significant results between the rating of hypothetical male and female applicants to an engineering program based upon gender and individual skills, it must be considered that this lack of evidence does not disprove prior studies that have found significant differences in the manner that males and females are viewed and rated.

Interpretation of Hypothesis Two for Job Selection and Rating

The second hypothesis in study two predicted a significant difference between males and females regarding their overall success as future engineers, based on the information provided about each hypothetical applicant. This hypothesis was tested to determine if a difference would be found in regard to beliefs about the future success of each applicant, in which only the name, and thereby gender, of each applicant was changed. There was no support for this hypothesis from the research results.

Arvey and Campion (1982) found male applicants for employment typically receive better ratings for their level of functioning than female applicants. Additionally, Gardner and Discenza (1988) found there may be distinct differences in the expectations for males and females who are applying for the same job. Another study reported that when males and females, each displaying similar personality characteristics, apply for the same employment opportunity, the male will be chosen for the job (Glick et al., 1988).

The current research did not support past findings suggesting that males would be viewed more favorably than their female counterparts. No significant difference was found between the ratings that males and females are given in regard to their future success as engineers. Current findings might indicate that the research sample was savvy that gender was the variable being explored for the research investigation. These results may also indicate there has been a significant positive shift in the way that females are viewed in the scientific disciplines, and there was less discrepancy between the ways that males and females are viewed for application and job promotion.

Hypotheses for Gender Role Conflict and Applicant Selection

Interpretation of Hypothesis A for Gender Role Conflict and Applicant Selection

This hypothesis predicted male engineering participants having high needs to be successful, powerful and competitive would rate females lower as potential engineering applicants, based on the information provided in regard to the skills and capabilities of the female applicant. The results were analyzed from the subscale Success, Power, and Competition of the Gender Role Conflict Scale and the mock applicant rating scenarios. Findings indicate no support for this hypothesis. Males having higher needs to be successful and powerful did not view female applicants less favorably. The mock female applicants were not considered to be less capable than their male counterparts. This could be the result of savvy participants who recognized that the difference in the scenarios was the name of the applicant. Participants may have recognized gender was being examined to learn if any gender biases were present in the male participants.

Interpretation of Hypothesis B for Gender Role Conflict and Applicant Selection

Hypothesis B predicted male engineering participants with high needs to be successful, powerful, and competitive would rate male hypothetical applicants to an engineering program higher as future engineers based on the information provided. Results were determined by analysis of the Success, Power, and Competition subscale of the Gender Role Conflict Scale and the mock applicant rating scenarios. There was no support found for this hypothesis from the results. Male engineering participants did not rate male mock applicants to the hypothetical engineering program more favorably.

Interpretation of Hypothesis C for Gender Role Conflict and Applicant Selection

This hypothesis predicted male engineering participants having highly restrictive emotions would rate females as future engineers less favorably based on the provided skills and abilities in the mock scenario. The results were analyzed from the subscale Restrictive Emotionality of the Gender Role Conflict Scale and the mock applicant rating scenarios. Results indicate no support for this hypothesis. There was no indication that male engineering participants believe that female mock applicants would be less capable or skillful than male counterparts, based on results. There was no significant difference found in the way that females were rated by male participants based upon the provided skills and capabilities. The participants may have recognized that there were minimal differences between the mock applicants, with the exception of the traditional male/female name provided as representation of gender. This recognition on part of the male participants could account for the minimal support for the hypothesis: male participants may have feared being truthful about their opinions of females entering the engineering field for fear of being labeled prejudiced or misogynistic.

Interpretation of Hypothesis D for Gender Role Conflict and Applicant Selection

This hypothesis predicted male engineering participants having restricted emotions would regard males more favorably to be future engineers based upon their provided skills and abilities. The results were analyzed from the subscale Restrictive Emotionality of the Gender Role Conflict Scale and the mock applicant rating scenarios. Findings indicate no support for this hypothesis. There was no evidence to support the prediction that males would be valued more as applicants to a hypothetical engineering program and as future engineers than their female counterparts. One reason that there was no support for this hypothesis could be the increase of recruitment for females in the engineering sciences. Male engineering students are likely aware of the recruitment of females into the engineering field, which makes it more likely that females are being valued for their potential contributions to the discipline.

Interpretation of Hypothesis E for Gender Role Conflict and Applicant Selection

Male engineering participants having restricted behaviors with other men were predicted to evaluate females less favorably to be future engineers based on the provided information about their skills and abilities. The results were analyzed from the subscale Restrictive Affectionate Behavior between Men of the Gender Role Conflict Scale and the mock applicant rating scenarios. Results indicate no support for this hypothesis. Male participants did not evaluate females more negatively as future engineers. This could be a result of the more socially conscious current social environment. In today's environment, gender equality is a much discussed topic in the media, classroom, and in social venues. Males could be demonstrating that females are now viewed more favorably for their

potential contributions to the engineering field. Past research that identified females as less desirable to be engineers may be demonstrated as antiquated viewpoints.

Interpretation of Hypothesis F for Gender Role Conflict and Applicant Selection

This hypothesis predicted male engineering participants that have restricted behaviors with other men would evaluate males more desirably based on the information provided to be future engineers. No support was found for this hypothesis from the results of the analysis of the subscale Restrictive Affectionate Behavior between Men from the Gender Role Conflict Scale and the mock applicant rating scenarios. In this hypothesis, male engineering students did not rate males to be better engineers based on the provided information regarding their skills and abilities. Males were not viewed by the male research participants as likely to have greater future success as engineers and were not rated more favorably.

Interpretation of Hypothesis G for Gender Role Conflict and Applicant Selection

Hypothesis G predicted male engineering participants with high levels of conflict between their work and leisurely activities would rate females lower as future engineers based on the provided information about their skills and abilities. Findings were derived from analysis of the subscale Conflict between Work and Leisure from the Gender Role Conflict Scale and the mock applicant rating scenarios. Results do not support this hypothesis. Results indicate males with high amounts of conflict within their professional pursuits and their leisure pursuits did not rate females less positively to be future engineers. The reason for this could be that males are recognizing the value of having diversity, specifically having women as colleagues, in the classroom and workplace.

Interpretation of Hypothesis H for Gender Role Conflict and Applicant Selection

This hypothesis predicted that male engineering participants having high levels of conflict between their work and leisurely pursuits would rate males more favorably as future engineers. The subscale Conflict between Work and Leisure from the Gender Role Conflict Scale and the mock applicant rating scenarios were used for analysis. No support for this hypothesis was found, which indicates male participants do not believe males are better suited to be future engineers. This was different than past findings, which identified males as more favorable candidates for the engineering discipline because of their perceived capabilities in mathematics and science (Sherman, 1988).

Interpretation of Hypothesis I for Gender Role Conflict and Applicant Selection

Female participants having high needs for success, power, and competition were predicted to rate other females lower as future engineers in this hypothesis. No support was found for this hypothesis. Results were found from analysis of the Success, Power, and Competition subscale from the Gender Role Conflict Scale and the mock applicant rating scenarios. Findings indicate female participants do not believe females to have less potential for success as future engineers than their male counterparts. One possible reason for the lack of support for this hypothesis was that females have likely recognized their capability for success as future engineers. These females are in turn projecting their sense of self-success onto their female colleagues and have belief that other females will be successful engineering candidates.

Interpretation of Hypothesis J for Gender Role Conflict and Applicant Selection

Hypothesis J predicted female participants having needs for success, power, and competition would rate male applicants to an engineering program more favorably as

future engineers, based on the provided information about their skills and abilities. The results were analyzed from the subscale Success, Power, and Competition from the Gender Role Conflict Scale and the mock applicant rating scenarios. There was no support for this hypothesis, which suggests that females do not view males as more desirable to be future engineers than their female equivalents. An argument could be made that past research that identified females in the engineering field as having lower self-efficacy feelings than males (Papastergiou, 2008; AAUW, 2008; Rittmayer & Beier, 2009; Sherman, 1988) was no longer applicable since females did not identify males to be more successful as future engineers. The argument could be made that females with low self-efficacy would believe males to be better at engineering skills and abilities; therefore, these females would rate the males as higher. No support was found for this hypothesis that males would be viewed by female participants as better engineering candidates.

Interpretation of Hypothesis K for Gender Role Conflict and Applicant Selection

This hypothesis predicted female participants having highly restricted emotions would rate females less positively to be future engineers based on the skills and abilities provided. Findings were analyzed from the Restrictive Emotionality subscale from the Gender Role Conflict Scale and the mock applicant scenarios. No support was found for this hypothesis. Female engineering participants did not view females as less desirable candidates to be future engineers. Female participants were likely honest in their evaluations of the mock female applicant into the engineering program, which could indicate that female participants believe in the capability of other females to be successful in training for engineering.

Interpretation of Hypothesis L for Gender Role Conflict and Applicant Selection

Hypothesis L predicted that female participants having highly restrictive emotions would rate males more positively as future engineers based on the information provided regarding their skills and abilities. This hypothesis was not supported by the results from the subscale Restrictive Emotionality from the Gender Role Conflict Scale and the mock applicant scenarios. Female participants did not demonstrate more favorable responses for males, indicating that females do not believe themselves to be inferior to males in regard to capabilities and skills necessary to be trained as an engineer. This could be indicative of higher self-efficacy for females studying to be engineers than previous research has determined. Sherman (1988) has identified that females entering into engineering have lower self-efficacy beliefs than do males who choose engineering as a career.

Interpretation of Hypothesis M for Gender Role Conflict and Applicant Selection

This hypothesis predicted female engineering participants having restrictive affectionate behaviors towards other females would rate other females as lower in regard to their future success as an engineer. The results were derived from the subscale Restrictive Affectionate Behavior Between Women from the Gender Role Conflict Scale and the mock applicant scenarios. No support was found for this hypothesis, which suggests that females who have difficulty in expressing their affection for other women do not doubt their capabilities and training for engineering. While these female participants do have difficulty in demonstrating affectionate behavior towards other women, these participants do not have difficulty in recognizing that other females are

capable of effective problem-solving, having quality mathematics and technical skills, and understanding the concepts necessary to be successful as an engineer.

Interpretation of Hypothesis N for Gender Role Conflict and Applicant Selection

Female engineering participants that have highly restrictive behaviors towards other women were predicted in this hypothesis to rate males more favorably as future engineers. Results were determined through analysis of the subscale Restrictive Affectionate Behavior between Women from the Gender Role Conflict Scale and the mock applicant scenarios. Results indicate no support for this hypothesis. Female engineering participants did not rate males more favorably, which may indicate that these females believe there was less discrepancy between the aptitude and competence of males and females choosing engineering as a career future. Therefore, no significant results were found, which likely indicates that females consider themselves to be equally successful as males as future engineers.

Interpretation of Hypothesis O for Gender Role Conflict and Applicant Selection

This hypothesis predicted female engineering participants having high conflict between their work and their leisurely pursuits would rate other females lower for their skills and capabilities to be future engineers. Analysis of the subscale Conflict between Work and Leisure from the Gender Role Conflict Scale and the mock applicant scenarios are how the results for this hypothesis were derived. This hypothesis was not supported by the results. Female engineering participants did not rate other females more negatively as future engineers based on their conflict between work and leisurely pursuits. Females were not viewed in a more negative manner by the female engineering participants,

which likely was indicative of higher feelings of self-efficacy in the female engineering participants.

Interpretation of Hypothesis P for Gender Role Conflict and Applicant Selection

Female engineering participants that have high conflict between their work and leisurely pursuits were predicted in this hypothesis to rate males higher based upon their skills and abilities for engineering. There was no support found for this hypothesis. Results were determined from analysis of the subscale Conflict between Work and Leisure from the Gender Role Conflict Scale and the mock applicant scenarios. Females were predicted to rate males higher because past research has identified that females have lower self-beliefs about their skills, or low self-efficacy, than their male counterparts (Papastergiou, 2008; AAUW, 2008; Rittmayer & Beier, 2009; Sherman, 1988). The current results were in contrast to past results as females did not rate males higher on the skills and abilities necessary to be engineer. This may be indicative that female participants are recognizing their value and self-worth to be contributors alongside males studying to be engineers.

Implications

The importance of attracting, retaining, and increasing women to the field of engineering cannot be denied (Werner & Denner, 2009; Committee on Equal Opportunities in Science & Engineering, 2004). The unequal representation of males compared to females within the field of engineering (National Science Foundation, 2008; Lane, 1999) has long-lasting impact on the scientific disciplines. Women, as a resource, are being underutilized despite their making up 46 percent of the overall labor force in the United States (Frome et al., 2006). The current study can provide information as to

reasons for fewer women to enter into the field of engineering. The results from the current study provide important implications for researchers interested in examining factors that influence career decision-making for females, specifically in regard to the choosing to enter the field of engineering.

The current study indicates there are several relationships between fearing failure and gender role conflict and self-efficacy. This study found that those engineering students who have difficulty in showing affection towards members of the same gender are unlikely to have concerns about their capabilities in mathematics. Results indicate relationships exist between having fear of shame and embarrassment associated with failing with the need for success and power and having conflicts between work and leisure. These results indicate that while the engineering student fears the embarrassment of failure, his/her personal need to be successful prevails and pushes them to work harder for success. However, this working harder comes at a cost: less amount of time to spend with family and pursue leisure activities. Fear of being shamed was also related to the ability to cope effectively, but the relationship was a negative correlation. This indicates that as the fear of shame increases, the ability to cope effectively decreases for the engineering student. The engineering student's fear of being devalued was related to the need for success and power and conflict with leisure and work, indicating that fear of having low self-worth was an incentive to gain success and power, even if less time was allocated for fun, leisure, and family. The fear of being devalued also was related to self-efficacy and coping capabilities. As fear of losing self-worth intensifies, the engineering student worries that he or she is incapable regarding his/her abilities as an engineer and has difficulty in successfully managing stress.

Results indicate that fear of not having a certain future in engineering, because the need for success is very important, was an enticement to give up family and leisure time to pursue future engineering career goals. However, as the engineering student experiences fear regarding his/her future, the ability to effectively handle anxiety and pressure will intensify and will negatively impact his/her self-efficacy beliefs. This study also found that as the fear that important others will lose interest in the engineering student intensifies, the student will continue to have need for success and power, but will have less restrictive emotional expression. However, the difficulty in managing conflict between work and leisure will continue to be a problem for the engineering student who was fearful that his/her significant other will lose personal interest. The fear of angering a significant other was determined to impact the need for success and power and having conflicts with work and leisure. The engineering students who were fearful of angering a significant other will experience more stress because of their need to be successful and juggle the responsibilities of work and family time. These students will likely experience lower beliefs about their capabilities when stressed because of their fear that their loved ones may become angry or upset.

The current study found that the self-efficacy of engineering students was negatively related to fear of upsetting important significant others. This was important because as the self-efficacy beliefs of the individual lessen, the engineering student fears that his/her significant other will become angry or upset. Also, these individuals have an overall fear of failing that, as their fear beliefs lessen regarding their skills as a future engineer, they begin to have doubts about all of their capabilities and skills and worry that they will be an overall failure. The engineering student who has problems with

coping effectively with stress and anxiety also experiences the overall fear of being a failure. This is important because beliefs about abilities can lead to self-fulfilling prophecy that occurs when the student begins to demonstrate failure behaviors, which in turn leads to more false beliefs about his/her inability to be successful in his/her future role as an engineer.

This study indicates females are more prone to experiencing fears of failing in regard to their skills and abilities for the field of engineering. Results indicate that females have fears of having an uncertain future that will require renegotiation of their career plans. Females also have fear of not being smart enough to optimally perform as an engineer and are concerned about how others are viewing them professionally. Females were found to feel less valuable when they fail, which significantly decreases their levels of individual self-esteem and self-worth feelings. These results were similar to past findings, in which the variable of fear of failure significantly correlated to experiencing feelings of low self-esteem and low self-worth (Sherman, 1988). Having fear of failure was often a roadblock to attempting an activity (Atkinson, 1966, p. 13). The current study identified that as negative feelings about self-worth intensify, beliefs about self-capabilities or self-efficacy decreases along with the ability to successfully problem-solve and cope with problems as they arise. This study also found females who feel less efficacious about their skills for engineering have concern about their future plans and their ability to utilize appropriate coping strategies when facing a dilemma. This has practical implications for those women entering into the engineering field. Education about how to successfully handle problematic situations when they arise may assist in lowering the attrition rate of female engineering students.

The current findings indicate that self-efficacy for male and female engineering students is less impactful than has been previously reported in the body of research literature. Self-efficacy has been identified in past research as being significantly lower for females entering into the field of engineering than males (Papastergiou, 2008). Low self-efficacy correlates significantly to the numbers of females who choose and remain in engineering as a career (AAUW, 2008; Rittmayer & Beier, 2009).The current study found only those beliefs regarding being successful at mathematics will increase feelings of self-worth and enhance career opportunities to be significant for self-efficacy in males. Gender was not an overall adequate predictor of self-efficacy in the present study. These results are significant because they may be indicative of a new trend for incoming engineering students: that males and females are more similar in their levels of personal self-efficacy than previously believed. The levels of self-efficacy for females may be increasing due to the education occurring at the high school level in regard to math and science skills, problem-solving, and skills useful as an engineering major. The current findings may indicate that self-efficacy is no longer a detrimental variable that will impact the choice to be an engineering major.

Limitations of the Study

The current study determined several significant relationships between the constructs of fear of failure, gender role conflict, and self-efficacy. Unfortunately, this study was not without limitations. Recognizing the limitations of a study can improve the appropriate application of the results. Two limitations that are most significant in the current study are: (1) the population of the sample used for the research study and (2) the instrumentation utilized for the current study.

The population sample used in the current study was not representative of the general population. First, only undergraduate engineering students were used for the data collection. The primary age of the students was between ages 18 and 22, and these students are from a small southern university. Therefore, the results were restricted due to the age, education level, and geographic location. The research population was also predominantly male (71.8%). Females in the study represented only 28.2% of the population; however, this is higher than the general population of the university engineering department. Females in the engineering department at Louisiana Tech represent only 16% of the total population of engineering students (J. D. Nelson, personal communication, October 24, 2011). The vast majority of the research participants were Caucasian American (75.9%) and identified themselves as Christians (79.5%) for their religious preference. The research population was identified as being predominantly unmarried (89.1%) and heterosexual (93.2%). These characteristics of the population are a limitation because there is a limited number of individuals representing other ethnicities, age, religious preferences, other relationship statuses, and sexual orientation. In addition, these results cannot be generalized to northern populations since this was from a small southern university and contained data from only engineering students as research participants.

Another limitation of the study was the use of self-report instruments. The results gathered from self-report methods are restricted to by the accuracy of the responses provided by the research participant. There is no means to determine if individuals were randomly responding to the questions or if the results are an accurate portrayal of the participants' true beliefs and self-perceptions. There were several comments made at the

retrieval of the data that indicated several of the questions regarding affection towards members of the same gender were perceived as being homosexual in nature. Since this data collection occurred in the "Bible Belt" of the south, these answers could reflect responses that were believed to be "appropriate" or "correct" and possibly not a true measure of feelings or beliefs of the research participant.

Another limitation of the instrumentation was the use of the engineering applicant rating scenarios as a means of judging beliefs about gender, skill and capabilities. The scenarios were exactly the same with only the gender and name changed in the scenario. Several comments were made at the time of data retrieval by the research participants that they knew "what it [the survey instrument] was looking for", meaning to see if gender of the applicant would cause different ratings on the scenarios by the research participants. This information makes it difficult to know if the results indicate the true beliefs of the research participants regarding how they feel regarding males and females entering into the field of engineering because it is possible that they answered in a manner that they believed would be considered non-sexist and acceptable. Additionally, the use of the Gender Role Conflict Scale with females has not been widely documented. Therefore, due to the minimal use with females, the data derived must be viewed tentatively.

The described limitations should not devalue the results of this research study as limitations are inherent in psychological research. However, the presence of limitations should identify areas of investigation that can advance the body of psychological data and research for functional application in the future.

Suggestions for Future Research

The current study identified relationships between the variables of fear of failure, self-efficacy, and gender role conflict. One suggestion for future research would be to increase the number of females utilized in the research. By increasing the number of females in subsequent research, results would be able to determine if the fewer female participants made a significant impact on the results of the current study.

Another suggestion for future research would be to utilize a more diverse and representative population sample. This would allow for more generalized results for the data found. Because the current study was completed on a college campus, there were significantly skewed demographic results in many areas. A different research population may provide more representative results in areas such as ethnicity, religious preference, sexual orientation and relationship status. A larger population sample at a larger university could assist in determining a more representative sample of the population. Also, it would be valuable to test engineers currently employed in the field for more representative results.

The final suggestion for future research would be to improve the research instrument used to predict how gender and names of applicants into an engineering program predict success and skill of the applicant. Because this was a newly created instrument, there are significant ways to improve the questionnaire. One suggestion is to have more than only two scenarios available with only the names/gender being changed. Having more than two scenarios available may increase the validity of the instrument because the research participants would be less likely to recognize that gender is the variable being researched. Another significant way to improve the instrument is to use

similar data for describing each applicant into the engineering program; however, the data describing would not be exact for each applicant. This could assist in identifying beliefs about females and males entering into the field of engineering because the research participant would not be able to identify exact information about each applicant for the engineering program.

Conclusions

The general information known about fear of failure, gender role conflict, and self-efficacy was increased due to the results of the current study. There were significant correlational relationships found between fear of failure, gender role conflict and self-efficacy. The current study also found significant results indicating that female engineering students experience specific aspects of fear of failure more than their male engineering counterparts. This is important for practical application to assist those females entering the field of engineering to increase their number of coping mechanisms in order to successfully manage their fear, anxiety and stress. Male engineering students were found to be similar to female engineering students in regard to self-efficacy for their engineering skills. These results were different than past results that identify females as having lower self-efficacy than their male counterparts (Papastergiou, 2008; AAUW, 2008; Rittmayer & Beier, 2009; Sherman, 1988). This difference in results merits further examination because there was one component determined as significant on the fear of failure instrument: Math Outcome Expectation. Further research would assist in identifying how mathematics is important to self-efficacy for males and females.

Finally, the research did not find conclusive results regarding how engineering student applicants are rated based on the provided names for their future success as an

engineer and their skills and capabilities. This research area would greatly benefit from additional investigation because past research has identified that females who enter into predominantly male careers are often viewed negatively (Schein et al., 1996). No support was found for the hypotheses that examined participants with high gender role conflict and their rating of mock applicants into an engineering degree program. Findings did not support the hypotheses that participants having high gender role conflict would rate mock applicants differently, based on the provided gender and the provided skills and abilities of the mock applicant.

The current study provides important data for the research body of knowledge for fear of failure, gender role conflict, and self-efficacy beliefs. The results of this study can be utilized as a means of improving coping mechanisms for females entering into the field of engineering because females have been identified as experiencing more significant fears regarding personal failure. This study can assist in understanding how self-efficacy in engineering students is distributed as well as factors that influence the self-efficacy of engineering students. The current study can provide insight for future research to examine these constructs in more depth to improve beliefs about the self and personal self-esteem, fears related to failure, and how gender influences daily interactions.

APPENDIX A

INSTITUTIONAL REVIEW BOARD HUMAN USE COMMITTEE APPROVAL FORM

LOUISIANA TECH
UNIVERSITY

OFFICE OF UNIVERSITY RESEARCH

MEMORANDUM

TO: Ms. Krista Nelson and Dr. Janelle McDaniel

FROM: Barbara Talbot, University Research

SUBJECT: Human Use Committee Review

DATE: October 24, 2011

RE: Approved Continuation of Study HUC 706

TITLE: **"The Relationship of Fear of Failure and Gender Role Conflict with Academic Self-efficacy Ratings in Engineering Students"**

HUC 706 Revision

The above referenced study has been approved as of October 24, 2011 as a continuation of the original study that received approval on October 26, 2009. **This project will need to receive a continuation review by the IRB if the project, including collecting or analyzing data, continues beyond October 24, 2012.** Any discrepancies in procedure or changes that have been made including approved changes should be noted in the review application. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of University Research.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Research or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

If you have any questions, please contact Dr. Mary Livingston at 257-4315.

APPENDIX B

HUMAN SUBJECTS CONSENT FORM

HUMAN SUBJECTS CONSENT FORM

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.

TITLE OF PROJECT: The relationship of fear of failure and gender role conflict with academic self-efficacy ratings in engineering students.

PURPOSE OF STUDY/PROJECT: To examine the effect of fear of failure and gender role conflict in regards to reports of self-efficacy in male and female students participating in undergraduate engineering courses.

PROCEDURE: You will be asked to complete a survey after class about your opinions regarding your gender, ratings of ability in engineering courses, and the personal implications of failure. You will be asked to return the survey to your next class meeting.

RISKS/ALTERNATIVE TREATMENTS: There are no risks associated with participation in this study. It requires completion of a survey after class in the privacy of your home. It also requires that you return your survey at the next class meeting. Participation is completely confidential. There are no alternative treatments. Participation is voluntary. You may choose to leave this study at any time without penalty. Questions may be omitted though answering all the questions will help create more complete results.

BENEFITS/COMPENSATION: Some participants may receive extra credit in their engineering class for participation in this study at the discretion of their class instructor. However, extra credit for participation is dependent upon each individual class instructor and is not guaranteed by researchers. The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

I, _____, attest with my signature that I have read and understood the following description of the study, "The relationship of fear of failure and gender role conflict with academic self-efficacy ratings in engineering students", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any negative way. I may be provided extra credit for my participation. Further, I understand that I may withdraw at any time. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

_____ _____

Signature of Participant or Guardian Date

CONTACT INFORMATION: The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.

Krista L. Nelson
Phone: 870-820-0557
Email: kennedyandsutton@sbcglobal.net

Dr. Janelle McDaniel
Phone: 318-257-4131
Email: jsilvers@latech.edu

Department of Psychology and Behavioral Sciences, College of Education
Louisiana Tech University

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:
Dr. Les Guice (257-3056) or Dr. Mary M. Livingston (257-2292 or 257-4315)

APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

Please complete this demographics questionnaire as is applicable to your current status. Please answer all questions honestly as this information is strictly confidential. Thank you.

1. **Age:** _____

2. **Sex/Gender:** _____ Male _____ Female

3. **Educational Level:** (Check the highest grade level that fits you.)

____High School Diploma ____Freshman ____Sophomore ____Junior ____Senior

____ Master's ____Doctorate _____Other

4. **Current Cumulative GPA:** _____

5. **What is your college major?** _____

6. **Present Relationship Status:** ____Married ____Single ____Divorced
____Remarried ____Widow/Widower
____Separated ____Living with Someone

7. **Race/Ethnicity**: ____White ____Black ____Latino/Latina ____Asian American

____Biracial ____Native American ____Other/Unknown

8. **Sexual orientation**: _____ Heterosexual _____Homosexual

_____Bisexual _____Unsure

9. **Religious Orientation:** _____ Christian _____Muslim _____Hindu

_____Buddhist _____Jewish _____Other

APPENDIX D

RATING OF POTENTIAL APPLICANTS SCALE

After reviewing the **FOUR** enclosed descriptions of potential applicants that are applying for entry into the Louisiana Tech University Engineering program, please complete the rating scales regarding the applicant descriptions

Applicant: Jessica

Jessica is a 24-year old non-traditional female student. She returned to college after taking several years off to work in the field of insurance. Jessica has excellent problem-solving skills and is a good communicator. She is logical and goal-oriented; she can be described as a self-motivator. She set a personal goal for to maintain a 4.0 grade point average when she returned to college. Thus far, Jessica has achieved her goal and has maintained a 4.0 GPA since her return to the university. Jessica is able to express herself verbally in a clear and comprehensible way when communicating to others. She has experience with technology and enjoys learning new computer systems. Jessica is considered to be meticulous to detail, and is able to work as a team player. Jessica admits that one of the reasons that she is interested in being an engineer is because she likes the team interactions that are a necessity when problem-solving with members of a larger team. She has strong analytical skills that enable her to examine objects to identify how they could be improved. Jessica admits to being a "tinkerer" and enjoys identifying how objects are put together when created. Further, Jessica has excellent skills in both mathematics and science. She received A's as grades in her math and science courses during her high school career. Her ACT exam showed excellent skills in math and science with a score of 29 in math and a score of 32 in science.

Rating Scale for Applicant: Jessica

Instructions: In the space to the left of each sentence below, write the number that most closely represents the degree that you Agree or Disagree with the statement.

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

1.) _____ I feel that the Applicant **Jessica** demonstrates the necessary problem-solving skills to address and solve complex engineering dilemmas.

2.) _____ I feel that the Applicant **Jessica** has the math and science skills required to be successful as a future engineer.

3.) _____ Applicant **Jessica** has the analytical aptitudes necessary to be effective as an engineer.

4.) _____ Applicant **Jessica** has the necessary technological knowledge and skills to be an engineering student.

5.) _____ I believe that the Applicant **Jessica** has the ability to think logically to solve complex problems and understand how things operate.

6.) _____ I believe that the Applicant **Jessica** would be successful as an engineer.

Applicant: Michael

Michael is a 20-year old male student that has decided to change his major to engineering. He was previously a pre-med major, but he opted to change his major after having several science courses that required him to dissect animals. Michael admits that his change to engineering was also the result of his change to a vegetarian lifestyle because he cannot stand the idea that animals have been killed for dissection purposes. Michael enjoys the examination of objects to learn how they are formed, produced or created. He has good skills for problem-solving and considers himself to be detail-oriented. He enjoys finding the solutions when faced with unforeseen problems. He is naturally curious and has demonstrated some good logical thinking capabilities. Michael does have difficulty in goal attainment. He admits that he often gets "off-track" and is prone to distractibility which limits his success at goal achievement. Michael is very verbal as an individual, and he enjoys communicating his findings to others. He has had some training in computer technology, but he often must spend extra time to master the technological skills. Michael has done acceptable since beginning college. He has received primarily B's and C's in his math and science courses. He did receive a grade of a D in his advanced biology class because he refused to dissect a baby pig. His cumulative GPA is now 3.01 for his college career. Michael did receive a 22 on his ACT science score, and scored a 21 on his ACT math score before he began his college career.

Rating Scale for Applicant: Michael

Instructions: In the space to the left of each sentence below, write the number that most closely represents the degree that you Agree or Disagree with the statement.

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

1.) _____ I feel that the Applicant **Michael** demonstrates the necessary problem-solving skills to address and solve complex engineering dilemmas.

2.) _____ I feel that the Applicant **Michael** has the math and science skills required to be successful as a future engineer.

3.) _____ Applicant **Michael** has the analytical aptitudes necessary to be effective as an engineer.

4.) _____ Applicant **Michael** has the necessary technological knowledge and skills to be an engineering student.

5.) _____ I believe that the Applicant **Michael** has the ability to think logically to solve complex problems and understand how things operate.

6.) _____ I believe that the Applicant **Michael** would be successful as an engineer.

Applicant: Matthew

Matthew is a 24-year old non-traditional male student. He returned to college after taking several years off to work in the field of insurance. Matthew has excellent problem-solving skills and is a good communicator. He is logical and goal-oriented; he can be described as a self-motivator. He set a personal goal for to maintain a 4.0 grade point average when he returned to college. Thus far, Matthew has achieved his goal and has maintained a 4.0 GPA since his return to the university. Matthew is able to express himself verbally in a clear and comprehensible way when communicating to others. He has experience with technology and enjoys learning new computer systems. Matthew is considered to be meticulous to detail, and is able to work as a team player. Matthew admits that one of the reasons that he is interested in being an engineer is because he likes the team interactions that are a necessity when problem-solving with members of a larger team. He has strong analytical skills that enable him to examine objects to identify how they could be improved. Matthew admits to being a "tinkerer" and enjoys identifying how objects are put together when created. Further, Matthew has excellent skills in both mathematics and science. He received A's as grades in his math and science courses during his high school career. His ACT exam showed excellent skills in math and science with a score of 29 in math and a score of 32 in science.

Rating Scale for Applicant: Matthew

Instructions: In the space to the left of each sentence below, write the number that most closely represents the degree that you Agree or Disagree with the statement.

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

1.) _____ I feel that the Applicant **Matthew** demonstrates the necessary problem-solving skills to address and solve complex engineering dilemmas.

2.) _____ I feel that the Applicant **Matthew** has the math and science skills required to be successful as a future engineer.

3.) _____ Applicant **Matthew** has the analytical aptitudes necessary to be effective as an engineer.

4.) _____ Applicant **Matthew** has the necessary technological knowledge and skills to be an engineering student.

5.) _____ I believe that the Applicant **Matthew** has the ability to think logically to solve complex problems and understand how things operate.

6.) _____ I believe that the Applicant **Matthew** would be successful as an engineer.

Applicant: Jennifer

Jennifer is 20-year old female student that has decided to change her major to engineering. She was previously a pre-med major, but she opted to change her major after having several science courses that required her to dissect animals. Jennifer admits that her change to engineering is also the result of her change to a vegetarian lifestyle because she cannot stand the idea that animals have been killed for dissection purposes. Jennifer enjoys the examination of objects to learn how they are formed, produced or created. She has good skills for problem-solving and considers herself to be detail-oriented. She enjoys finding the solutions when faced with unforeseen problems. She is naturally curious and has demonstrated some good logical thinking capabilities. Jennifer does have difficulty in goal attainment. She admits that she often gets "off-track" and is prone to distractibility which limits her success at goal achievement. Jennifer is very verbal as an individual, and she enjoys communicating her findings to others. She has had some training in computer technology, but she often must spend extra time to master the technological skills. Jennifer has done acceptable since beginning college. She has received primarily B's and C's in her math and science courses. She did receive a grade of a D in her advanced biology class because she refused to dissect a baby pig. Her cumulative GPA is now 3.01 for her college career. Jennifer did receive a 22 on her ACT science score, and scored a 21 on her ACT math score before she began her college career.

Rating Scale for Applicant: Jennifer

Instructions: In the space to the left of each sentence below, write the number that most closely represents the degree that you Agree or Disagree with the statement.

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

1.) _____ I feel that the Applicant **Jennifer** demonstrates the necessary problem-solving skills to address and solve complex engineering dilemmas.

2.) _____ I feel that the Applicant **Jennifer** has the math and science skills required to be successful as a future engineer.

3.) _____ Applicant **Jennifer** has the analytical aptitudes necessary to be effective as an engineer.

4.) _____ Applicant **Jennifer** has the necessary technological knowledge and skills to be an engineering student.

5.) _____ I believe that the Applicant **Jennifer** has the ability to think logically to solve complex problems and understand how things operate.

6.) _____ I believe that the Applicant **Jennifer** would be successful as an engineer.

Manipulation Check

When answering the next 3 questions, please do not change your answers on the previous rating of applicants into the Engineering program.

1.) Did you believe there were differences between the applicants' intelligence levels?

_____ Yes _____ No

2.) Did you feel there are differences in the applicants based upon math and science skills?

_____ Yes _____ No

3.) Do you feel there are differences in the applicants based upon their gender?

_____ Yes _____ No

APPENDIX E

GENDER ROLE CONFLICT SCALE

Gender Role Conflict Scale

Instrument copyrighted. Used with permission. Please contact original author, Dr. Jim O'Neil, for permission to use.

APPENDIX F

GENDER ROLE CONFLICT SCALE

FEMALE VERSION

Gender Role Conflict Scale – Female Version

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APPENDIX G

PERFORMANCE FAILURE APPRAISAL

INVENTORY

Performance Failure Appraisal Inventory

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APPENDIX H

LONGITUDINAL ASSESSMENT OF ENGINEERING SELF-EFFICACY

Longitudinal Assessment of Engineering Self-Efficacy (LAESE)

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