Identity compatibility, career adaptability, and adaptive coping as predictors of college women's commitment in STEM majors

Michelle Murray

University at Albany, State University of New York, michelleamurray85@gmail.com
IDENTITY COMPATIBILITY, CAREER ADAPTABILITY, AND ADAPTIVE COPING AS PREDICTORS OF COLLEGE WOMEN’S COMMITMENT IN STEM MAJORS

by

Michelle A. Murray

A Dissertation Submitted to the University at Albany, State University of New York in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

School of Education
Department of Educational & Counseling Psychology

2015
Identity Compatibility, Career Adaptability, and Adaptive Coping as Predictors of College Women’s Commitment in STEM Majors

by

Michelle A. Murray

COPYRIGHT 2015
Acknowledgements

I am grateful to my family, friends, and peers who have supported me throughout my dissertation and graduate studies process. I would like to thank Dr. LaRae Jome, whose encouragement made this dissertation possible. She is an amazing role model and mentor, and I am forever grateful for her belief in me despite the many challenges and roadblocks along the way. I am appreciative of the support and guidance of Dr. Lorna Guyett, to whom I owe much of my clinical and professional growth. I would like to thank Dr. Richard Haase for his feedback and imparting his infinite wisdom of research and statistics to me. I have gratitude for my academic advisor, Dr. Micki Friedlander, and her endless work as training director of the Counseling Psychology program.

I want to acknowledge my mother, Betsy, for her unwavering support, encouragement, and optimism that has kept me motivated to continue this professional journey despite the barriers and obstacles I have faced. Many thanks to my cohort members and peers from the doctoral program who engaged in countless hours of meaningful conversations with me that have served as a catalyst for my personal growth. Andi Xhihani, I-Ching Hung, Snehal Kumar, Matt Worhach, Katy Shaffer, Mike Zlatev, Kristin McLaughlin, Abi Nicolas, Jeremy Bissram, Arthur Ritmeester, and Michael Gale; thank you for your support, friendship, feedback, and honesty.

I would also like to acknowledge all of the participants who were willing to share a glimpse of their experiences being women pursuing degrees in STEM fields. Most importantly, I would like to acknowledge the strong women in my life, some of whom were mentioned above, that have and will continue to inspire me to do meaningful work.

This dissertation is dedicated to my grandmother, Cora Bradley Nelson (1925-2011), whose fearlessness and strength has shown me what it means to be a feminist.
# Table of Contents

Acknowledgements ........................................................................................................ iii  
Table of Contents ........................................................................................................ iv  
List of Tables ................................................................................................................ vii  
List of Figures ............................................................................................................... viii  
Abstract ........................................................................................................................ ix  
Chapter I. Introduction .................................................................................................. 1  
  Implications of the Study for Research, Theory, and Practice ............................... 5  
Chapter II. Literature Review ..................................................................................... 7  
  Career Construction Theory ....................................................................................... 7  
  Women’s Commitment to STEM Majors ................................................................. 9  
  Identity and Major Compatibility ............................................................................ 12  
  Career Adaptability ................................................................................................. 15  
  Coping Through Social Support ............................................................................. 21  
  Current Study .......................................................................................................... 24  
  Hypotheses .............................................................................................................. 25  
Chapter III. Method .................................................................................................. 27  
  Design ..................................................................................................................... 27  
  Participants .............................................................................................................. 27  
    Power Analysis ....................................................................................................... 30  
  Measures ................................................................................................................ 31  
    Demographics ....................................................................................................... 31  
    Major Commitment .............................................................................................. 32
Identity Compatibility ................................................................. 32
Career Adaptability ................................................................. 33
Social Support Seeking ............................................................... 35
Procedure .................................................................................... 37
Planned Preliminary Analyses ...................................................... 38
Planned Major Analyses ............................................................. 40
  Independent Variables ............................................................ 40
  Moderator Variables ............................................................... 40
  Dependent Variable ............................................................... 40
Chapter IV. Results .................................................................... 43
  Missing Data .............................................................................. 43
  Data Screening .......................................................................... 43
  Descriptive Statistics ................................................................ 45
    Descriptive Statistics of Demographics ..................................... 45
    Descriptive Statistics of Study Variables ................................... 46
  Correlations .............................................................................. 49
  Analysis of Hypothesized Model .............................................. 49
  Exploratory Analyses ............................................................... 52
Chapter V. Discussion ................................................................. 55
  Career Adaptability and STEM Major Commitment .................... 56
  Identity Compatibility and STEM Major Commitment ................ 58
  Social Support and STEM Major Commitment ........................... 60
  Major Commitment ................................................................. 62
Limitations ........................................................................................................... 63

Conclusion and Future Research ..................................................................... 64

References ........................................................................................................ 67

Appendices ....................................................................................................... 91
  Appendix A. Demographic Questionnaire ..................................................... 91
  Appendix B. Career Commitment Scale (adapted to college major) ............. 92
  Appendix C. Career Adapt-Abilities Scale (USA-form) ............................... 94
  Appendix D. COPE subscales (Instrumental and Emotional Social Support Seeking) ... 96
  Appendix E. Perceived Identity between Gender and Major/Career ............. 98
List of Tables

Table 1.  Demographic Characteristics of Sample (N=226) …………………………………. 77
Table 2.  Declared Majors of Sample (N=225) …......................................................... 78
Table 3.  Group Membership Among Sample (N=225) …............................................ 79
Table 4.  Pearson Correlations, Means, and Standard Deviations for Demographic
and Study Variables………………………………………………………………………………… 80
Table 5.  Summary of Hierarchical Multiple Regression Analysis of Perceived
Identity Compatibility, Inclusion of Self in Other, Career Adaptability,
and Social Support Seeking as Predictors of Major Commitment .......................... 81
Table 6.  Summary of Hierarchical Multiple Regression Analysis of Perceived
Identity Compatibility, Inclusion of Self in Other, Career Adaptability,
and Social Support Seeking as Predictors of Affective Commitment ..................... 82
**List of Figures**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Proposed interaction of identity compatibility and Career Adaptability on Major Commitment</td>
<td>83</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Proposed interaction of identity compatibility and Social Support Seeking on Major Commitment</td>
<td>84</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Scatterplot of residuals versus predicted values</td>
<td>85</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Histogram of standardized residuals</td>
<td>86</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Normal p-p plot of regression standardized residuals</td>
<td>87</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Cook’s distance scatterplot by case</td>
<td>88</td>
</tr>
<tr>
<td>Figure 7</td>
<td>The interaction of Perceived Identity Compatibility and Social Support Seeking on Affective Commitment</td>
<td>89</td>
</tr>
<tr>
<td>Figure 8</td>
<td>The interaction of Perceived Identity Compatibility and Career Adaptability on Affective Commitment</td>
<td>90</td>
</tr>
</tbody>
</table>
Abstract

The ‘leaky pipeline’ is a metaphor often used to describe the progressive and persistent phenomenon that occurs when women who have initially planned on pursuing STEM careers drop out before a career is established (Cronin & Roger, 1999). Women pursuing STEM occupations often receive messages that they do not belong or are not expected to succeed in the field, which can negatively impact one’s academic performance, increase psychological stress, and influence one’s persistence within a field of study (Steele & Aronson, 1995; London, Downey, Bolger & Velilla, 2005). Using career construction theory (Savickas, 2013) as a framework, the current study explored factors that contribute to undergraduate women persisting in STEM majors, and whether the environmental stress or lack of belonging they may experience negatively impacts their commitment to pursuing a STEM degree. Career adaptability and social support were examined to shed light on the relationship between identity compatibility and women’s commitment to STEM majors.

Participants were 225 women who were currently enrolled at a predominantly engineering university and have declared STEM majors. The study hypothesized that there would be positive relationships between major commitment and identity compatibility, career adaptability, and social support seeking. It was also hypothesized that both career adaptability and social support seeking would moderate the relationship between identity compatibility and major commitment.

Results indicated that both social support seeking and career adaptability did not have significant moderating effects on the relationship between the identity compatibility measures and major commitment. In addition, social support and identity compatibility were not significantly related to major commitment. It was found that career adaptability was significantly
related to major commitment among women STEM majors. Post hoc analyses were conducted to better understand how career adaptability predicts different types of major commitment.

Given that women pursuing STEM majors experience unique challenges and barriers, these findings support the use of career adaptabilities as a way to cope with the environmental stress they may face. This finding has implications for the way new college students are encouraged to adapt to the college environment, and strategies to help women graduate in STEM majors.
Chapter I

Introduction

Women have consistently been underrepresented in science, technology, engineering, and mathematics (STEM) majors and careers (Morganson, Jones, & Major, 2010; Buck, Plano Clark, Leslie-Plecky, Lu, & Cerda-Lizarraga, 2008; Blickenstaff, 2005; Fassinger & Asay, 2006; Betz, 1994). The U.S. Census Bureau’s 2009 American Community Survey (ACS) found that although women comprise 48% of the U.S. workforce, they only hold 24% of STEM jobs (Beede et al., 2011). Given that STEM careers are associated with high status and pay, the underrepresentation of women in STEM careers is problematic because it perpetuates gender inequality in the workforce (Beede et al., 2011; Fassinger & Asay, 2006). In addition, the lack of women in science and engineering careers also results in a loss of diverse perspectives for the creation of STEM technology and innovations (Blickenstaff, 2005; Betz, 1994).

Not only are there lower rates of women compared to men entering math and science, many women that pursue STEM careers eventually end up in a different field. In fact, only 26% of women with STEM degrees end up working in STEM fields compared to 40% for their male counterparts (Beede et al., 2011). The ‘leaky pipeline’ is a metaphor often used to describe the progressive and persistent phenomenon that occurs when women who have initially planned on pursuing STEM careers drop out before a career is established (Cronin & Roger, 1999). The ‘leaky pipeline’ occurs at three crucial stages: when women decide to not pursue their interest of science in college, when women in STEM majors drop out or change majors, and when women do not pursue a STEM career after graduating college in a STEM major (Blickenstaff, 2005; Betz, 1994). The underrepresentation of women in science and math fields is perpetuated by the substantial loss of women from STEM majors during their college experience (Fassinger & Asay,
Women’s discontinued pursuit of STEM majors during college is an important stage of the ‘leaky pipeline’ to focus on because it is often the first time they receive a glimpse of their future career. Undergraduate STEM students are immersed in a competitive environment where they are learning extensively about their chosen field of study, and are interacting with their future coworkers and superiors. For women in STEM, college is a crucial stage in their career development because it is often the first time they are experiencing the unique stress of pursuing a nontraditional field for their gender within a highly competitive environment.

According to social cognitive career theory (Lent, Brown, & Hackett, 1994, 2000), students’ environmental supports play a significant part in their expectations and abilities to succeed in the STEM majors (Lent et al., 2013). It has been argued that STEM women may experience a ‘chilly climate’ resulting in less environmental support compared to their male counterparts (Morganson et al., 2010; Fassinger & Asay, 2006; Brainard & Carlin, 1998). The lack of strong women role models (Buck et al., 2008; Lips, 2004), presence of sex-biased pedagogy (Sadker, Sadker, & Zittleman, 2009), prevalence of sexist attitudes (Cronin & Roger, 1999), and subjectivity to stereotype threat (Shapiro & Williams, 2012) have all contributed to the creation of an unfriendly and unsupportive environment toward women. This experience of an unsupportive environment can impact how women view their identity and belongingness within STEM majors (London, Rosenthal, Levy, & Lobel, 2011; Rosenthal, London, Levy, & Lobel, 2011).

Women pursuing STEM occupations often receive messages that they do not belong or are not expected to succeed in the field (London et al., 2011; Rosenthal, London, Levy, & Lobel, 2011). When belonging to a stigmatized group, such as women in STEM, one’s perceived social identity or sense of belonging can negatively impact one’s academic performance and increase
psychological stress (Steele & Aronson, 1995; London, Downey, Bolger & Velilla, 2005). Furthermore, one’s social identity could also influence one’s persistence within a field of study. For example, commitment to one’s academic major, along with satisfaction with and involvement in the academic major have been identified as crucial factors in the persistence of a STEM degree (Holland, Major, & Orvis, 2012). Given women in STEM are members of a stigmatized group, it is important to understand the degree to which their perceived identity compatibility between their gender and their STEM major contributes to their level of commitment to their STEM major.

To date, most of the research in this area has focused on reasons why women choose not to pursue or discontinue their pursuit of STEM careers (e.g. Betz, 1994; Blickenstaff, 2005; Cronin & Roger, 1999; Giurleo, 1997). Research often overlooks the positive effects and adaptive coping that result from stressful situations and their impact on persistence in the context of work (Simmons, 2002; Lazarus, 2000). Two factors that have the potential to shed light on the relationship between identity compatibility and women’s commitment to STEM majors are career adaptability and social support. Career adaptability, an internal psychosocial resource, and social support, an external resource, are both coping mechanisms that can assist in the commitment to STEM majors.

Career construction theory (Savickas, 2013) identifies career adaptability as a set of psychosocial resources that act as coping mechanisms when work events affect one’s social integration with the work world. Career adaptability is defined as “the readiness to cope with the predictable tasks of preparing for and participating in the work role and with the unpredictable adjustments prompted by changes in work and working conditions” (Savickas, 1997, p. 254). For example, one’s competency to respond to work transitions by using an adaptive strategy, such as
increasing personal control over the work transition, is a career adaptability. Career adaptabilities (e.g. increasing personal control over one’s vocational future, having curiosity to explore different career-related options, being concerned about future work, and having confidence to pursue one’s aspirations) are considered to be a necessary component to one’s career success, satisfaction, and well-being (Savickas, 2013; Savickas & Porfeli, 2012). In the context of women in STEM majors, career adaptability can function as a buffer for the environmental stress that causes women to discontinue the pursuit of a STEM major. Research has shown that factors defined within the set of career adaptability can serve as a buffer between environmental stress and commitment to or performance in one’s STEM major (Chemers, Zurbriggen, Syed, Goza, & Bearman, 2011; Hernandez, Schultz, Estrada, Woodcock, & Chance, 2013; Rice, Lopez, Richardson, & Stinson, 2013). Therefore, it is expected that the use of career adaptabilities would allow women to remain committed to their STEM major regardless of the environmental stress they are experiencing. Thus the use of career adaptabilities will moderate the relationship between identity compatibility and major commitment so that when identity compatibility is low, career adaptabilities will serve as a buffer to increase one’s commitment to their STEM major.

Given that career adaptability is a set of internal psychosocial resources used for coping, it is important to also include external methods of adaptive coping to gain a more comprehensive understanding of the factors that contribute to women’s commitment to STEM majors. The seeking of instrumental social supports (e.g. getting advice on what to do) and emotional social supports (e.g. talking to someone about one’s feelings) have been found to predict major commitment of women in STEM (Morganson et al., 2010). Given that social support complements career adaptability as an additional coping resource, it will also serve as a moderator between environmental stress and the commitment of one’s major. Therefore, it is
also expected that the presence of social support will moderate the relationship between identity compatibility and major commitment so that when identity compatibility is low, social support will act as a buffer to increase the commitment to one’s STEM major.

The purpose of this study is to better understand the factors that contribute to undergraduate women persisting in STEM majors, and whether the environmental stress or lack of belonging they may experience negatively impacts their commitment to pursuing a STEM degree. Specifically, the study explores the degree to which undergraduate women’s use of career adaptabilities and coping behaviors affects the relationship between their identity compatibility between their gender and major and the commitment with their STEM major. It is expected that women with higher identity compatibility between gender and major will report higher commitment to their STEM major. Women with lower identity compatibility between gender and major will be expected to report lower levels of commitment to their STEM major. In addition, it is expected that career adaptability and social support will moderate the relationship between identity compatibility and major commitment so that the negative affects of low identity compatibility between one’s gender and major will be buffered by career adaptability and social support. Women with low levels of identity compatibility and high levels of career adaptability and social support are expected to experience higher levels of commitment to their STEM major.

**Implications of the Study for Research, Theory, and Practice**

The proposed study will advance research by taking a positive approach to understanding a population that has consistently been overlooked and misunderstood. Most of the past research looking at women in STEM fields has either focused on reasons why they do not persist or ways to attract more women into the field. In an attempt to change the culture of STEM colleges to become more woman-friendly, some of the research has suggested solutions that actually widen
the gap between genders and adhere to gender stereotypes, such as proposing gender segregated curriculums where men remain in competitive classrooms and women are put in collaborative settings (Baker, 2013). Given that the majority of research has concentrated on women’s struggles within the STEM fields, the proposed study will take a strengths-based approach by looking at what helps women persist in STEM.

Additionally, this study aims to advance theory by identifying salient factors that help women persist within STEM majors. Pulling from existing theories, the study provides further rationale as to why having social support and building adaptability skills are sources that can help populations, such as women in STEM, cope and overcome the barriers they consistently face.

The proposed study will build on the practice of career counseling with women in nontraditional career choices. By identifying factors that help women stay committed to STEM majors, career counselors can focus on building the client’s career adaptabilities, social supports, and self-awareness of self-concept within the field. This will not only increase client’s persistence in nontraditional fields, but will also assist the client’s self awareness of their own identity within the field and empower the client to recognize specific skills that will allow greater resiliency against the barriers they face.
Chapter II

Review of the Literature

The acknowledgement of the ‘leaky pipeline’ phenomena over the last 20 years has prompted a body of research that strives to understand the experience of women in STEM careers (e.g. Cronin & Roger, 1999; Seymour, 1995; Lips, 2004; Morganson et al., 2010). As a result, research studies have identified several environmental and psychological factors that contribute to women’s academic achievement, motivation, and commitment (Farmer, 1997; Lent et al., 2013; Korabik, McDonald, & Rosin, 1993). Taking into account the environmental barriers women in STEM majors face, the proposed study will focus on the internal and external factors that contribute to the persistence of women in STEM majors. More specifically, the study will concentrate on whether women’s perceptions of their own fit within the STEM field will be related to greater commitment to their STEM major. Additionally, the proposed research study hypothesizes that use of adaptive coping strategies will serve to buffer against the lack of major commitment that occurs when women perceive a low fit between their gender identity and choice of major. The following chapter will provide a literature review on previous research attempting to increase an understanding of factors that affect women’s persistence in nontraditional majors and career choices.

Career Construction Theory

Given the inherent barriers women face when making nontraditional career choices, it is important to view women’s STEM career paths from a perspective that allows for self-empowerment. Career construction theory (Savickas, 2013) provides a framework for understanding women’s career development, especially when they are faced with challenges that can threaten their persistence in STEM occupations. Career construction theory asserts that
career development is a process by which individuals create their vocational identity through enacting their own concept of self (Savickas, 2013). The theory holds a constructivist perspective, which posits that individuals construct reality through self perceptions, and that those self perceptions can change when reacting to specific situations (e.g. identifying as an underrepresented gender within one’s career choice). Therefore, the vocational decisions of individuals are guided by their self-concept and personal, experienced reality. Accordingly, career construction theory describes career development in a time of social change and uncertainty (Blustein, 1997; Savickas, 1997). Women pursuing STEM careers are often amidst an environment of social change and uncertainty due to the nature of science and technology work and their minority status in the field. By using adaptive coping resources (e.g. career adaptabilities) unpredictable changes and uncertainty in the work environment can be overcome (Phillips, 1997; Savickas, 2013).

Given the underrepresentation of women in STEM careers, the developing career identity of women in STEM majors remains relatively unstudied. Using Savickas’ (2013) construct of self-agency, the enacting of one’s self-concept into one’s vocational identity, college students are at a particularly crucial stage of constructing one’s vocational-self. Self-agency, defined as “a movement into or out of educational or vocational positions, each of which provide a mechanism of social integration” (Savickas, 2013, p. 155), is a particularly important and relevant stage of career construction for women in STEM majors due to the barriers often experienced in the college environment.

Through the process of agency, an individual’s concept of self is being socially integrated into a vocational identity where one’s potential and self-esteem can flourish. Because agency incorporates the movement of one’s self-concept to vocational behavior, many factors can either
inhibit or assist in the pursuit of ones’ career and life goals (Savickas, 1997). Specifically, women STEM students often experience barriers to completing their degree (e.g. stereotype threat) that can inhibit their ability to realize their potential, lower their self-esteem, and create a lower sense of belonging within the major (Blickenstaff, 2005; Major, Holland, & Oborn, 2012). Therefore, it is important to understand how women in STEM majors adapt to environmental barriers when engaging in the ‘self as agency’ process.

Given that self-agency is the enacting of one’s self-concept into one’s vocational identity (Savickas, 2013), it is important for the individual to remain committed to their desired career path. Therefore, it is crucial for women that view their future vocational identity within the STEM field to feel committed to their STEM major. In order to address the ‘leaky pipeline’ problem that exists, it is vital to study women’s commitment to their STEM major in relation to the environmental barriers that they face.

**Women’s Commitment to STEM Majors**

College is an important time in one’s career development because the college experience is a foreshadowing of future work environments, therefore, choosing to discontinue the pursuit of a STEM major during college is a critical stage of the “leaky pipeline”. More specifically, it is essential to understand women’s persistence of STEM majors in order to prevent some of the “leaks” in the “leaky pipeline.” Some studies have operationalized persistence in STEM majors as continued enrollment in a STEM major (e.g. Brainaird & Carlin, 1998; Seymour, 1995), while others have measured persistence as the intention to pursue or continue pursuing a STEM major (e.g. Lent et al., 2013, Deemer, Thoman, Chase, & Smith, in press). While measuring one’s intentions to pursue a STEM major can be more informative about a woman’s psychological experience than enrollment dropout rates, it still does not provide information on the attachment
or belonging one may or may not feel toward their STEM major. Given that the current study is pulling from career construction theory (Savickas, 2013) to provide an understanding for women’s career development in a nontraditional field, it is important to understand female students’ perceptions of attachment to their major, that is, their feelings of commitment to their major in the face of environmental barriers. From a career constructivist perspective, a woman’s persistence in a STEM major can be a function of self-agency and, therefore, may be understood by measuring their commitment to their major.

The “leaky pipeline” phenomena highlights that at different points in the career path, some women change their minds about whether to pursue a STEM major. During the college years, the “leaky pipeline” can occur either when women are immersed into the college environment and choose to change from a STEM major or when women complete a STEM degree but decide not to pursue a career in STEM. Both points in the “leaky pipeline” suggests that there is an environmental factor involved in the persistence of women in STEM majors and careers (Blickenstaff, 2005). The women who decide to enter STEM majors are often faced with environmental barriers that are isolating and threaten their commitment to the degree they are seeking.

Several landmark studies have looked at the environmental factors contributing to women’s persistence in STEM majors. They have shown that there are psychological effects for women in male-dominated STEM majors when the environment is perceived to be “chilly” towards women. Seymour (1995) found that many women feel marginalized by their male peers. Reports of not being included in study groups, being told that they cannot succeed in STEM majors, and being interacted with for sexual interests have been linked to negative psychological effects for women, such as depression and the loss of self-esteem (Seymour, 1995). Seymour
found that 89% of the women that switched out of math, engineering, and science majors reported that the faculty had done a poor job teaching the material, and 84% of women that had switched reported not receiving the advising or help they needed. Conversely, seeking help and working collaboratively with other students served as a buffer against women switching from STEM majors.

Research has shown that the “chilly climate” women often experience in STEM majors contributes to the “leaky pipeline” (Brainard & Carlin, 1998; Seymour, 1995). Switching from or dropping out of a STEM major results from the lack of persistence toward obtaining a degree within the STEM field. Given the difficulty of finding women who have switched from STEM majors the current study will measure the degree of persistence within the major, which is operationalized as commitment to the major. Commitment to one’s major is defined as the emotional attachment to, identification with, and involvement in the major (Meyer, Allen, & Smith, 1993). The level of commitment one has toward their major or career has been found to predict one’s decision to continue within a major or career, as well as one’s well-being, where a greater level of commitment towards one’s major or career leads to lower turnover or dropout rates and greater levels of satisfaction with one’s career or major (Meyer, Stanley, Herscovitch, & Topolnytsky, 2002). By focusing on women’s commitment toward their STEM major, the current study strives to gain an understanding of factors that contribute to women’s persistence toward their STEM major, as well as the impact of their perception of identity on their commitment within the major.

Freshman year is a crucial time for women pursuing STEM majors because students are transitioning to the college environment. In a six-year longitudinal study following multiple cohorts of college women in STEM majors, researchers found that self-confidence had dropped
and feelings of isolation and intimidation had increased significantly from the beginning to the completion of participants’ first year of college (Brainard & Carlin, 1998). The study also found that women were more likely to persist in STEM majors if they had a positive relationship with an advisor, enjoyed classes, and felt accepted into the environment (Brainard & Carlin, 1998). The barriers women often face in STEM majors have been identified to have negative psychological effects that subsequently contribute to women feeling isolated and lacking commitment toward their STEM major. While these landmark studies have highlighted barriers that contribute to the discontinued pursuit of STEM majors, these studies have also identified several factors that serve as buffers against the detrimental effects of the “chilly climate.”

Identity and Major Compatibility

The current imbalance of women in STEM makes it important to focus on ways to mend the “leaky pipeline” and create greater gender equity in STEM occupations. Some attempts to solve the “leaky pipeline” problem have focused on increasing the numbers of women that enter the pipeline at the early stages. For example, several elementary and high school programs have been implemented to increase girls’ interest in math and science through providing positive science-related experiences and introducing girls to female role models in STEM careers (Buck et al., 2008; Lips, 2004; Blickenstaff, 2005; Betz, 1994). While these programs have been shown to be effective in increasing girls’ interest in math and science, their self-perceptions of their abilities and future career possibilities within STEM fields decrease as they begin making choices about their career paths (Chalk, Meara, Day, & Davis, 2005; Lips, 2004). Therefore, these studies suggest that the lack of women entering science and math related majors could be a result of their perceived identity, that is, lack of perceived identity fit, within the STEM field rather than a lack of interest.
Given that women are historically a stigmatized group in STEM fields, social identity theory (Tajfel & Turner, 1979) can provide a framework for explaining how women perceive their fit within STEM majors. Social identity theory states that individuals develop identities based on certain groups they are affiliated with, and that specific social contexts will trigger behavioral, cognitive, and emotional reactions consistent with one’s social identity (London et al., 2011; Tajfel & Turner, 1979). Within the context of women in STEM, messages and stereotypes that women are not compatible with the identity of a scientist, engineer, or mathematician are prevalent within society, as well as in the college environment. For example, studies have found differences in academic performance and interest in science among women who have experienced stereotype threat (Shapiro & Williams, 2012; Shaffer, Marx, & Prislin, 2013).

Stereotype threat is defined as a situation where “a negative stereotype about a group to which one belongs becomes self-relevant” (p. 616; Steele, 1997). Stereotype threat has been found to negatively affect women in STEM majors because of their exposure to messages that they will not perform as well as their male counterparts or do not belong in the STEM field (Shapiro & Williams, 2012). Shaffer et al. (2013) found that after exposing women to information about men outperforming women in math, women scored significantly lower on math tests than women who had been given additional information about women’s success in STEM. In addition, Shaffer et al. (2013) found that women who had been exposed to information about men outperforming women in math were more likely to be concerned with confirming the group-relevant stereotype (e.g. women are worse than men at math) compared to men. Interestingly, the group of women who were given additional information about women’s success in STEM after the information that men outperform women in math were significantly less concerned with confirming the stereotype that women are worse at math related tasks than
men (Shaffer et al., 2013).

Research supporting the negative academic and psychological effects of stereotype threat on women in STEM majors highlights ways in which the college environment can trigger the perception that one’s social identity as a woman is incompatible with the STEM major (London et al., 2011; Shapiro & Williams, 2012; Shaffer et al., 2013). Several studies have explored perceptions of compatibility between one’s perceived social identity and one’s college major (e.g., London et al., 2011; Rosenthal, London, Levy, & Lobel, 2011). London et al. (2011) looked at various psychosocial factors that affected women’s sense of belonging, motivation, and security within STEM majors as they transitioned into undergraduate programs. Using daily journals to measure students’ experience over the first three weeks of freshman year, researchers found that greater social support and perception of compatibility between one’s gender and college major predicted a greater sense of belonging, higher motivation, and less insecurity within the STEM major (London et al., 2011). Compared to the first three weeks of freshman year, results indicate a significant decline of perceived identity compatibility between gender and major, a significant decline in perceived social support, and a significant increase in the expectation to drop out of the STEM major at spring semester follow-up (London et al., 2011). In addition, a follow-up at the end of participants’ freshman year revealed that greater social support and identity compatibility predicted lower expectations of dropping out of their STEM major (London, et al. 2011). Another study looking at women in single-sex STEM programs found that greater perceived social support and identity compatibility predicted an increased sense of belonging within the STEM major (Rosenthal, London, Levy, & Lobel, 2011). Furthermore, sense of belonging has been found to moderate the relationship between identity compatibility and interest in pursuing medical school among women enrolled in pre-med courses.
(Rosenthal, Levy, London, Lobel, & Bazile, 2013). Based on the emerging body of research within the past couple of years, the construct of identity compatibility has been found to be predictive of women’s sense of belongingness in and motivation to persist in nontraditional majors.

Based on the theoretical, empirical, and logical evidence presented, it is hypothesized that women in STEM majors who perceive greater compatibility between their gender and major will report greater commitment to their STEM major. Likewise, women who perceive low compatibility between their gender and major will report lower commitment to their STEM major.

The identity compatibility between gender and major has been found to be one influential factor for women’s motivation and sense of belonging in STEM majors (Rosenthal, London, Levy, & Lobel, 2011; London et al., 2011), however, the psychological experience of women in STEM is a complex issue. Women choosing to enter STEM fields are not only faced with barriers such as stereotype threat and a “chilly climate,” but are also engaging in their personal process of career development. Therefore, to allow for a more complex understanding of women’s experiences pursuing STEM degrees, career construction theory (Savickas, 2013) will provide an explanation of how women thrive while pursuing a degree that they may not feel is historically compatible with their gender.

**Career Adaptability**

Career theorists (e.g., Farmer, 1997; Blustein, 1997) have argued that it is important and essential to understand how one’s environmental and contextual factors affect one’s career development. Women pursuing STEM degrees are in an environment that may stigmatize them and create barriers unique to their experience of career development. Career construction theory
posits that the use of psychosocial resources can assist in the adaptation and flexibility to cope with such work traumas and barriers (Savickas, 2013). Career adaptability is defined as the “readiness to cope with the predictable tasks of preparing for and participating in the work role and with the unpredictable adjustments prompted by changes in work and working conditions” (Savickas, 1997, p. 254). In addition to being considered a necessary component for one’s career success, satisfaction, and well-being, career adaptability can serve as a buffer for environmental stress within the workplace (Savickas, 1997; Savickas & Porfeli, 2012).

According to Savickas’ (2013) model, career adaptability is divided into four dimensions: curiosity, concern, control, and confidence. Curiosity is described as having an “inquisitiveness about and exploration of the fit between oneself and the work world” (Savickas, 2013, p.160). Concern refers to the ability to look ahead and prepare for the future, thus having the ability to make career decisions. Control is the ability to be conscientious and take on responsibility for oneself, which is similar to having an internal locus of control. And confidence, like self-efficacy, is the concept that one can be effective in actualizing one’s own career path. Taken together, the use of career adaptabilities can serve as an internal coping resource for women in STEM majors that are experiencing a “chilly climate.” For example, one study has shown that women in male-dominated careers tend to expect their careers to be more demanding and perceive themselves as “survivors,” which has served as a buffer by decreasing their perceptions of work as stressful (Korabik et al., 1993).

The readiness to cope with change, or adaptability, can lead to greater career decidedness, success and satisfaction (Savickas & Porfeli, 2012). In general, research has supported the link between career adaptability and career decidedness, satisfaction, and success. A quasi-experimental longitudinal study on the effectiveness of a career adaptability workshop for recent
college graduates found that participants demonstrated a significant increase in concern, control, and curiosity at both the completion of the program and at the six-month follow-up (Koen, Klehe, & Van Vianen, 2012). Additionally, the participants of the program reported significantly higher rates of job satisfaction and success, greater person-organization fit, and lower turnover intentions than did members of the control group (Koen et al., 2012). Given the findings from the effects of the career adaptability workshop, it is suggested that career adaptability skills can be learned as a way to empower clients when adjusting to school or work changes to improve the persistence and success of a career choice.

When looking at women and career choices, research has shown that a woman’s concept of ‘possible self’ may negatively impact her career choice and confidence in a traditionally masculine occupation. The ‘possible self,’ an aspect of career adaptability, is the concept that one can imagine themselves in multiple roles based on their own self-concept and idea of their own potential (Markus & Nurius, 1986). Chalk et al. (2005) found that women feared masculine jobs more than they viewed the jobs as possible. The top reasons women reported fearing masculine jobs were competition, lack of self-efficacy, and the inability to succeed (Chalk et al., 2005).

Not only may the concept of possible selves impact one’s career choice, it has also been found to impact one’s perceived ability and confidence of obtaining a career. Specifically for women in STEM careers, Buday, Stake, and Peterson (2012) found that science career-related possible selves mediated the relationship between social and environmental support and perceived ability to attain a science career. Therefore, seeing one’s future self as succeeding in a STEM career may contribute to a woman’s commitment of pursuing a STEM major.
With college students, research has supported the relationship of career adaptability to college major commitment and satisfaction. Research on college students has found that greater curiosity and knowledge about possible careers is related to one’s decidedness about a college major (Rottinghaus, Buelow, Matyja, & Schneider, 2012). Adaptability has been linked to satisfaction with one’s major, commitment to completing college, and greater confidence toward facing challenges. In a 10-month longitudinal study conducted using adolescents, Hirschi (2009) found that greater levels of adaptability predicted self-efficacy and life satisfaction. A separate longitudinal study found that college students who reported higher expectations of adapting to the college environment and greater confidence about facing future challenges were more likely to have graduated or remained enrolled than students who had discontinued their college educations (Gerdes & Mallinckrodt, 1994). Additionally, a study looking at the perceived fit of college students’ majors in relation to satisfaction found that adaptability moderated the relationship for students that reported low perceived fit and high satisfaction (Wessel, Ryan, & Oswald, 2008). Given the support found for the relationship of greater adaptability to higher levels of college retention and satisfaction, it is important consider the role of career adaptability for college students.

Given the support for career adaptability to major commitment, it is important to understand how career adaptability assists students that choose STEM majors. Research has found that outcome expectations have been linked to both the persistence of engineering majors and satisfaction with one’s major for both men and women (Lent et al., 2013). Major et al. (2012) found that active planning and behavioral engagement mediated the relationship between proactive personality and commitment to one’s major. Therefore, by using career adaptabilities
to prepare for one’s career future, one is able to hold more positive outcome expectations for one’s career future, and thus is more likely to stay committed to STEM majors.

Given that women in STEM majors have been found to have lower self-esteem and self-efficacy, as well as higher rates of depression and anxiety, it is important to understand how career adaptabilities can provide a buffer against the negative affects of environmental stressors and thus help one maintain the commitment to one’s STEM major. In a longitudinal study following high school students from entry to graduation, Skorikov (2007) found that career planning and decisiveness positively correlated with greater self-esteem, life satisfaction, self-efficacy, and social adaptation. Planning and decisiveness was also negatively related to depression and anxiety (Skorikov, 2007). Similarly, Uthayakumar, Schimmack, Hartung, and Rogers (2010) found that greater career decidedness predicted higher reports of life satisfaction among undergraduate college students. By understanding that career adaptabilities can psychologically impact one’s persistence of a career, it is argued that women in STEM majors would benefit from greater levels of career adaptabilities.

Women in STEM majors’ perceived abilities, as well as interest level in science and math, have been shown to impact their satisfaction and persistence within their STEM major. Shapiro, Williams, and Hambarchyan (2013) found that self-affirmation activities made women in STEM majors more resilient to concerns that their performance, as a woman in science or math, would reflect poorly on their own abilities. Lent et al. (2008) found support for a unidirectional model in which greater self-efficacy for STEM careers lead to greater STEM interests for first-year engineering students. Both interest in STEM fields and self-concept of abilities in STEM skills have been found to be significantly related to college students’ intent to pursue a STEM major, satisfaction of STEM major, and higher academic adjustment (Tokar & Ackerman, 2012).
When looking at women and minority groups in science specifically, the research continues to support the influence of self-concept and self-efficacy on the commitment of STEM majors. Lent et al. (2013) found that greater self-efficacy significantly predicted higher persistence of engineering majors for women undergraduates. Mau (2003) also found that greater academic self-efficacy was related to persistence in science and engineering majors along with parental expectations, high SES, and academic proficiency for college students. In a study using undergraduate and graduate student members of the Society for the Advancement of Chicanos and Native Americans in Science as participants, it was found that one’s self-efficacy for science and one’s identity as a scientist mediated the relationship of supportive experiences and commitment to one’s school program (Chemers et al., 2011).

In summary, a review of the literature shows theoretical and empirical support for the link between career adaptabilities and persistence with one’s chosen career path. When looking at women in STEM majors, the use of career adaptabilities has been shown to predict higher levels of commitment and satisfaction with one’s major. Given that women pursuing STEM majors experience unique challenges and barriers, it may be beneficial for women to use career adaptabilities as a way to cope with the environmental stress they may face. Therefore, it is hypothesized that greater career adaptabilities will be related to greater STEM major commitment. Because career adaptabilities are conceptualized as internal coping resources that women may use to cope with the barriers they may face pursuing a STEM major, it is also hypothesized that women who perceive low gender compatibility with their major but who have high use of career adaptabilities may be able to cope with the incompatibility and thus remain highly committed to their STEM major despite the lack of identity compatibility.
There is no simple solution to removing the barriers women experience while pursuing
STEM majors; however, concentrating on the skills women pursuing STEM fields already utilize
can provide an understanding of how women thrive and persist in these environments. By
studying the use of career adaptabilities with women in STEM majors, the proposed study can
better understand how women stay committed to their majors thus preventing the “leaky
pipeline.”

**Coping Through Social Support**

While career adaptability focuses on being flexible and adaptable to the environment to
better achieve goals related to one’s career paths, other coping strategies can also be important
buffers to the barriers women in STEM majors often face. Lazarus and Folkman (1984) proposed
that coping strategies (e.g. seeking social support) are initiated by the perceived threat, loss, or
harm of one’s goals. It can be argued that women pursuing STEM majors experience perceived
threat, loss, or harm of their career goals through sex-biased pedagogy, chilly classroom
environments, and the prevalence of sexist attitudes in STEM fields. However, if a stressor is
perceived more positively (e.g. challenging, engaging, or stimulating) it is more likely to have a
positive effect on one’s well-being (Simmons, 2002; Lazarus & Folkman, 1984). Depending on
how a situation is appraised and how much control one feels they have over the stressor,
different coping strategies will be used.

Expanding upon previous theoretical models and measures, Carver, Scheier, and
Weintraub (1989) created a general coping model that incorporates problem-focused coping,
emotion-focused coping, and maladaptive coping. Problem-focused coping consists of active
coping, planning, suppression of competing activities, restraint coping, and seeking of
instrumental social support. Emotion-focused coping consists of seeking of emotional social
support, positive reinterpretation, acceptance, denial, and turning to religion; and maladaptive coping consists of focusing on and venting of emotions, behavioral disengagement, and mental disengagement (Carver et al., 1989). Given that the proposed study is focusing on the “leaky pipeline” problem, and therefore is attempting to identify factors that contribute to women’s commitment to their STEM majors, it is relevant to concentrating on the seeking of instrumental and emotional social supports as forms of coping.

Previous research has found that women’s use of coping strategies can provide a buffer against work stress to increase career commitment (Simmons, 2002; Welbourne et al., 2007; Morganson et al., 2010). Creating meaning from one’s stressful work situation, feeling like the stress is manageable, having a positive affect about the experience, and being optimistic or hopeful that one can achieve their goals have all been connected to work commitment (Simmons, 2002). For example, a study of female nurses found that the adaptive coping strategies were related to greater job satisfaction (Welbourne, Eggerth, Hartley, Andrew, & Sanchez, 2007).

Some researchers have focused on studying gender differences among coping strategies. These studies have argued that women are more likely to engage in social or emotion-focused coping to alleviate stress compared to their male counterparts (Carver, Scheier, & Weintraub, 1989; Folkman & Lazarus, 1980). When looking at gender differences among college students’ coping, Brougham, Zail, Mendoza, and Miller (2009) found that women reported more stress than men in college and were more likely to use instrumental and emotional social support as a coping strategy. In contrast, other studies have found no differences between men and women’s coping strategies when participants have equal levels of education and job status (Zappert & Weinstein, 1985; Richard & Krieshok, 1989). In a sample of 122 female and 57 male hospital employees, Harris, Winskowski, and Engdahl (2007) found that social support significantly
predicted greater job tenure and satisfaction, regardless of gender. Regardless of whether gender differences exist, instrumental and emotional social support have been supported in the research as a coping strategy that is linked to greater job satisfaction and career commitment.

When looking at women in STEM majors, seeking instrumental and emotional social support has been linked to greater major commitment. Morganson et al. (2010) studied the retention of undergraduate women in STEM majors through social coping. They found that not only do women use social coping strategies more frequently than men, but women who engage in social coping strategies were more strongly committed to their STEM major choice (Morganson et al., 2010). Therefore, in the current study it is expected the use of social support will lead to greater major commitment for women in STEM majors.

In summary, there is empirical and theoretical support that social coping strategies can serve as buffers against work stress to maintain job satisfaction and career commitment. While some researchers argue that there are gender differences among coping styles between men and women, findings have been inconsistent. Regardless of the mixed findings among gender differences, women have consistently been shown to use coping strategies when faced with environmental stressors. Seeking social support is a type of adaptive coping distinct from career adaptabilities that has been linked to greater major commitment among women in STEM majors. Given the existing empirical support, it is hypothesized that social support will lead to greater major commitment. In addition, it is hypothesized that women who perceive low compatibility with their major may use instrumental and emotional social support as an adaptive coping strategy as a way to remain committed to their STEM major. Thus, instrumental and emotional social support is predicted to moderate the relationship between identity compatibility and major commitment.
**Current Study**

Given that there is an underrepresentation of women in STEM fields, the current study will examine factors that facilitate women’s commitment to their STEM majors. Prior research has established that college is a crucial time for women pursuing STEM fields because it is a time of adjustment that often includes their first contact with the ‘chilly climate.’ Pulling from social identity theory (Tajfel & Turner, 1979) to explain the experience of women as a marginalized group within STEM, the study will strive to identify how women’s own perceptions of their identity compatibility between their gender and major can play a crucial role in their commitment to a STEM major.

Because college is a crucial time for women pursuing STEM careers, the participants of the current study will be women enrolled in undergraduate courses at an engineering university in the northeastern region of the United States. Participants will be selected on the basis that they self-identify as being women and have declared a STEM major. Women enrolled in their first semester of college will not be included in the study due to their lack of experience coping in the college environment.

Rather than focusing on reasons why the “leaky pipeline” occurs at the college level, like much of the past research, the current study will concentrate on factors that facilitate women’s commitment to STEM majors. By using career construction theory (Savickas, 2013) as an overarching framework, adaptive coping resources are identified as factors that can help women persist and thrive within the STEM career field and college environment. This study will take a strengths-based approach to look at developed psychosocial resources and coping skills that women in STEM majors use as buffers against the environmental stressors they face to help them stay committed to their STEM major. By concentrating on how women persist and thrive in
STEM majors when they do not feel their gender is compatible, the current study will provide major implications for counseling practice and college programs that can assist in building social supports and facilitate adaptability among STEM women.

**Hypotheses**

Based on previous literature, existing theory, and rationale, the proposed study will test the following hypotheses:

H1. It is expected that there will be a positive relationship between identity compatibility and major commitment. High identity compatibility between gender and major will be directly related to greater commitment to STEM major. In contrast, low identity compatibility between gender and major will be related to lower major commitment.

H2. It is expected that there will be a positive relationship between career adaptability and major commitment. High career adaptability will be directly related to greater levels of major commitment, and low career adaptability will be related to lower major commitment.

H3. It is expected that there will be a positive relationship between social support seeking and major commitment. High social support seeking will be directly related to greater commitment to STEM major. In contrast, low social support seeking will be related to lower major commitment.

H4. Career adaptability will moderate the relationship between identity compatibility and major commitment, such that there will be an interaction where difference between the slopes of the relationships will be greater when identity compatibility is low. It is expected that when career adaptability is high, the relationship between identity compatibility and major commitment will become neutral; however, when career adaptability is low, the relationship between identity compatibility and major commitment will remain positive. A graph of the anticipated interaction between identity compatibility and career adaptability is shown in Figure 1.
H5. Social support seeking will moderate the relationship between identity compatibility and major commitment, such that there will be an interaction where difference between the slopes of the relationships will be greater when identity compatibility is low. It is expected that when social support seeking is high, the relationship between identity compatibility and major commitment will become neutral; however, when social support seeking is low, the relationship between identity compatibility and major commitment will remain positive. A graph of the anticipated interaction between identity compatibility and social support seeking is shown in Figure 2.
Chapter III

Method

Design

The present study was an ex-post facto design where observed variables were measured and no manipulation was performed. The statistical model used was a multiple regression analysis. The three continuous independent variables of the present study were: Identity Compatibility, that is, the compatibility between one’s gender and college major, Career Adaptability, and Social Support Seeking. Identity Compatibility was measured by the Perceived Identity Compatibility Between Gender and Major/Career scale (London & Downey, 2006) and a pictorial measure of compatibility, the Inclusion of Self in Other scale (Aron, Aron, & Smollan, 1992) that has been adapted for use with women in STEM majors by London, Rosenthal, Levy, and Lobel (2011). Career Adaptability was measured by the Career Adapt-Abilities Scale (Savickas & Porfeli, 2012), and Social Support Seeking was measured by two subscales of the Coping Orientations to Problems Experienced Scale (Carver, Scheier, & Weintraub, 1989). The continuous dependent variable of the present study was STEM Major Commitment and was measured by a modified version of the Career Commitment Scale (Meyer, Allen, & Smith, 1993). Career Adaptability and Social Support Seeking were included as moderating variables between Identity Compatibility and Major Commitment.

Participants

There were a total of 225 participants included in the study. The participants recruited were women who were currently enrolled at a predominantly engineering university located in the Northeastern region of the United States. Participants were at least 18 years of age, had declared STEM majors, and were of full-time status (12 credits). Inclusion criteria were
identified from participant information provided by a self-report demographic questionnaire. STEM majors were defined by the list provided by the U.S. Economics and Statistics Administration (Beede et al., 2011). According to the U.S. Economics and Statistics Administration list of STEM undergraduate majors (Beede et al., 2011), all women reporting enrollment in an undergraduate or graduate degree from the Schools of Architecture, Engineering, Science, and Information Technology and Web Science meet STEM major criteria. In addition, women who report declaring a dual major, minor, or concentration in a STEM area while pursuing a Bachelor’s of Science in the following fields were included in the present study: Design, Innovation, and Society; Electronic Arts; Electronic Media, Arts, and Communication; Games and Simulation Arts and Sciences; Science, Technology, and Society; and Sustainability Studies. Women who reported being enrolled in school for less than one semester, had not declared a major, or were not of full-time status were not included in the study.

Table 1 provides a frequency distribution of the demographic data. Of the 225 participants, 99.1 percent of the students identified as female and 0.9 percent identified as gender diverse (genderfluid, agender, etc.) The age of the participants ranged from 18-29 years ($M = 19.89$, $SD = 1.23$); and the majority of the participants identified as Caucasian (75.9%), followed by Asian or Asian American (14.2 %) and Hispanic/Latina (4.9%). International students consisted of 3.1% of the sample, and the mean GPA of the participants was 3.31 ($SD = 0.47$), with a range of 1.5 to 4.0. With regard to year at the university, the sample was widely distributed with a mean of 2.35 years attending the university ($SD = 1.234$). Freshman consisted of the largest group of the sample (34.5%), followed by sophomores and seniors (both 21.1%), juniors (19.5%), and graduate level students (2.7%).
A majority the sample were pursuing a major in the School of Engineering (63.1%), followed by Science (26.7%), Humanities, Arts, and Social Sciences (4.0%), Architecture (3.1%), Management (1.8%) and Information Technology and Web Science (1.3%). Table 2 provides a frequency distribution of the declared majors of the participants in the study. A majority of the participants were majoring in an engineering program, with Biomedical Engineering (16.4%), Chemical and Biological Engineering (10.2%), Mechanical Engineering (7.5%), and Civil Engineering (6.6%) as the most frequently reported. Aside from engineering programs, Biology (9.7%) and Computer Science (7.5%) were also among the most frequently reported majors of the participants. A small percentage (1.8%) of the sample indicated that they were pursuing a Business and Management degree, and only 1 participant indicated that their primary major was Psychology, with a minor in Sustainability Studies. Due to the university’s emphasis on technology the School of Business, the participants enrolled in the Business and Management major were included in the final sample. In addition, it is assumed that the participants of the School of Business experience a similar campus climate to those in the Schools of Engineering, Architecture, Science, Humanities, Arts, and Social Sciences, and Information Technology and Web Science given that they are non-traditional majors for women and are located in the same campus.

With regards to club membership, 81.4 percent of participants indicated that they were a member of at least one student group or club. Table 3 provides a frequency distribution of the types of student groups or clubs that participants indicated they were active in. One hundred and twenty seven (56.2%) participants indicated that they were active members of the university’s Mentorship Program for women. Sororities (19.9%), the Society of Women Engineers (18.6%), and athletic teams or clubs (18.6%) were also among the most reported among the sample.
In summary, the demographic data suggests that the participants were predominately 18 to 22 year-old Caucasian women in engineering majors. Most participants had around a 3.3 GPA, and were an active member of one or two clubs or student groups, such as the Women’s Mentorship Program.

Power Analysis. A power analysis was conducted to calculate the minimum sample size necessary to detect a reasonable effect size. The value of power was fixed at .80, as suggested by Cohen (1988), and the alpha level for the regression was set at .05. A review of the literature provided an estimate of effect sizes among the relationships of constructs in the present study. The effect sizes estimated were each of the relationships of identity compatibility, adaptive coping, and career adaptability to major persistence.

Literature showing significant associations between identity compatibility with persistence in the major (expectation of dropping out of STEM major) has reported correlations of $r = -.19$, $-.21$, and $-.24$ (London et al., 2011; Rosenthal, London, Levy, Lobel, & Herrera-Alcazar, 2011). Literature reporting significant correlations between career adaptability and career commitment have values of $r = .26$ (commitment making), $r = -.44$ (commitment identity), and $r = -.20$ (self-doubt) (Porfeli & Savickas, 2012). Significant correlations reported for the relationship between social support seeking and major commitment for STEM students equal $r = .09$ (social coping) (Major et al., 2012; Morganson et al., 2010). When looking at the relationship between social support and the motivation to pursue science careers for women, the reported correlations range from .50 to .72 (Buday et al., 2012).

While effect sizes have been reported on the associations of identity compatibility, career adaptability, and social support seeking on major commitment, the hypothesized moderator effects of the present study are of primary focus. Specifically, the semi-partial effects of
interactions between social support seeking and identity compatibility, and between career adaptability and identity compatibility are the effect sizes of primary interest for the current study. To date, there have been no published studies looking at the interactions between career adaptabilities and identity compatibility, and social support seeking and identity compatibility. A review of literature on moderating effects found that in studies within the area of psychology, the effect sizes of interactions typically range from .01 to .03 (Chaplin, 1991; Whisman & McClelland, 2005). A more comprehensive review of interaction testing in the field of Counseling Psychology revealed a median effect size of $\eta^2 = .033$ (Haase, Martens, Ferrier & Corbett, 2005).

Given that the primary focus of the current study is on the interacting effects, it is understood that the effect size of the interactions will be smaller than those of the main effects (Whisman & McClelland, 2005; Haase et al., 2005). Based on a review of the literature of moderator effects, and identity compatibility, career adaptability, and social support seeking to commitment toward STEM majors, an estimated effect size of .03 has been used to calculate the necessary sample size. Using an estimated effect size of .03 and $\alpha = .05$, a sample size of 247 participants is needed to maintain an 80% power of detecting the interaction; however, the final sample size of 225 was determined to be adequate for the current study.

**Measures**

**Demographics.** A demographic questionnaire was used to provide information on inclusion criteria of participants (see Appendix A). The questionnaire asked for participants’ gender, major, semester at the institution, full-time status, and expected graduation date. Additionally, data was collected on participants’ age, race/ethnicity, GPA, and membership in on-campus women’s fraternities, societies, mentorship programs, and athletic teams.
**Major Commitment.** Major Commitment was measured by the Career Commitment Scale (CCS; Meyer et al., 1993; see Appendix B). The 18-item CCS has been adapted for use of students’ commitment to their major in several studies by substituting “nursing profession” for “major” (e.g. Morganson et al., 2010; Major et al., 2012). The adapted CCS assesses affective, continuance, and normative commitment to major. A sample item includes “I am proud to be in my major.” Responses are rated on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The mean score for the CCS ranges from 1-7, with higher scores indicating stronger Major Commitment. Allen and Meyer (1996) reported the alpha coefficient for the CCS ranging from .73 to .85 for each of the subscales. For the current study, the alpha coefficient for the CCS was .839. Internal consistencies for each type of commitment in the present study were as follows: Affective $\alpha = .797$; continuance $\alpha = .923$; and normative $\alpha = .783$.

**Identity Compatibility.** Identity Compatibility was measured by London and Downey’s (2006) 6-item Perceived Identity Compatibility Between Gender and Major/Career scale, along with a pictorial measure of compatibility, the Inclusion of Self in Other measure (Aron, Aron, & Smollan, 1992), that has been adapted for use with women in STEM majors by London et al. (2011; see Appendix E). For the Perceived Identity Compatibility Between Gender and Major/Career scale, sample items include: “I don’t think that my gender will affect how well I do in my major,” “I think I may experience difficulties in my major due to my gender,” and “I think my gender and major are very compatible.” Participants are asked to indicate how much they agree or disagree with the statements on a 1 to 6 Likert-type scale from 1 (strongly disagree) to 6 (strongly agree). Scores on the measure can range from 6 to 36, with a mean score of the 6-item scale (3 are reverse coded) to provide a composite measure of perceived compatibility between gender and major.
The pictoral measure of compatibility through the adapted Inclusion of Self in Other measure is a one-item scale consisting of seven Venn diagram pictures of circles overlapping at various amounts, with the first diagram showing two circles next to each other and each circle after showing a greater degree of overlap between the circles. The Inclusion of Self in Other measure is adapted for identity compatibility between gender and major by having the circles labeled “gender” and “major” (London et al., 2011). The participant is prompted to select one of the seven pictures that best represents how compatible they feel their gender is with their major (London et al., 2011). A two-week test-retest reliability of the one-item Inclusion of Self in Other measure yielded a Cronbach’s alpha of .83 (Aron et al., 1992).

London et al. (2011) reported a Cronbach’s alpha of .73 in the spring semester of freshman year for women in STEM majors. Similarly, another study using the Perceived Identity Compatibility Between Gender and Career/Major measure on a sample of women in STEM undergraduate majors found Cronbach’s alphas ranging from .67 to .78 over the course of six time points within the first two and a half years in the STEM major (Rosenthal, London, Levy, Lobel, & Herrera-Alcazar, 2011). For the current sample, there was an alpha coefficient of .644.

Identity Compatibility has been associated with women’s persistence in STEM majors. Rosenthal et al. (2011) found that higher scores on the Perceived Identity Compatibility Between Gender and Career/Major measure were associated with lower self-reported expectations of dropping out of the STEM major \( (B = -.38, p < .001) \). Greater perceived identity compatibility was also found to be associated with greater motivation for academic performance among female STEM students \( (B = .27, p < .0001; \) London et al., 2011).

**Career Adaptability.** Career Adaptability was measured by the 24-item Career Adapt-Abilities Scale (CAAS; Savickas & Porfeli, 2012; see Appendix C). The scale consists of four 6-
item subscales assessing Concern, Confidence, Curiosity, and Control. The Concern subscale pertains to the ability to look ahead. A sample item for the concern subscale is “planning how to achieve my goals.” The Confidence subscale measures the ability for the person to actualize choices for their life design, and consists of a sample item “working up to my ability.” The Control subscale assesses a person’s ability to be individually responsible for themselves and environment. A sample item from the control subscale is “sticking up for my beliefs.” Curiosity measures the ability for a person to think about themselves in different roles, and includes the sample item “looking for opportunities to grow as a person.” Each item is rated from 1 (not strong) to 5 (strongest). Scores on each subscale range from 6-30, with higher scores representing a stronger career capability in the respectable subscale. The subscale scores can be added together to provide an overall score for Career Adaptability strength, ranging from 24-144. After administering the measurement in 13 different countries, Savickas and Porfeli (2012) reported an overall alpha coefficient of .92 for the CAAS. The alpha coefficient was .83 for Concern, .74 for Control, .79 for Curiosity, and .85 for the Confidence subscales across samples from 13 countries (Savickas & Porfeli, 2012). The internal consistencies for Career Adaptability in the present study was .878, with .775 for Concern, .741 for Control, .773 for Curiosity, and .826 for the Confidence subscales.

Research on the psychometric properties of the USA form of the CAAS have provided strong evidence for concurrent and construct validity for scores on the scale. Porfeli and Savickas (2012) found that the scale items conformed to statistical assumptions, and the results of a confirmatory factor analysis provided support that the CAAS-USA fits the theoretical model. In addition, the CAAS-USA was found to be comparable to CAAS-International, with the U.S.
population scoring higher in Confidence and the international population generally scoring higher in Curiosity (Porfeli & Savickas, 2012).

Concurrent validity of the CAAS has been supported through the pattern of association found with the Vocational Identity Status Assessment (VISA; Porfeli, Lee, Vondracek, & Weigold, 2011). The Exploration and Commitment dimensions of VISA were significantly related in the positive direction to CAAS-USA, but the commitment flexibility subscale of VISA’s Reconsideration dimension was not significant (Porfeli & Savickas, 2012). Additionally, the CAAS-USA total adaptability score was associated with the identity status continuum, with a higher adaptability score coinciding with an “achieved” vocational identity status and a lower adaptability resulting in “diffused” and “undecided” vocational identities (Porfeli & Savickas, 2012).

Social Support Seeking. The Coping Orientations to Problems Experienced Scale (COPE; Carver, Scheier, & Weintraub, 1989; see Appendix D) is a 60-item measure assessing a broad range of coping strategies through 15 subscales with 4-items each. The Instrumental Social Support Seeking and Emotional Social Support Seeking subscales will be used in the current study. Sample items from the Instrumental Social Support Seeking subscale are “I talk to someone who could do something concrete about the problem,” “I ask people who have had similar experiences what they did,” and “I talk to someone to find out more about the situation.” Items from the Emotional Support Seeking Subscale include: “I discuss my feelings with someone,” “I try to get emotional support from friends or relatives,” and “I get sympathy and understanding from someone.” Each item is rated from 1 (I usually don’t do this at all) to 4 (I normally do this a lot). Scores on the subscales range from 4-16, with higher scores representing the greater use of that particular coping strategy. The Instrumental and Emotional Social Support

35
Seeking subscale scores can be summed together for a scoring range of 8-32, with higher scores representing the greater use of social support seeking behaviors.

Carver, Scheier, and Weintraub (1989) reported an alpha coefficient of .75 on Instrumental Social Support Seeking and .85 on Emotional Social Support Seeking with a sample of 978 college undergraduates. A six week test-retest reliability for undergraduate students revealed a correlation of .76 for Instrumental Social Support Seeking, and a correlation of .72 for Emotional Social Support Seeking. For an eight week test-retest reliability from a different sample of undergraduates, correlations were .65 for Instrumental Social Support Seeking and .77 for Emotional Social Support Seeking (Carver, Scheier, & Weintraub, 1989).

Clark (2006) combined the Instrumental Social Support Seeking and Emotional Social Support Seeking subscales to look at the effects of perceived racism with black college women on vascular reactivity. For the study, social support seeking behaviors were hypothesized as moderating the effect of perceived racism on blood pressure. The alpha coefficients were .77 for both subscales (Emotional and Instrumental). Clark found that social support seeking moderated the relationship of perceived racism to high blood pressure in black college women, where women who perceived experiences of racism and reported low social support seeking behaviors had a significant increase in blood pressure. Women who perceived experiences of racism and reported high social support seeking behaviors were found to have no significant changes in blood pressure. Thus, Instrumental and Emotional Support Seeking behaviors have been found to have a buffering effect on perceived stress (e.g. experiences of racism).

Morganson, Jones, and Major (2010) also combined the Instrumental and Emotional Support Seeking subscales from the COPE measure to create a “social coping” variable. Combined, the subscales had a Cronbach’s alpha of .90 for the study, which used a sample of
1061 undergraduate college students in STEM majors (Morganson et al., 2010). The study looked at the role of social coping on the commitment to STEM major and intention to change major. Morganson et al. (2010) found that social coping is a significant predictor of college students’ commitment to their STEM major among men (ß = .08, p = .032) and women (ß = .24, p = .001). The findings also suggest that for women in STEM majors, the impact of social coping on commitment to major is stronger than for men. The Cronbach’s alpha for the current sample was .826.

**Procedure**

After gaining approval through the respective university’s Institutional Review Board, participants were recruited through listservs and social media websites of on-campus women’s engineering clubs, Greek life, and women undergraduates. Emails inviting women on campus to participate in the study were sent to the listservs for women in engineering, women undergraduates, and the women’s mentorship program. Presidents of sororities on campus were also emailed asking if they would be willing to pass along the “invitation to participate” email to their sorority members. In addition, a video of the principle investigator reading the recruitment script was posted on the campus’ chapter of the Society of Women Engineers website and social media sites (e.g. Twitter and Facebook). Potential participants were informed that they were invited to be a part of a study surveying women’s experiences at a STEM university.

In the email and video posting, participants were asked to fill out an anonymous online-survey that took approximately 20 minutes and given a link to the survey. After clicking on the link that connected to the study’s website, participants were presented with a consent page that included a brief description of the study, rights as a research participant, potential benefits and consequences of participating in the study, and contact information of the Principle Investigator.
Participants were asked to click on a button at the bottom of the webpage to indicate they were giving their informed consent and were at least 18 years of age. After indicating their informed consent, participants were asked to complete pages that contained the Perceived Identity Compatibility Between Gender and Major/Career scale, the Career Adapt-Abilities-USA scale, the Instrumental Social Support Seeking and Emotional Social Support Seeking subscales of the COPE, the Career Commitment Scale, and a demographic questionnaire.

At the completion of the survey, participants were informed of the opportunity to receive a “prize” of $5.00 to be deposited into their student account in appreciation of completing the survey. Participants that chose to receive the “prize” entered their email address and last name on a webpage that was independent of and could in no way be linked to their survey answers. Participants were given the principal investigator’s contact information should they have any further questions or concerns.

**Planned Preliminary Analyses**

First, the data were examined for missing data points. A preliminary analysis was performed to ensure that the assumptions for multiple regression were met. Using the techniques suggested by Cohen, Cohen, West, and Aiken (2003), procedures assessing violations in the assumptions of linearity, homoscedasticity, and normality were performed. Finally, an assessment of outliers and multicollinearity was conducted, and descriptive statistics on the demographic characteristics of participants were generated.

It was assumed that the assumption of independence of the residuals had been met due to the independence of observations within the design of the study. To assess for a violation in the assumption homoscedasticity, a visual inspection of scatterplot between the residuals and the predicted values was conducted. To ensure that the residuals are homoscedastic, the assumption
that the variance of the residuals is not related the predicted values, the lowess line was superimposed onto the scatterplot. By visually assessing that the points on the scatterplot were symmetrically distributed around the lowess line, homoscedasticity of the data was assumed.

The assumption of normality and linearity were assessed through normal p-p plots of the residuals. An inspection of the histogram of the residuals indicated that the residuals were normally distributed. In addition, a visual inspection of the error data fitting a diagonal line indicates that the assumptions of normality and linearity have been met.

Regression diagnostics were used to assess for outliers in the data. Each data point was checked for leverage, discrepancy, and influence. Leverage reflects how far the observed values for a case are from the mean values of the IVs. As recommended by Cohen et al. (2003), a data point was considered to have high leverage if the $h_{ii}$ value is greater than $2M_h = 2(k + 1)/n$, where $M_h$ is the mean value of leverage, $k$ is the number of IVs, and $n$ is the number of cases. Discrepancy, the distance between the predicted and observed values of the dependent variable, was assessed through a calculation of externally studentized residuals. A value of ± 2.0 was considered a large magnitude for $t_i$ indicating a high discrepancy of for the data point, as suggested by Cohen et al. (2003). Influence was assessed using Cook’s D, which measures the global influence of a case on the regression equation. If Cook’s D value for a case exceeds the critical value of $F_{(k+1, n-k-1)}$ with an $\alpha = .50$, then it was considered to be influential (Cohen et al., 2003).

Potential multicollinearity was assessed through the variance inflation factor (VIF) and tolerance. Cohen et al. (2003) suggests that correlations between independent variables become a concern when tolerance is .10 or less and the VIF is 10 or higher. As stated by Whisman and McClelland (2005), nonessential multicollinearity among independent variables in a moderated
multiple regression is not a problem when variables have been centered. Therefore, multicollinearity was assessed, but it is not expected that nonessential multicollinearity will be accounted for once the independent variables have been centered.

Lastly, descriptive statistics of the demographic questionnaire were assessed to ensure that diversity and variability amongst the participants adhered to the inclusion criteria for the proposed study. The means, standard deviations, and intercorrelations of participant characteristics and major study variables were calculated to provide descriptive statistics for comparisons among other published work.

**Planned Major Analyses**

A hierarchical multiple regression analysis was performed to test the hypotheses. The procedure included two continuous independent variables, two continuous moderating variables, and one continuous dependent variable.

**Independent variables.** The independent variables in the current model were Perceived Identity Compatibility and Inclusion of Self in Other.

**Moderator variables.** The two moderator variables are Career Adaptability and Social Support Seeking.

**Dependent variable.** The dependent variable in the proposed study is Major Commitment.

To test the study hypotheses, a hierarchical multiple regression was conducted. As suggested in the literature on studying moderator variables, the independent variables will be centered to reduce problems of multicollinearity when interpreting interactions (Frazier, Tix & Barron, 2004; Whisman & McClelland, 2006; Tabachnick & Fidell, 2007). As suggested by Cohen et al. (2003), centering the continuous predictor variables “eliminates nonessential
multicollinearity between first-order predictors and predictors that carry their interaction with other predictors” (p. 266). Therefore, Perceived Identity Compatibility, Inclusion of Self in Other, Career Adaptability, and Social Support Seeking were centered by transforming the raw scores into their mean deviation through the subtraction of their sample means. Then, the cross-product terms will be created by multiplying the pairs of centered variables together. The cross-product terms represent the interactions between Career Adaptability and Perceived Identity Compatibility, Career Adaptability and Inclusion of Self in Other, Social Support Seeking and Perceived Identity Compatibility, and Social Support Seeking and Inclusion of Self in Other.

The hierarchical multiple regression was conducted in two steps following the recommendations of Cohen et al. (2003). First, the main effects of the independent variables were assessed by testing for significance of each centered predictor variable of Inclusion of Self in Other, Perceived Identity Compatibility, Career Adaptability, and Social Support Seeking on Major Commitment. The second step tested the main effects, as well as each of the four interaction effects of the moderator variables. This was done by entering each of the centered cross-product terms, Perceived Identity Compatibility x Career Adaptability, Perceived Identity Compatibility X Social Support Seeking, Inclusion of Self in Other X Career Adaptability, and Inclusion of Self in Other X Social Support Seeking. The formula for the full model equation was as follows:

\[ y_{\text{major commitment}} = a + b_1 X_{\text{perceived identity}} + b_2 X_{\text{inclusion of self}} + b_3 X_{\text{career adaptability}} + b_4 X_{\text{social support}} + b_5 X_{\text{perceived identity} \times \text{career adaptability}} + b_6 X_{\text{perceived identity} \times \text{social support}} + b_7 X_{\text{inclusion of self} \times \text{career adaptability}} + b_8 X_{\text{inclusion of self} \times \text{social support}} + e \]

To interpret the results from the hierarchical multiple regression analyses, tests of statistical significance were conducted. The squared semipartial correlations for the regression
were tested for statistical significance using the $F$ test, with $\alpha = .05$. Two graphs (Figures 1 and 2) showing the hypothesized buffering effects of Career Adaptability and Social Support Seeking were included, with the Identity Compatibility variables on the x-axis and Major Commitment on the y-axis. Three lines will be plotted on each graph to show the interaction of the Identity Compatibility variables with either Career Adaptability or Social Support Seeking at low, medium, and high levels.

The interaction effects, Hypotheses 4 and 5, were assessed through an $F$ test at $p < .05$ for statistical significance of the moderator effects of Career Adaptability and Social Support Seeking, which represented the change in variance that is explained as a result of adding each of the product terms simultaneously. If the interaction terms were significant, then the moderator effect was interpreted. As suggested by Cohen et al. (2003), the squared semipartial correlations of each interaction will be calculated to determine the amount of variance in Major Commitment that is attributable to Perceived Identity Compatibility X Career Adaptability, Inclusion of Self in Other X Career Adaptability, Perceived Identity Compatibility X Social Support Seeking, Inclusion of Self in Other X Social Support Seeking. Testing the slopes of the regression lines of either perceived identity compatibility or inclusion of self in other by major commitment at specific values of career adaptability and social support seeking for statistical significance would provide information about each interaction effect at different levels (Cohen et al., 2003; Tabachnick and Fidell, 2007). If the interaction effects were not significant, the main effects, Hypotheses 1, 2, and 3, were interpreted.
Chapter IV

Results

Missing Data

Three hundred and ten participants logged on to the online survey. Forty-nine participants provided no data, which may occur when an individual decides not to participate after accessing the online survey. These 49 cases were deleted, along with an additional 35 cases that did not complete the survey, leaving 226 participants. After examining outliers and excluding one case, the final sample was 225. Among the final sample, 22 participants were missing one item out of their total response, and 3 participants were missing 2 items out of the total survey response. Upon examining the specific missing items, the distribution of missing items was considered unpredictable and was characterized as missing completely at random. Given that the quantity of missing values was considered random and small in quantity, mean substitution was the procedure chosen to handle the missing data. Using the mean substitution is a conservative method that does not change the distribution of the data, nor does it require the researcher to guess at missing values (Tabachnick & Fidell, 2007). Therefore, the sample means of each scale were computed and inserted in place of the missing value for their respective scales.

In addition to the random missing data, one item was inadvertently omitted from the Career Adapt-Abilities Scale-USA Form (Savickas & Porfeli, 2012) due to researcher error. Therefore the scale was altered from 24 items to 23 items.

Data Screening

Data was screened to ensure that the assumptions for multiple regression were met. Using the techniques suggested by Cohen et al. (2003), procedures assessing violations of assumptions of homoscedasticity, normality, linearity, and independence were performed. To assess for a
violation in the assumptions of homoscedasticity, a visual inspection of scatterplot between the residuals and the predicted values for Major Commitment were inspected (Figure 3). Upon inspecting the scatterplot of the residuals, it was concluded that the assumption of homoscedasticity has been met due to the circular cluster of data points scattered around the lowess line.

The assumptions of normality and linearity were assessed through a visual inspection of the histogram of the residuals (Figure 4) and normal p-p plot of the residuals (Figure 5) of Major Commitment. Upon inspecting the fit of the error data to the diagonal line, it is assumed that the assumptions of normality and linearity have been met.

To assess for multicollinearity between the variables, the variance inflation factor (VIF) and tolerance values were analyzed. As suggested by Cohen et al. (2003), the correlations between independent variables become a concern when tolerance is .10 or less and the VIF is 10 or higher. After the variables were centered, each of the tolerance correlation values were greater than .10 and the VIF correlation values were less than 10. Therefore, it was assumed that the independent variables were not highly correlated and nonessential multicollinearity amongst the variables was not a concern.

Data points were assessed for influence, discrepancy, and leverage to determine if outliers existed. Influence of the data points was assessed using Cook’s D (Figure 6). The values for Cook’s D were compared to the critical value of $F(9, 216) = 1.92$ at an $\alpha = .50$, with any observed values exceeding the critical value considered to be influential (Cohen et al., 2003). Discrepancy was assessed through a calculation of externally studentized residuals, where a value of $\pm 2.0$ was considered a large magnitude for $t_i$ indicating a high discrepancy of for the data point. Leverage was assessed by comparing the centered leverage values to the
recommended value of .08 resulting from the formula $2M_h = 2(k + 1)/n$. After inspecting the data for outliers, it was decided that one of the data points was considered to have undue leverage and influence on the results. The data point was deleted from the sample resulting in a final sample of 225.

**Descriptive Statistics**

Prior to conducting the main analyses, the means, standard deviations, and intercorrelations of participant characteristics and major study variables were calculated to provide descriptive statistics for comparisons among other published work.

**Descriptive statistics of demographic variables.** Descriptive statistics were conducted on the demographic data to better understand the characteristics of the sample. Table 1 provides a frequency distribution of the demographic data (e.g., race/ethnicity, gender, school status, school of study, group membership, age, GPA, and year in school). Table 2 provides information on the declared majors of the participants. The mean age for the sample was 19.89 ($SD = .90$, range = 1 – 5, $Mdn = 1$). The mean GPA and years attended were 3.31 ($SD = .47$, range = 1.5 – 4.0, $Mdn = 3.32$) and 2.35 years ($SD = 1.24$, range = 1 – 5, $Mdn = 2$), respectively. As part of the demographic questionnaire, participants were asked, “On a scale from 1 (not at all) to 5 (most of the time), how much are you thinking about changing your major?” as an indicator of participants’ commitment level to their major and intention on remaining in the major they have chosen. The mean response was 1.55 ($SD = .90$, range = 1 – 5, $Mdn = 1$), indicating that participants were generally not thinking about changing their major. Overall, the demographic data suggests that the participants were predominately 18 to 22 year-old Caucasian women in engineering majors with a 3.3 GPA. Most participants indicated that they are not thinking about
changing their major, and are an active member of one or two clubs or student groups, such as the Women’s Mentorship Program.

**Descriptive statistics of study variables** Descriptive statistics were conducted on the study variables to provide a comparison between the data from the study to previously published work. The sample mean of the scores on the CCS was 4.86 (SD = .898, range = 2.39 – 6.78, Mdn = 4.94), indicating that the sample endorsed that they felt generally committed to their major. The descriptive characteristics from the subscales of the CCS indicate that the sample endorsed affective and continuance commitment items more so than normative commitment. The mean of the scores for affective commitment was 5.77 (SD = .934, range = 2.50 – 7.00, Mdn = 6.00); continuance commitment was 5.05 (SD = 1.71, range = 1.00 – 7.00, Mdn = 5.50); and normative commitment was 3.77 (SD = 1.25, range = 1.00 – 7.00, Mdn = 3.83). The average scores on the affective (t (224) = 3.181, p = .002), continuance (t (224) = 10.606, p = .000), and normative (t (224) = 4.829, p = .000), subscales are significantly higher than the average obtained from a sample of 530 student nurses (Meyer et al., 1993). In addition, the average scores for the affective commitment subscale were significantly higher than the average obtained from a different sample of 290 women in STEM majors (5.77 vs. 5.47; t (224) = 4.786, p = .000) (Major et al., 2012). It is possible that the current sample of undergraduate women in STEM majors may have higher affective, continuance, and normative commitment scores than previous samples because of characteristics of the university. For example, the university that the current sample is attending is a private university with a relatively high tuition cost and a specific mission toward science and engineering. Also, there is a high presence of student services available to assist in the continuation of students completing their degree, and potentially more family pressure to stay at a prestigious school.
The sample average of the scores on the Perceived Identity Compatibility between Gender and Major scale was 4.26 (SD = .846, range = 1.67 – 6.00, Mdn = 4.33), indicating that the sample generally endorsed that their identities between their major and gender were slightly compatible. The average scores for Perceived Identity Compatibility are significantly lower (4.26 vs. 4.48; t (224) = -3.887, p = .000) than the average obtained from a sample of 168 undergraduate women in STEM majors (London et al., 2011). Again, it is possible that the difference between the college campus environment accounts for the significant difference among the samples. The current sample of undergraduate women in STEM majors may have a lower average score on the scale, thus feeling that their gender and major are not as compatible as the comparative sample, because the campus they are attending is an engineering university and predominantly men. The studies used as the comparison sample were conducted at non-engineering specific universities, thus potentially creating a greater sense of compatibility due to a more gender balanced campus environment. Interestingly, the sample mean for the Inclusion of Self in Other item was 4.71 (SD = 1.60, range = 1.00 – 7.00, Mdn = 5.00), which was not statistically different from the mean of 4.88 from a sample in a previous study including 65 women in the Women in Science and Engineering (WISE) Program (t (224) = -1.582, p = .115; Rosenthal et al., 2011). The similarity between the current sample and previous sample of 65 women in WISE program is not surprising due to characteristic similarities among the two samples. In the current sample, 81.8% of the sample is involved in student groups and organizations, with 56.2% being members of the Women’s Mentorship Program.

A comparison of the sample mean on the CAAS-USA with the current sample and a sample of 460 high school students was significantly different. The mean average of the CAAS-USA from the current sample was 3.65 (SD = .544, range = 2.04 - 5.00, Mdn = 3.70), compared
to 3.84 for the pre-existing sample ($t (224) = -5.156, p = .000$; Porfeli & Savickas, 2012). The comparison indicates that the current sample of undergraduate women in STEM majors endorsed significantly lower levels of career adaptability skills compared to general sample of high school students. It is possible that the difference of Career Adaptability between the current sample and sample of high school students is due to age and maturity level. It is expected that those with higher levels of Career Adaptability would be knowledgeable about the world of work and the career they are pursuing, but it is likely that people could potentially score higher on the CAAS-USA prior to entering a career or pursuing a career because they answering what they believe they would do rather than a realistic answer of what they are currently doing or have done when faced with work stress.

The mean score on the social support subscale of the COPE was significantly different from a sample of 110 Black undergraduate women. The mean of the current sample was 21.18 ($SD = 5.26$, range $= 8.00\text{-}32.00$, $Mdn = 21.00$) compared to 19.59 for the pre-existing sample (Clark, 2006). The comparison ($t (224) = 4.537, p = .000$) indicates that the current sample of undergraduate women in STEM majors endorsed significantly higher levels of Social Support Seeking compared to a sample of Black undergraduate women, indicating that the current sample is more likely to seek social support as a coping mechanism than the comparative sample. The current sample’s high level of involvement in student clubs and organizations reflects the high level of Social Support Seeking in the current sample. It is possible that the current sample scored higher on Social Support Seeking because of the sampling procedure of the study. The current study recruited of participants through listservs and social media websites of on-campus women’s engineering clubs and Greek life, thus sampling undergraduates that were connected with various social supports and involved in on-campus organizations.
Correlations. Bivariate correlations were calculated between the continuous demographic variables (e.g. age, GPA, years attended, and frequency of thinking about changing major) and all of the major study variables (see Table 4). Not surprisingly, participants’ age and years attended were significantly correlated (r = .83). Age, years attended, and GPA were all significantly associated with the degree to which participants indicated they were thinking about changing their major (rs = -.30, -.32, and -.30, respectively). Additionally, age, years attended, and thinking about changing major were also significantly associated with Major Commitment (rs = .32, .41 and -.18, respectively). GPA was significantly associated with the Perceived Identity Compatibility and Inclusion of Self in Other (rs = .19 and .17, respectively), as well as Career Adaptability and Social Support Seeking (rs = .19 and .18, respectively). The degree to which participants indicated they were thinking about changing their major was also significantly associated with the Perceived Identity Compatibility and Inclusion of Self in Other (rs = -.22 and -.15, respectively). In addition, thinking about changing one’s major and years attended were significantly associated with Career Adaptability (rs = -.19 and .16, respectively).

Bivariate correlations amongst the study variables indicate that the Perceived Identity Compatibility is significantly associated with Inclusion of Self in Other (r = .39). Career Adaptability is significantly associated with Perceived Identity Compatibility, Social Support Seeking, and Major Commitment (rs = .14, .16, and .16, respectively).

Analysis of the Hypothesized Model

To test the hypotheses of the present study a hierarchical regression analysis was conducted with two independent variables and two moderators. The dependent variable was Major Commitment, the independent variables were Perceived Identity Compatibility and Inclusion of Self in Other, and the two moderator variables were Career Adaptability and Social
Support Seeking. The formula for the main effects and interactions of the independent variables was as follows:

\[ y_{\text{major commitment}} = a + b_1 X_{\text{perceived identity}} + b_2 X_{\text{inclusion of self}} + b_3 X_{\text{career adaptability}} + b_4 X_{\text{social support}} + \\
( b_5 X_{\text{perceived identity}} \times \text{career adaptability} + b_6 X_{\text{perceived identity}} \times \text{social support} + b_7 X_{\text{inclusion of self}} \times \text{career adaptability} + \\
b_8 X_{\text{inclusion of self}} \times \text{social support} + e) \]

Table 5 provides the results of the hierarchical regression analysis. In step 1 the variables Inclusion of Self in Other, Perceived Identity Compatibility, Career Adaptability, and Social Support Seeking were added, and then Step 2 contained the full model including the main effects and four interactions. The full model was significant ($R^2 = .075$, $F(8, 216) = 2.19$, $p = .029$). Examination of the influence of each main effect in Step 1 and Step 2 reflected only slight differences. In addition, examination of the variance inflation factors (VIF) within the full model showed that the presence of the interactions in the model had minimal impact on the main effects.

The interaction effects, Hypotheses 4 and 5, were examined for significance. Hypothesis 4 suggested that Career Adaptability would moderate the relationship between Perceived Identity Compatibility and Major Commitment, and Inclusion of Self in Other and Major Commitment, such that there would be an interaction where difference between the slopes of the relationships would be greater when identity compatibility is low. That is, it was expected that when career adaptability was high, the relationship between identity compatibility and major commitment would become neutral, and when career adaptability was low, the relationship between identity compatibility and major commitment would remain positive. Examination of the interaction effects between Career Adaptability and Perceived Identity Compatibility ($\beta = -.089$, $sr^2 = .006$, $p = .237$), and Career Adaptability and Inclusion of Self in Other ($\beta = -.105$, $sr^2 = .008$, $p = .164$) showed no significant moderating effects. Thus, Hypothesis 4 was not supported.
Hypothesis 5 indicated that Social Support Seeking would moderate the relationship between Perceived Identity Compatibility and Major Commitment, and Inclusion of Self in Other and Major Commitment, such that there would be an interaction where difference between the slopes of the relationships would be greater when identity compatibility is low. That is, it was expected that when social support seeking was high, the relationship between identity compatibility and major commitment would become neutral, and when social support seeking was low, the relationship between identity compatibility and major commitment would remain positive. Examination of the interaction effects between Social Support Seeking and Perceived Identity Compatibility ($\beta = .120$, $sr^2 = .010$, $p = .119$), and Social Support Seeking and Inclusion of Self in Other ($\beta = -.095$, $sr^2 = .007$, $p = .219$) showed no significant moderating effects. Thus, Hypothesis 5 was not supported.

Given that the interaction effects, Hypotheses 4 and 5, were not significant, the main effects within the full model were then examined for significance. Hypothesis 1 indicated that Perceived Identity Compatibility and Inclusion of Self in Other would each be related to Major Commitment. Evaluation of the beta weights and squared semi-partial correlations revealed that neither ISS ($\beta = -.08$, $sr^2 = .005$, $p = .260$) nor PIC ($\beta = -.010$, $sr^2 = .000$, $p = .888$) were significantly related to Major Commitment. Thus, Hypothesis 1 was not supported.

Hypothesis 2 suggested that Career Adaptability would be significantly related to Major Commitment and this hypothesis was supported. Examination of the main effects showed that the relationship between Career Adaptability and Major Commitment was significant ($\beta = .161$, $sr^2 = .025$, $p = .018$). Therefore, Hypothesis 2 was supported indicating that as participants’ level of career adaptability increased, their commitment to their major increased.
Hypothesis 3 indicated that Social Support Seeking would be related to Major Commitment. Evaluation of the beta weights and squared semi-partial correlations revealed that SC (β = .015, sr² = .000, p = .820) was not significantly related to Major Commitment. Thus, Hypothesis 3 was not supported.

In summary, examination of the F-tests indicated that none of the interaction terms were significant in the model and thus Hypotheses 4 and 5 were not supported. Neither Social Support Seeking nor Career Adaptability had a moderating effect on the relationship between the Identity Compatibility measures and Major Commitment. Hypotheses 1 and 3 were also not supported, indicating that neither Social Support nor the Identity Compatibility measures were significantly related to Major Commitment. Hypothesis 2, however, was supported, indicating that Career Adaptability was significantly related to Major Commitment among women STEM majors.

To investigate the stability of Career Adaptability as a main effect, the main effects were analyzed without the presence of the interaction terms as suggested by Pedhazur (1997). For nonorthogonal designs, it is suggested that each factor should be tested while adjusting for the other factors to account for multicollinearity among the variables (Pedhazur, 1997). As seen in Table 5, a comparison of the main effects model (Step 1) to the full model (Step 2) of the hierarchical regression analysis revealed that there were slight differences among the statistical terms of Career Adaptability. The differences were not deemed substantial enough to negate the interpretation of the full model. Additionally, examination of the variance inflation factors (VIF) showed that the presence of the interactions in the model had minimal impact on the stability of Career Adaptability as a main effect. Therefore, the full model including the interaction terms was retained.
Exploratory Analyses

Given that the majority of studies in the literature tend to use all three subscales of the Major Commitment scale, Normative, Continuance, and Affective commitments, as suggested by Meyer et al. (1993), rather than the total scale, some additional exploratory analyses were conducted using the three separate subscale. Meyer et al. (1993) defined normative commitment to a major as one’s obligation to complete the major. Continuance commitment is associated with the cost of leaving or changing majors, and affective commitment is defined as one’s emotional attachment towards one’s major. Both Morganson et al. (2010) and Major et al. (2012) explored the career commitment of women in STEM majors and used the subscale of affective commitment as a more refined and precise scale of one’s commitment or attachment felt towards one’s major.

Therefore, a post hoc statistical analysis was conducted to test the relationship among the independent and moderator variables with Affective Commitment as the dependent variable. The potential interactions of Perceived Identity Compatibility and Social Support Seeking (Figure 7), and Perceived Identity Compatibility and Career Adaptability (Figure 8) were examined by fitting trendlines when the moderating variables are at low, medium, and high levels. A hierarchical regression was conducted with Perceived Identity Compatibility, Inclusion of Self in Other, Social Support Seeking, and Career Adaptability entered in Step 1, and the interactions between the identity compatibility variables and the two moderators of Social Support Seeking and Career Adaptability entered in Step 2. The results of this analysis are presented in Table 6. The $F$-test for the main effects in Step 1 was significant ($R^2 = .125, F(4, 220) = 7.828, p = .000$). Examination of the main effects revealed that there was a significant relationship between Career Adaptability and Affective Commitment ($\beta = .518, sr^2 = .087, p = .000$). The $F$-test for the full
model including the main effects and interactions was also significant ($R^2 = .138, F(8, 216) = 4.33, p = .000$). None of the individual interaction terms, however, were significant. Thus, the relationship between Career Adaptability and Affective Commitment was significant, suggesting that Career Adaptability is important to Major Commitment, specifically Affective Commitment, for women pursuing STEM majors. Participants with greater career adaptability tended to report greater affective commitment to their STEM major. In the following chapter, the findings of the study will be discussed, along with limitations and implications for theory, practice, and future research.
Chapter V

Discussion

The study examined factors that facilitate women’s commitment to their STEM majors. Since prior research has established how crucial college often is for women pursuing STEM fields due to their experience as a marginalized group within STEM, the study sought to identify how women’s own perceptions of their identity compatibility between their gender and major can play a crucial role in their commitment to a STEM major. In addition, the study attempted to identify adaptive coping resources that can help women persist and thrive within the STEM career field and college environment. The present study examined the relationship between major commitment and identity compatibility, adaptive coping strategies, and the interactions between adaptive coping strategies and identity compatibility.

The sample consisted of 225 women in STEM majors at a predominantly engineering university in the Northeastern region of the United States. The participants were predominately 18 to 22 year-old Caucasian women with around a 3.3 GPA, and were active members of one or two clubs or student groups, such as the Women’s Mentorship Program. Although it was hypothesized that career adaptability and social support would moderate the relationship between identity compatibility and major commitment, the results indicated that neither of these interactions were significant. Additionally, the hypothesized relationship between identity compatibility and major commitment was not significant. Furthermore, no support for the hypothesized relationship between social support and major commitment was found. However, the hypothesized relationship between career adaptability and major commitment was found to be significant.
Given that prior research on women’s commitment in STEM majors and careers has used affective commitment as a more refined and precise scale to measure one’s commitment or attachment felt towards one’s major, exploratory post hoc analyses were conducted to examine the relationships between identity compatibility, adaptive coping, and affective commitment. Similar to the original model, no support was found for career adaptability and social support moderating the relationship between identity compatibility and affective commitment. Additionally, the relationships between identity compatibility and affective commitment, and social support and affective commitment were not significant. A significant relationship was found for career adaptability and affective commitment, thus supporting that women in STEM majors who have greater levels of career adaptability were more affectively committed to their majors.

**Career Adaptability and STEM Major Commitment**

The hypothesis that greater career adaptability would be related to greater commitment to STEM major was supported. Thus, in this sample, women in STEM majors who reported greater adaptation and flexibility to cope with work stress tended to report feeling more committed to the major. This finding is consistent with prior research showing that career adaptability is positively related to college major commitment and satisfaction among college students (Gerdes & Mallinckrodt, 1994; Hirschi, 2009; Rottinghaus, Buelow, Matyja, & Schneider, 2012; Wessel, Ryan, & Oswald, 2008). Specifically looking at women in STEM majors, support has been found for the relationship between types of career adaptability (e.g., outcome expectations, active planning, self-efficacy, and career decidedness) and the persistence or commitment to one’s major (Lent et al., 2013; Major et al., 2012; Skorikov, 2007); however the current study was the first study to explicitly look at and find a connection between career adaptability and major
commitment for women in STEM majors. Given that women pursuing STEM majors experience unique challenges and barriers, these findings support the use of career adaptabilities as a way to cope with the environmental stress they may face.

Career theorists (e.g., Savickas, 2013; Blustein, 1997) have argued the importance of understanding how one’s environmental and contextual factors affect one’s career development. Thus, it is important to understand how women use psychosocial resources (e.g. career adaptabilities) to cope with environmental barriers. The current study supports the argument that women’s use of adaptive coping strategies through career adaptability techniques coincides with increased levels of affective commitment towards one’s major. Thus, women who remain curious about the fit between the work world and themselves, have the ability to look ahead and prepare for the future, take responsibility in their career decision-making, and have confidence in their chosen career path are more likely to be committed to the pursuit of their STEM major. Alternatively, women who see themselves as being less adaptable tend to feel less committed to their STEM major and may be more likely to switch or drop out of their major. While there is no simple solution to removing the barriers women experience while pursuing STEM majors, identifying the skills women pursuing STEM fields may already utilize to remain committed and satisfied with their career choice can provide more effective ways to prevent the “leaky pipeline.”

Interestingly, when compared to previous research, the current sample reported significantly lower levels of career adaptability skills and significantly higher levels of commitment toward their majors. It is possible that the current sample reported higher levels of commitment toward their majors due to environmental factors. For example, the university that the participants were enrolled in is selective in its admissions process, expensive to attend, and competitive, which may have increased their feelings of commitment toward their major due to
the higher levels of investment in their education. Additionally, the participants may have reported lower levels of career adaptability than other samples because they may not have the desire to consider alternative career paths due to the level of difficulty and motivation that has already been required to maintain their current career path. Therefore, this suggests that those who are highly invested in their current career path, thus reporting higher levels of commitment, may not necessarily need to build or utilize career adaptability skills because the possibility of alternative career paths is not explored.

**Identity Compatibility and STEM Major Commitment**

It was hypothesized that greater identity compatibility between gender and major would be related to greater commitment to STEM major, and that women with lower identity compatibility between gender and major would express less commitment to their major; however, the hypothesis was not supported. Thus, women were committed to their major regardless of whether they felt strongly it was compatible with their gender identity or not. Two instruments were used to measure identity compatibility between gender and major: the Perceived Identity Compatibility Between Gender and Major/Career scale (London & Downey, 2006) and the pictoral Inclusion of Self in Other item (Aron, Aron, & Smollan, 1992). The relationship between major commitment and both measures of identity compatibility were found to be not significant. This finding is surprising considering that past literature has found that identity compatibility between gender and major is an influential factor for women’s motivation and sense of belonging in STEM majors (Rosenthal, London, Levy, & Lobel, 2011; London et al., 2011).

One possible explanation for the lack of significant findings is that the perceived identity compatibility measure had a fairly low alpha coefficient for the participants in the current study.
In a previous study of women in STEM undergraduate majors, the Cronbach’s alphas for the Perceived Identity Compatibility Between Gender and Career/Major measure ranged from .67 to .78 over the first two and a half years in the STEM major (Rosenthal, London, Levy, Lobel, & Herrera-Alcazar, 2011); however, for the current sample there was an alpha coefficient of .644. It is possible that the measure had mediocre internal consistency due to the measure only being 6-items (Cohen et al., 2003).

In addition, the current sample had significantly lower scores on the Perceived Identity Compatibility Between Gender and Major/Career scale (London & Downey, 2006) than previous studies, with the majority of the participants scoring in the middle range for the measure. The sample average of the scores on the Perceived Identity Compatibility between Gender and Major scale was 4.26, compared 4.48 from a previous study including 168 undergraduate women in STEM majors (London et al., 2011). The comparatively lower scores for the current sample may reflect their campus environment. The campus they are attending is an engineering university and predominantly male, whereas the comparison sample was at a non-engineering specific university, thus potentially creating a greater sense of compatibility due to a more gender balanced campus environment. In addition, the spread of the scores on the Perceived Identity Compatibility between Gender and Major scale had little variability, with few participants indicating they felt their choice in major was completely compatible or completely incompatible with their gender. It is possible that the relationship between identity compatibility and major commitment was not significant due to this lack of variation among different degrees of identity compatibility. Thus, the lack of differentiation between feeling one’s gender and major were compatible versus incompatible may have impacted the ability to detect a significant relationship between identity compatibility and major commitment. Furthermore, the spread of the data may
have also taken away from the ability to detect a moderation effect between identity compatibility and adaptive coping strategies.

Although identity compatibility was not significant in the overall model, a significant bivariate correlation was found between Perceived Identity Compatibility and career adaptability, and both measures of identity compatibility (Perceived Identity Compatibility and Inclusion of Self in Other) and GPA. These findings indicate that those with higher career adaptability also felt more compatible with their major, and were more successful in their major. A significant bivariate correlation was also found between identity compatibility and affective commitment, indicating that those who felt more compatible with their major were more affectively committed. The support for these relationships within the preliminary analyses indicates that more research needs to be done to determine if identity compatibility between gender and major has an important role in women’s career development of non-traditional majors.

Social Support and STEM Major Commitment

It was hypothesized that greater social support seeking would be related to greater commitment to STEM major; however, the hypothesis was not supported. Thus, the degree that women sought forms of social support as a coping mechanism was not associated with their degree of commitment to their major. This finding is intriguing due to the conflict surrounding the subject of gender specific coping strategies. Several studies have argued that women are more likely to engage in social or emotion-focused coping to alleviate stress compared to their male counterparts (Brougham et al., 2009; Carver, Scheier, & Weintraub, 1989; Folkman & Lazarus, 1980; Morganson et al., 2010). In contrast, other studies have found no differences between men and women’s coping strategies when participants have equal levels of education
and job status (Harris, Winskowski, & Engdahl, 2007; Zappert & Weinstein, 1985; Richard & Krieshok, 1989).

One possibility for the lack of significance among social support as a coping strategy and major commitment is that social support may not be that important to women’s commitment to their STEM major. The current study’s findings suggest that using social and emotional coping strategies may not facilitate greater career commitment. Although the study reflected that women in STEM majors seek out social support, it is possible that the items on the scale used or support they were seeking may not directly translate to greater commitment to one’s major. It may be important to understand the type of support that women in STEM majors might find helpful in the career commitment process, and it might be that general social support is not sufficient but support that is more clearly related to one’s major and career future is more helpful. The findings from this study suggest that career adaptability, that is, being proactive and planful, which may entail talking to other people about one’s career future, might help women in STEM majors feel more confident and committed to their career paths.

The current sample’s mean score of the Social Support Seeking scale was significantly higher than the comparison sample of Black undergraduate women, indicating that the current sample is more likely to seek social support as a coping mechanism than the comparative sample. It is possible that the current sample scored higher on Social Support Seeking because of the sampling procedure of the study through listservs and social media websites of on-campus women’s engineering clubs and Greek life. Thus, the resulting sample of participants were those who were connected with various social supports and involved in on-campus organizations.

One possible alternative explanation for the lack of support for a relationship between social coping and major commitment is that scores on the Social Support Seeking scale were
negatively skewed, thus lacking enough variation amongst the scores to show a significant relationship between social support and major commitment. It is also possible that although women may seek social support for the stress of being in a STEM major, it may not have an effect on their commitment to their major. While social support may help women cope with the stress, it may not help women change their intrinsic feelings and motivations towards continuing to pursue or not pursue a career in STEM fields.

**Major Commitment**

The Major Commitment scale (Meyer et al., 1993), consists of three subscales measuring distinct types of commitment: Normative, Continuance, and Affective commitments. Affective commitment is defined as one’s emotional attachment towards one’s major. Given that the affective commitment subscale is a more refined and precise measure of one’s attachment felt towards one’s major, and exploratory post hoc analysis was conducted to examine the relationships between identity compatibility, adaptive coping, and affective commitment. Although no support for the relationships between identity compatibility and affective commitment, and social support and affective commitment were found, a significant relationship was found for career adaptability and affective commitment. Thus, women in STEM majors who have greater levels of career adaptability were more affectively committed to their majors. When comparing the variance accounted for by the relationship between Career Adaptability and Major Commitment to Career Adaptability and Affective Commitment, it is concluded that more of the variance is explained through Affective Commitment than the more general Major Commitment.

This finding suggests that women with greater levels of career adaptability are more apt to being emotionally attached to their STEM major. Thus, women who are more planful and proactive with regards to their career choice and professional development are more likely to be
affectively committed to their major. This finding highlights that when women possess career adaptability skills, being affectively committed to one’s STEM major is more important than feeling loyal or obligated to continue pursuing the degree because it is a major that they enjoy and are proud to identify with. Thus, helping women engage in career adaptability skills can assist in building women’s enthusiasm, pride, and identity in their STEM major (i.e. affective commitment); therefore, lowering the risk of becoming part of the “leaky pipeline.”

**Limitations**

Threats to the validity of the results of this study include limitations inherent in self-report measures. Given that the university the current study’s participants are enrolled in is reputed as highly competitive, participants may be less likely to report a lack of commitment to their major. Additionally, many participants that are not committed to their major were more difficult to recruit because they may not have been a part of the organizations the principal investigator recruited from or they may have already dropped out of the STEM major.

Another limitation to consider is that the measure for Perceived Identity Compatibility between gender and major had mediocre internal consistency reliability. Studies that have used the measure have found it to have higher alpha levels toward the end of the participants’ freshman year and the years following. This may be a result of the participants’ growing awareness of how their gender is perceived within they declared major. To avoid complications involving the Perceived Identity Compatibility and Inclusion of Self in Other measure’s reliabilities, participants in their first year of college were not included in the study.

Measuring the participants’ commitment to their major was another threat to the validity of the study. The current study aimed to understand what helps women persist in STEM majors. By measuring commitment level, the participants’ feelings about their major were assessed
rather than their actual performance and continuance within the major. Therefore, the results of the study cannot be generalized to all women in STEM. Rather, the findings of the study better explains the importance of career adaptabilities in one’s affective commitment to their STEM major.

One limitation of the current study is that the current sample was relatively homogenous in their demographic characteristics. The participants were mostly around 19 years of age and predominately Caucasian. They were mostly high achieving students with around 3.3 GPAs and were generally active members of one or two clubs or student groups, such as the Women’s Mentorship Program. It is possible that the study would have yielded different results if the participants were more diverse with regards to race, age, GPA, and level of connectedness to student organizations. Therefore, it is suggest that the study is replicated with a larger, more diverse sample size.

**Conclusion and Future Research**

This study took a strengths-based approach to look at developed psychosocial resources and coping skills that women in STEM majors use as buffers against the environmental stressors they face to help them stay committed to their STEM major. The study concentrated on how women persist and thrive in STEM majors, and found that those with greater career adaptability, but not social support or identity compatibility, had greater commitment to their STEM major. There are a number of theoretical, empirical, and clinical implications of the study.

The study identified a salient factor that may help women persist within STEM majors. The finding that career adaptability was important in women’s affective commitment to their STEM major provides support that career adaptabilities are important resources for one’s career development. Career adaptabilities have been theorized as crucial elements to remaining satisfied
and successful in one’s career path despite the presence of work stress and barriers. The findings
from the current study support the argument that Career Adaptability is an important theoretical
construct in Career Construction Theory (Savickas, 2013).

The current study advanced research by taking a positive approach to understanding a
population that has consistently been overlooked and misunderstood. Given that the majority of
research has concentrated on women’s struggles within the STEM fields, the current study added
to the breadth of research by taking a strengths-based approach to looking at what helps women
persist in STEM. The current study should be replicated in an effort to provide further support
for the importance of career adaptability in major commitment for women in STEM.
Additionally, future research should be conducted to continue looking at the potential
interactions of environmental stress and adaptive methods of coping on women’s persistence of
STEM careers, as very little is known with regards to what helps women persist in STEM.
Specifically, this area of research would benefit from the development of a more reliable scale in
identity compatibility, and other scales that measure environmental stress with regards to career
development. It would also be worthwhile to look at different types of identity compatibility, not
only between gender and STEM major, but also racial or cultural identity and STEM major.
While there is a growing amount of research in the area of racial/ethnic identities, environmental
stress, and college, there is a dearth of research looking at environmental stress among different
racial/ethnic identities with regards to STEM, as well as the intersectionality of gender and
racial/ethnic identities as it relates to STEM majors and careers. Lastly, a longitudinal study
would provide a breadth of information on persistence and career development with women in
STEM as they transition from college to early career professionals.
The current study provides information for career counseling with women in nontraditional career choices. The study identified career adaptabilities as an important resource that may help women feel and stay committed to STEM majors. This finding has implications for the way new college students are encouraged to adapt to the college environment, and strategies to help women graduate in STEM majors. Specifically, colleges and counselors can focus on building students’ career adaptabilities within their STEM major and college environment. This may not only increase persistence in their majors, but may also increase students’ self-awareness of their own identity within the field and empower them to recognize specific skills that will allow greater resiliency against the barriers they face.

Research often overlooks the positive effects and adaptive coping that result from stressful situations and their impact on persistence in college, thus it is important to continue research in this area to provide alternative resources that help students who are struggling to graduate. Furthermore, the “leaky pipeline” phenomenon that results in a substantial loss of women from STEM majors during their college experience may be counterbalanced with future research on how women persist and thrive in STEM majors and careers. Although there is no fast and simple fix, finding ways to stop the “leaky pipeline” on an individual level can lead to the end of the systemic problem of gender inequality that is perpetuated in the workforce and the lack of perspectives from diverse populations in the creation of STEM technology and innovations.
References


Shapiro, J.R. & Williams, A.M. (2012). The role of stereotype threats in undermining girls’ and 
womens’ performance and interest in STEM fields, Sex Roles, 66, 175-183. DOI 
10.1007/s11199-011-0051-0

Shapiro, J.R., Williams, A.M., & Hambarchyan, M. (2013). Are all interventions created equal? 
A multi-threat approach to tailoring stereotype threat interventions, Journal of 
Personality and Social Psychology, 104, 277-288. DOI: 10.1037/a0030461

Burke & D.L. Nelson (Eds.) Advancing Women’s Careers, Malden, MA: Blackwell 
Publishers Inc.

Skorikov, V. (2007). Continuity in adolescent career preparation and its effects on adjustment, 
Journal of Vocational Behavior, 70, 8–24. doi:10.1016/j.jvb.2006.04.007

employee turnover, Journal of Vocational Behavior, 82, 176–187. doi: 
10.1016/j.jvb.2013.01.011

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and 


Allyn and Bacon.

& S. Worchel (Eds.), The Social Psychology of Intergroup Relations, pp. 33–47, 


Table 1

Demographic Characteristics of the Sample (N= 226)

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race/Ethnic Identity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>170</td>
<td>75.9</td>
</tr>
<tr>
<td>Asian/Asian American</td>
<td>32</td>
<td>14.2</td>
</tr>
<tr>
<td>Hispanic/Latina</td>
<td>11</td>
<td>4.9</td>
</tr>
<tr>
<td>Black/African American</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Biracial/Multiracial</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>223</td>
<td>99.1</td>
</tr>
<tr>
<td>Other (Agender, genderfluid)</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Student Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-state/Out of state</td>
<td>213</td>
<td>94.7</td>
</tr>
<tr>
<td>International</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Missing</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>School of Study</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>142</td>
<td>63.1</td>
</tr>
<tr>
<td>Science</td>
<td>60</td>
<td>26.7</td>
</tr>
<tr>
<td>Humanities, Arts, and Social Sciences</td>
<td>9</td>
<td>4.0</td>
</tr>
<tr>
<td>Architecture</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Management</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Information Technology and Web Science</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Group/Club Membership</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not a Member</td>
<td>41</td>
<td>18.2</td>
</tr>
<tr>
<td>Member of 1</td>
<td>89</td>
<td>39.4</td>
</tr>
<tr>
<td>Member of 2</td>
<td>63</td>
<td>27.9</td>
</tr>
<tr>
<td>Member of 3 or More</td>
<td>32</td>
<td>14.2</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Table 2

Declared Majors of Sample (N = 225)

<table>
<thead>
<tr>
<th>Major</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Engineering</td>
<td>37</td>
<td>16.4</td>
</tr>
<tr>
<td>Chemical and Biological Engineering</td>
<td>23</td>
<td>10.2</td>
</tr>
<tr>
<td>Biology</td>
<td>22</td>
<td>9.7</td>
</tr>
<tr>
<td>Computer Science</td>
<td>17</td>
<td>7.5</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>17</td>
<td>7.5</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>16</td>
<td>7.1</td>
</tr>
<tr>
<td>Industrial and Management Engineering</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>9</td>
<td>4.0</td>
</tr>
<tr>
<td>Architecture</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Computer Systems Engineering</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Mathematics</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Nuclear Engineering</td>
<td>7</td>
<td>3.1</td>
</tr>
<tr>
<td>Aeronautical Engineering</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Materials Engineering</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Applied Physics</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Biochemistry and Biophysics</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Business and Management</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Electronic Media, Arts, and Communication</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Bioinformatics and Molecular Biology</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Information Technology and Web Science</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Cognitive Science</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Geology</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Interdisciplinary Science</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Psychology</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Science, Technology, and Society</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Sustainability Studies</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Engineering (Unknown)</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Table 3

*Group Membership Among Sample (N =225)*

<table>
<thead>
<tr>
<th>Type of Group</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women’s Mentorship Program</td>
<td>127</td>
<td>56.2</td>
</tr>
<tr>
<td>Sorority</td>
<td>45</td>
<td>19.9</td>
</tr>
<tr>
<td>Society of Women Engineers (SWE)</td>
<td>42</td>
<td>18.6</td>
</tr>
<tr>
<td>University Athletic Team/Club</td>
<td>42</td>
<td>18.6</td>
</tr>
<tr>
<td>Honors Societies or Professional Engineering Clubs</td>
<td>16</td>
<td>7.1</td>
</tr>
<tr>
<td>Community Action or Service Clubs</td>
<td>15</td>
<td>6.6</td>
</tr>
<tr>
<td>Hobby/Special Interest Clubs</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>Religious/Cultural Clubs</td>
<td>10</td>
<td>4.4</td>
</tr>
<tr>
<td>ROTC</td>
<td>5</td>
<td>2.2</td>
</tr>
<tr>
<td>Residence Life</td>
<td>5</td>
<td>2.2</td>
</tr>
</tbody>
</table>
Table 4

Pearson Correlations, Means, and Standard Deviations for Demographic and Study Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. GPA</td>
<td>.07</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Year</td>
<td>.83**</td>
<td>.08</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MAJ</td>
<td>-.30**</td>
<td>-.39**</td>
<td>-.30</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. ISS</td>
<td>.10</td>
<td>.19**</td>
<td>.11</td>
<td>-.15*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PIC</td>
<td>.03</td>
<td>.17*</td>
<td>.08</td>
<td>-.22**</td>
<td>.39**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. CAAS</td>
<td>.12</td>
<td>.19*</td>
<td>.16*</td>
<td>-.18**</td>
<td>.09</td>
<td>.14*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. SC</td>
<td>.07</td>
<td>.18*</td>
<td>.07</td>
<td>-.08</td>
<td>-.00</td>
<td>-.03</td>
<td>.16*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. ISS X SC</td>
<td>.10</td>
<td>-.03</td>
<td>-.12</td>
<td>-.02</td>
<td>.04</td>
<td>.10</td>
<td>-.05</td>
<td>-.07</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. ISS X CAAS</td>
<td>.14*</td>
<td>.06</td>
<td>-.08</td>
<td>-.03</td>
<td>.07</td>
<td>.19**</td>
<td>-.03</td>
<td>-.05</td>
<td>-.17*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. PIC X SC</td>
<td>.07</td>
<td>-.08</td>
<td>-.02</td>
<td>-.03</td>
<td>.10</td>
<td>.04</td>
<td>-.09</td>
<td>-.01</td>
<td>.04</td>
<td>.07</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. PIC X CAAS</td>
<td>.09</td>
<td>.10</td>
<td>-.07</td>
<td>-.11</td>
<td>.18**</td>
<td>.17**</td>
<td>-.05</td>
<td>-.10</td>
<td>-.14*</td>
<td>.04</td>
<td>-.12</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. MC</td>
<td>.32**</td>
<td>.04</td>
<td>.44**</td>
<td>-.18**</td>
<td>-.09</td>
<td>-.06</td>
<td>.16*</td>
<td>.06</td>
<td>-.07</td>
<td>-.17*</td>
<td>.04</td>
<td>-.14*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Affective</td>
<td>.03</td>
<td>.27**</td>
<td>.06</td>
<td>-.46**</td>
<td>-.09</td>
<td>.18**</td>
<td>.32**</td>
<td>.05</td>
<td>.34**</td>
<td>.03</td>
<td>-.04</td>
<td>.07</td>
<td>.04</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Continuance</td>
<td>.48**</td>
<td>.01</td>
<td>.57**</td>
<td>-.11</td>
<td>-.11</td>
<td>-.07</td>
<td>.08</td>
<td>.05</td>
<td>.84**</td>
<td>-.02</td>
<td>-.09</td>
<td>-.11</td>
<td>-.02</td>
<td>-.12</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>16. Normative</td>
<td>.02</td>
<td>-.13</td>
<td>.11</td>
<td>.11</td>
<td>-.12</td>
<td>-.17**</td>
<td>-.01</td>
<td>.03</td>
<td>.75**</td>
<td>.02</td>
<td>.45**</td>
<td>-.06</td>
<td>-.19**</td>
<td>.06</td>
<td>-.17*</td>
<td>--</td>
</tr>
<tr>
<td>Mean</td>
<td>19.9</td>
<td>3.31</td>
<td>2.35</td>
<td>1.55</td>
<td>4.71</td>
<td>4.26</td>
<td>3.65</td>
<td>21.2</td>
<td>99.7</td>
<td>17.3</td>
<td>90.1</td>
<td>15.6</td>
<td>4.86</td>
<td>5.77</td>
<td>5.05</td>
<td>3.77</td>
</tr>
<tr>
<td>SD</td>
<td>1.59</td>
<td>.471</td>
<td>1.24</td>
<td>.896</td>
<td>1.60</td>
<td>.846</td>
<td>.544</td>
<td>5.26</td>
<td>42.7</td>
<td>6.67</td>
<td>28.8</td>
<td>4.17</td>
<td>.898</td>
<td>.934</td>
<td>1.71</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Note. **p<.01; *p<.05. MAJ = Thinking About Changing Major; ISS = Inclusion of Self in Other; PIC = Perceived Identity Compatibility; CAAS = Career Adaptability; SC = Social Support Seeking; MC = Major Commitment.
Table 5

Summary of Hierarchical Multiple Regression Analysis of Perceived Identity Compatibility, Inclusion of Self in Other, Career Adaptability, and Social Support Seeking as Predictors of Major Commitment

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE\ B$</th>
<th>$\beta$</th>
<th>$p$</th>
<th>$sr$</th>
<th>$sr^2$</th>
<th>Tol.</th>
<th>VIF</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS</td>
<td>-.046</td>
<td>.040</td>
<td>-.081</td>
<td>.259</td>
<td>-.075</td>
<td>.006</td>
<td>.848</td>
<td>1.18</td>
<td>.038</td>
</tr>
<tr>
<td>PIC</td>
<td>-.053</td>
<td>.077</td>
<td>-.050</td>
<td>.490</td>
<td>-.046</td>
<td>.002</td>
<td>.837</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>CAAS</td>
<td>.271</td>
<td>.112</td>
<td>.164</td>
<td>.016</td>
<td>.161</td>
<td>.026</td>
<td>.954</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>.006</td>
<td>.011</td>
<td>.034</td>
<td>.613</td>
<td>.033</td>
<td>.001</td>
<td>.973</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.075</td>
</tr>
<tr>
<td>ISS</td>
<td>-.046</td>
<td>.040</td>
<td>-.081</td>
<td>.260</td>
<td>-.074</td>
<td>.005</td>
<td>.827</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>PIC</td>
<td>-.011</td>
<td>.077</td>
<td>-.010</td>
<td>.888</td>
<td>-.009</td>
<td>.000</td>
<td>.803</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>CAAS</td>
<td>.266</td>
<td>.111</td>
<td>.161</td>
<td>.018</td>
<td>.156</td>
<td>.025</td>
<td>.941</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>.003</td>
<td>.011</td>
<td>.015</td>
<td>.820</td>
<td>.015</td>
<td>.000</td>
<td>.959</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>ISS X CAAS</td>
<td>-.114</td>
<td>.082</td>
<td>1.11</td>
<td>.164</td>
<td>-.091</td>
<td>.008</td>
<td>.765</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>ISS X SC</td>
<td>-.010</td>
<td>.008</td>
<td>-.095</td>
<td>.219</td>
<td>-.081</td>
<td>.007</td>
<td>.716</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>PIC X CAAS</td>
<td>-.175</td>
<td>.148</td>
<td>-.089</td>
<td>.237</td>
<td>-.078</td>
<td>.006</td>
<td>.754</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>PIC X SC</td>
<td>.022</td>
<td>.014</td>
<td>.120</td>
<td>.118</td>
<td>.102</td>
<td>.010</td>
<td>.721</td>
<td>1.39</td>
<td></td>
</tr>
</tbody>
</table>

Note. $sr$ = semi-partial correlation. $sr^2$ = squared semi-partial correlation. Tol. = tolerance values. VIF = variance inflation factor values. $R^2$ = Proportion of variance accounted for. ISS = Inclusion of Self in Other; PIC = Perceived Identity Compatibility; CAAS = Career Adaptability; SC = Social Support Seeking.
Table 6

Summary of Hierarchical Multiple Regression Analysis of Perceived Identity Compatibility, Inclusion of Self in Other, Career Adaptability, and Social Support Seeking as Predictors of Affective Commitment

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p</th>
<th>sr</th>
<th>sr²</th>
<th>Tol.</th>
<th>VIF</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS</td>
<td>.020</td>
<td>.040</td>
<td>.034</td>
<td>.617</td>
<td>.032</td>
<td>.001</td>
<td>.848</td>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td>PIC</td>
<td>.141</td>
<td>.076</td>
<td>.127</td>
<td>.066</td>
<td>.117</td>
<td>.014</td>
<td>.837</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>CAAS</td>
<td>.518</td>
<td>.111</td>
<td>.302</td>
<td>.000</td>
<td>.295</td>
<td>.087</td>
<td>.954</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>.001</td>
<td>.011</td>
<td>.004</td>
<td>.952</td>
<td>.004</td>
<td>.000</td>
<td>.973</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS</td>
<td>.012</td>
<td>.041</td>
<td>.020</td>
<td>.775</td>
<td>.018</td>
<td>.000</td>
<td>.827</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>PIC</td>
<td>.149</td>
<td>.078</td>
<td>.135</td>
<td>.057</td>
<td>.121</td>
<td>.015</td>
<td>.803</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>CAAS</td>
<td>.533</td>
<td>.112</td>
<td>.310</td>
<td>.000</td>
<td>.301</td>
<td>.091</td>
<td>.941</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>.001</td>
<td>.011</td>
<td>.004</td>
<td>.953</td>
<td>.004</td>
<td>.000</td>
<td>.959</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>ISS X CAAS</td>
<td>-.089</td>
<td>.082</td>
<td>-.079</td>
<td>.278</td>
<td>-.069</td>
<td>.005</td>
<td>.765</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>ISS X SC</td>
<td>.001</td>
<td>.008</td>
<td>.006</td>
<td>.934</td>
<td>.005</td>
<td>.000</td>
<td>.716</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>PIC X CAAS</td>
<td>.093</td>
<td>.148</td>
<td>.046</td>
<td>.531</td>
<td>.040</td>
<td>.002</td>
<td>.754</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>PIC X SC</td>
<td>.016</td>
<td>.014</td>
<td>.085</td>
<td>.254</td>
<td>.072</td>
<td>.005</td>
<td>.721</td>
<td>1.39</td>
<td></td>
</tr>
</tbody>
</table>

Note. sr = semi-partial correlation. sr² = squared semi-partial correlation. Tol. = tolerance values. VIF = variance inflation factor values. R² = Proportion of variance accounted for. ISS = Inclusion of Self in Other; PIC = Perceived Identity Compatibility; CAAS = Career Adaptability; SC = Social Support Seeking.
Figure 1. Proposed Interaction of identity compatibility X Career Adaptability (CA) on Major Commitment.
Figure 2. Proposed Interaction of identity compatibility X Social Support Seeking on Major Commitment.
Figure 3. Scatterplot of residuals versus predicted values with lowess line. This figure illustrates the assumption of homoscedasticity has been met.
Figure 4. Histogram of the standardized residuals. This figure illustrates the fit of the residuals to a normal distribution curve.
Figure 5. Normal p-p plot of regression standardized residuals. This figure illustrates that the assumptions of normality and linearity among the residuals have been met.
Figure 6. Cook’s Distance scatterplot by case. This figure illustrates no presence of cases that are overly influential.
Figure 7. The interaction of Perceived Identity Compatibility and Social Support Seeking on Affective Commitment.
Figure 8. The interaction of Perceived Identity Compatibility and Career Adaptability on Affective Commitment.
Appendix A

Demographic Questionnaire

What is your age? __________

What is your gender? _____ Male _____ Female _____ Other

What is your race/ethnicity?
___ Caucasian _____ Native Hawaiian/Pacific Islander _____ Bi-racial/Multi-racial
___ Black/African American _____ Asian _____ Unknown
___ American Indian/Alaskan Native _____ Hispanic/Latin _____ Other

What is your Major? ______________________ Minor/Concentration: __________________

Expected date of graduation: ______________ GPA: __________

Have you completed at least one semester of coursework? ____Yes ____No

What year in school are you?
___ Freshman _____ Sophomore _____ Junior
___ Senior _____ Graduate Level _____ Other

What is your student status? _____ in-state/out-of-state _____ international

Are you currently? _____ part-time student _____ full-time student _____ other

On a scale from 1 (not at all) to 5 (most of the time), how much are you thinking about changing your major? ____

Are you an active member in any of the following:
___ Varsity Athletics _____ Greek Life _____ Society of Women Engineers (SWE)
___ Women at Rensselaer Mentor Program _____ Other (please specify): ______________
Appendix B

Career Commitment Scale (adapted to college majors)

Instructions

Listed below is a series of statements that represent feelings that individuals might have about the major for which they are in. With respect to your own feelings about the particular major you have chosen, please indicate the degree of agreement or disagreement with each statement by circling a number from 1 to 7 using the scale below.

1 = Strongly Disagree
2 = Disagree
3 = Slightly Disagree
4 = Undecided
5 = Slightly Agree
6 = Agree
7 = Strongly Agree

1. My major is important to my self-image. 1 2 3 4 5 6 7
2. I regret having entered my major. 1 2 3 4 5 6 7
3. I am proud to be in my major. 1 2 3 4 5 6 7
4. I dislike my major. 1 2 3 4 5 6 7
5. I do not identify with my major. 1 2 3 4 5 6 7
6. I am enthusiastic about my major. 1 2 3 4 5 6 7
7. I have put too much into my major to consider changing it now. 1 2 3 4 5 6 7
8. Changing majors now would be difficult for me to do. 1 2 3 4 5 6 7
9. Too much of my life would be disrupted if I were to change my major. 1 2 3 4 5 6 7
10. It would be costly for me to change my major now. 1 2 3 4 5 6 7
11. There are no pressures to keep me from changing my major.  
12. Changing majors now would require considerable personal sacrifice.  
13. I believe that people who have taken classes in a major have a responsibility to stay in that major for a reasonable period of time.  
14. I do not feel any obligation to remain in my major.  
15. I feel a responsibility to my major to continue in it.  
16. Even if it were to my advantage, I do not feel that it would be right for me to change my major now.  
17. I would feel guilty if I change my major.  
18. I am in my major because of a sense of loyalty to it.
Different people use different strength to build their careers. No one is good at everything, each of us emphasizes some strengths more than others. Please rate how strongly you have developed each of the following abilities using the scale below.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking about what my future will be like</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realizing that today’s choices shape my future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparing for the future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Becoming aware of the educational and career choices that I must make</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning how to achieve my goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerned about my career</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping upbeat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making decisions by myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking responsibility for my actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sticking up for my beliefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting on myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doing what’s right for me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exploring my surroundings

Looking for opportunities to grow as a person

Investigating options before making a choice

Observing different ways of doing things

Probing deeply into questions I have

Becoming curious about new opportunities

Performing tasks efficiently

Taking care to do things well

Learning new skills

Working up to my ability

Overcoming obstacles

Solving problems
Appendix D

COPE subscales:

Instrumental and Emotional Social Support Seeking

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel, when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by blackening one number on your answer sheet for each, using the response choices listed just below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1 = I usually don’t this at all  □
2 = I do this a little bit       □
3 = I do this a medium amount □
4 = I normally do this a lot

1. I talk to someone who could do something concrete about the problem  1  2  3  4
2. I try to get advice from someone about what to do  1  2  3  4
3. I get sympathy and understanding from someone  1  2  3  4
4. I ask people who have had similar experiences what they did  1  2  3  4
5. I discuss my feelings with someone
6. I try to get emotional support from friends or relatives
7. I talk to someone about how I feel
8. I talk to someone to find out more about the situation
Appendix E

Perceived Identity Between Gender and Major/Career

Directions. Using the scale provided below, please indicate how much you agree or disagree with each of the following statements.

<table>
<thead>
<tr>
<th>1 - Strongly Disagree</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6 - Strongly Agree</th>
</tr>
</thead>
</table>

1. _____ I don’t think that my gender will affect how others view me in my major.
2. _____ I don’t think that my gender will affect how well I do in my major.
3. _____ I think my gender and my major are very compatible.
4. _____ I think I may experience difficulties in my major because of my gender.
5. _____ I think my gender will be an important factor in the type of career I decide to pursue.
6. _____ I don’t think I would pursue certain fields because of my gender.
Directions. Please look carefully at these pictures and then answer the question below. Select one of the 7 pairs of overlapping circles shown below that best represents how compatible you think your two identities are (your gender and your major).

Which of the 7 pictures above best describes how compatible you think your gender is with being in your major? ____