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**THE MODERATING ROLE OF EXPERIENTIAL AVOIDANCE  
BETWEEN CHILD-CAREGIVER DYNAMICS AND STEM MOTIVATION**

by

Dylan L. Harrell, M.S.

A Dissertation in Partial Fulfillment  
of the Requirements of the Degree  
Doctor of Psychology

College of Education

LOUISIANA TECH UNIVERSITY

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LOUISIANA TECH UNIVERSITY

GRADUATE SCHOOL

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**Dylan L. Harrell**

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be accepted in partial fulfillment of the requirements for the degree of

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## **Abstract**

The National Academy of Sciences released a report that discussed the increased need to improve interest and retention of Science, Technology, Engineering, and Math (STEM) careers in the United States. Early childhood factors within one's family plays an essential role in the process of career decision making, self-concept, and vocational identity. The current study examined the relationship experiential avoidance has on early family dynamics (i.e., family environment, differentiation of self, attachment, and perceived parenting) and perceived motivation in STEM. A total of 231 participants currently enrolled in a Southern University taking a STEM course (Psychology, Biology, Social Science, Computer Science, Engineering, Mathematics, Statistics, and Physical Science) were surveyed using online Likert-Type questionnaires. Participants were surveyed to determine the potential moderating role of experiential avoidance on the relation between early family dynamics and STEM motivation. Results indicated evidence that experiential avoidance moderates the relation between avoidant attachment style and perceived parental care on STEM motivation.

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## **Dedication**

This dissertation is dedicated to all those who have supported and loved me along the way. Further, this dissertation is for the past me who did not believe this was possible.

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## **Chapter One:**

### **Introduction**

The National Academy of Sciences (NAS, 2011) released a report that discussed the increased need to improve interest and retention of Science, Technology, Engineering, and Math (STEM) careers in the United States. Women and racial/ethnic minorities make up only a fraction of those currently involved in STEM-related jobs (NAS, 2011).

Further, women and racial/ethnic minorities are less likely to choose STEM majors in college. Even if they decided STEM initially, marginalized individuals are more likely to choose alternative majors later in their academic careers (Griffith, 2010). The NAS (2011) discussed the need to increase STEM career interest earlier in development to improve STEM career interest and retention later. Career interest is a life-long, multi-dimensional process (Super, 1980), and understanding this process about improving STEM career interest involves multiple perspectives.

Many factors are involved in an individual's vocational development and the career decision-making process (Super, 1980). Early childhood factors within one's family plays an essential role in the process of career decision making, self-concept, and vocational identity (Hargrove et al., 2002; Hargrove et al., 2005; Penick & Jepsen, 1992). Family cohesion, conflict, and emphasis on personal growth are involved in the career

decision-making process (Hargrove et al., 2005; Johnson, Buboltz, & Nichols, 1999; Penick & Jepsen, 1992). These early family experiences can be captured by having adults retrospectively examine their family experiences (Moos & Moos, 2009), differentiation of self (Bowen, 1972, 1974), attachment/internal working models (Bowlby, 1969), and perception of their parent's behaviors (Parker, Tupling, & Brown, 1979). These early experiences, especially the insecure and maladaptive ones, can cause distressing emotions (Braunstein-Bercovitz et al., 2012) that often interrupt vocational development or the career decision-making process. Individuals handle these emotions differently. An individual attempting to distance themselves from these distressing emotions is called experiential avoidance (Hayes et al., 1999; Wilson, 2008). Thus, by understanding how an individual avoids the painful emotions stemming from early family dynamics, one might better understand ways to influence career decision making and vocational identity.

One's ability to purposefully and nonjudgmentally pay attention is known as mindfulness (Hayes, Strosahl, & Wilson, 1999). Learning mindfulness skills has been shown to influence academic success and emotion regulation with science and math anxiety (Keye & Pidgeon, 2013). Specifically, developing mindfulness-based skills to handle the stress of academia increased one's overall self-efficacy and resiliency. By increasing one's self-efficacy and resiliency, individuals are more likely to reach graduation (Keye & Pidgeon, 2013). Mindfulness-based learning involves learning more flexibly and accepting distressful emotions (Anglin, Pirson, & Langer, 2008). By introducing mindfulness-based intervention, there is a reduction in the effects of gender on STEM-career. Specifically, women performed just as well as their male counterparts when learning STEM-related material (Anglin et al., 2008). Thus, understanding the role

of experiential avoidance on the relation between family dynamics and STEM-career might lead to interventions that improve the interest and retention of minorities in STEM fields.

This study attempts to examine and further the literature around the role family dynamics, specifically caregiver-child interactions, play in STEM career interest. Further, this study plans to examine the ways in which individuals experientially avoid difficult emotions influences early family dynamics and STEM career interest/motivation. All of these relations are being examined in respect to women within STEM. By attempting to understand the role of child-caregiver interactions, experiential, avoidance and STEM career interest and retention, future researchers might be able to develop interventions that help women enter and succeed in STEM careers.

### **Statement of Problem**

One of the primary national concerns is increasing the number of individuals interested in and entering STEM-related fields as these workers' demand increases (Arcidiacono, Aucejo, & Hotz, 2016; NAS, 2011). Women and racial/ethnic minorities are underrepresented in STEM-related fields, and there is a call to increase diversity within these fields (Arcidiacono et al., 2016; NAS, 2011). Although many initiatives created by universities aim to improve the interest and retention of individuals entering into STEM-related careers, there continues to be ambiguity in the factors that influence interest and retention for minority students. Despite minority students demonstrating similar interest in STEM-related fields as privileged students, there is an apparent discrepancy in minority students from completing their degrees. Thus, attempting to understand early preventative strategies that emphasize later STEM interest and present

moment therapeutic interventions that allow for continued retention in STEM is needed (Arcidiacono et al., 2016).

Many external and internal factors influence adolescents' interest in STEM careers as they are developing (Grossman & Porche, 2014). Middle-school girls report lower confidence in their science-related abilities early in their development. In contrast, racial minorities report more insufficient academic resources or academic support that influence STEM interest (Grossman & Porche, 2014). Brickhouse, Lowery, & Schultz (2000) discuss how receiving systemic messages related to STEM abilities, especially for women, discourages participation in STEM fields. For example, women whose home environment discusses women being unable or unsuitable for the science field drastically decrease STEM interest (Brickhouse et al., 2000). Minorities face negative stereotypes around their identities and report lower interest in STEM fields than those not facing these stereotypes (Grossman & Porche, 2014). Parental care and support provide a buffer for the adverse effects of minority stress (i.e., microaggressions) on STEM career interest. Specifically, adolescents exposed to stereotypes, microaggressions, or barriers to entering into STEM fields are more likely to be persistent and confident enough to persist through their degrees. Family experiences and environments play a critical role in understanding the factors that influence STEM interest. Further, by understanding these family dynamics and their relation to STEM career interest, professionals can develop interventions that improve family dynamics and improve STEM interest (Grossman & Porche, 2014).

## **Justification**

Although there are more women enrolled in a full-time college than men, women make up only a minority in most STEM fields (National Science Foundation, NSF, 2016). Identifying factors that increase women and minorities in STEM fields is an essential desire of our country, given the projected need and desirability for STEM workers (Arcidiacono, Aucejo, & Hotz, 2016; NAS, 2011). Super's developmental theory (1953), Krumboltz (1979), Gottfredson (1981), and Holland (1985) all discussed ways that build an individual's career interests, goals, self-concept, self-efficacy, and vocational identity that link to STEM-career interest. Early family dynamics directly influence these career concepts (Hargrove, Creagh, & Burgess, 2002; Hargrove, Inman, & Crane, 2005; Penick & Jepsen, 1992). The family environment (Moos & Moos, 2009), ways individuals self-differentiate from the family (Bowen, 1972, 1974), internal working models of self-worth/other-trustworthiness (Bowlby, 1969), and perception of their parent's warmth and demandingness (Parker, Tupling, & Brown) all play a role in shaping career development and interest.

Whenever an individual's early family dynamics are problematic, they tend to develop maladaptive reactions, like anxiety. Distressing emotions are among the causal factors between maladaptive family experiences and career exploration (Larson & Wilson, 1998). Individuals struggling with difficult emotions continue to distance themselves from their life values, like their careers (Hayes et al., 1999). Further, individuals who are struggling with difficult emotions are less likely to consult with their family around career-related issues and develop a poorer self-concept, indicating the importance of emotional management (Larson & Wilson, 1998). Thus, understanding

how individuals attempt avoid difficult familial experiences might provide further insight into STEM career interest, such that intervention and prevention strategies can be made to improve women majoring in STEM.

## **Literature Review**

### **Career Theories**

Several career theories relate to early family experiences that eventually influence STEM career interest and potentially retention. The first theory is Super's (1953) developmental career theory. Super's (1953) theory advocates that one's career self-concept develops from external and internal factors like family experiences. Further, Super (1990) discussed critical and formative developmental stages around career development as well as outlined tasks and stages across the lifespan. These factors build into his propositions around career development (Super & Bachrach, 1957; Super, Kowalski, & Gotkin, 1967). Related to self-concept, Holland (1985) developed the concept of vocational identity which is similar to the idea of Super's self-concept. Vocational identity involves developing a clear image of individuals' vocational goals and interests (Holland, Gottfredson, & Power, 1980). Another theory critical to STEM career development is Krumboltz's (1979) social learning theory that advocates that one's learning history has a role in career decision making. Finally, Gottfredson's (1981) theory, indicates that job gender stereotyping (i.e., gender) and prestigiousness of jobs influence or shape an individual's career decision-making.

### **Career Development**

An essential component to understanding career exploration and development is examining career from a lifespan perspective (Brown & Brooks, 1990). Examining one's

career exploration involves understanding an individual's previous experience that shaped their career, current abilities, and future goals and desires. Super (1980) and colleagues (Super & Bachrach, 1957; Super et al., 1967) developed critical propositions that outlined the developmental aspects around self-concept (Super's Archway), vocational development stages, and unique roles (Super's Rainbow).

Super's theory involves various propositions that outline much of career development (Super & Bachrach, 1957; Super et al., 1967). These propositions around career development range from individual, unique components to emphasizing focus and direction in people's lives (Super & Bachrach, 1957; Super et al., 1967). Some of these propositions discuss Super's (1963) archway model of career self-concept. The archway describes that biographical (i.e., family dynamics) and geographical (i.e., social policy) factors that influence the development of one's perception of themselves or self-concept. One's self-concept then leads individuals to make critical decisions around their career (Super, 1963). This journey does not happen overnight, such that individuals are on a lifelong vocational journey (Super, 1990). Vocational identity development undergoes growth, exploration, establishment, maintenance, and disengagement (Super, 1990). Further, as individuals experience these different developmental stages, they also change roles and theaters (Super, 1990). Thus, Super's vocational developmental theory includes many factors that emphasize an individual developing their self-concept which will be implemented in their career decisions.

**Career Propositions.** Super (1953), Bachrach (1957), Kowalski, and Gotkin (1967) discussed fourteen propositions around career development. The first proposition involved individuals being unique within their interests, traits, personalities, needs, and

values. Second, due to everyone's uniqueness, they are qualified to perform different occupations. The third proposition involves that occupations are unique and offer individuals variety and growth within an occupation. The fourth proposition involves individuals within the workspace continuously developing their self-concept through their experiences, but self-concept should have some aspects of continuity in which it is stable. The fifth proposition advocates that understanding career self-concept is a developmental process that goes through distinct stages and cycles. Sixth, an individual's career self-concept is influenced by environmental factors like parental behaviors, social status, income, and community resources. The seventh proposition involves the concept of Career Maturity. Career maturity involves the biopsychosocial and coping aspects towards career (Super, 1953; Super & Bachrach, 1957; Super et al., 1967). For instance, one demonstrating career maturity involves them being able to make concrete decisions around their career, like deciding on their major.

The eighth proposition involves the complexity of career maturity, such that it is a hypothetical construct with a dynamic definition (Super, 1953; Super & Bachrach, 1957; Super et al., 1967). The ninth proposition states career self-concept guides one's career development. The tenth proposition involves the role of synthesis, self-concept, and opportunity for career development. Specifically, as individuals engage in opportunities to grow this information or experience synthesizes with their already developing self-concept. The eleventh proposition advocates that individuals role-playing or being provided feedback shape future behavior, such that feedback is incorporated to the developing self-concept. The twelfth proposition involves individuals' work-related satisfaction, such that individuals require appropriate outlets to express needs, values, or

personality traits to be satisfied. Further, the degree to which individuals are satisfied within their careers directly depends on their ability to implement self-concept. The final proposition emphasizes how work provides a focus for most individuals (Super, 1953; Super & Bachrach, 1957; Super et al., 1967). These propositions offer an overview of Super's (1953; Super & Bachrach, 1957; Super et al., 1967) theory that lays the groundwork towards understanding a holistic view of individuals' vocational development throughout the lifespan. Thus, these propositions are useful in this study to outline the wide variety of components that go into STEM career interest and potential retention theory.

**Super's Archway.** Super's (1963; Brown & Brooks, 1990) Archway model emphasizes and highlights the roles in which biographical and geographical factors influence one's self-concept development. This self-concept will then have importance to career choice because individuals choose jobs that reflect their self-concepts. Super (1963) demonstrated this self-concept pictorially with an actual archway. Specifically, biographical and geographical components make up the foundation that builds the pillars leading into the arch. Once these factors are established, they feed into one's developmental and role history. As individual biographical and geographical factors interact with their developmental history, their self-concept is formed (Super, 1963). Thus, understanding self-concept from the archway perspective requires an individual to break down each of these components.

The left side of the archway involves how psychological factors influence self-concept development like values or personality. Psychological factors also include needs, values, and interests that build into one's personality. Social resources involve the

community, school, family, peer groups building into social policies (Brown & Brooks, 1990; Super, 1963). Personality from Super's perspective involves many components (Brown & Brooks, 1990; Super, 1963). One of the foundations within personality involves how the environment influences needs and intelligence. From the interaction between the environment and conditions, one's values and attitudes are formed. As individuals engage in activities related to their values, they start to develop interests. As individuals continue to practice, partake, and engage in these interests derived from values, they start to develop aptitudes. General aptitude involves having well-developed abilities in things common to many (i.e., math abilities, spatial abilities, etc.). In contrast, special aptitudes involve having capabilities in more specific areas (i.e., clinical, mechanical). Thus, one's personality with respect to their career self-concept development involves how their needs, values, and aptitudes all synthesize together (Brown & Brooks, 1990; Super, 1963).

In contrast, the archway's right side involves how social resources and factors influence self-concept development like economic resources and social policy. Social policy involves all the external and environmental factors that makeup self-concept within career (Brown & Brooks, 1990; Super, 1963). The foundation of social policy involves the ways community, more specifically the economy, influence social policy through community resources and local economy. Beyond the local economy, an individual's social environment within education or family shapes their ideals around careers and their career self-concept. Further, one's peer group and current labor market also fall under the social policy related to self-concept development. Thus, the archway's

social policy side involves all the environmental and external factors involved in career self-concept development (Brown & Brooks, 1990; Super, 1963).

Although Personality and Social Policy are two separate concepts related to career self-concept development, they influence one another (Brown & Brooks, 1990; Super, 1963). One's personality and social policy feed into their developmental stages alongside the roles in which they fulfill. Specifically, the individual condenses all these factors regarding their developmental history to inform the roles and decisions they make about their career self. For example, an individual utilizes their interest and abilities to seek out positions in society and their career (i.e., leadership roles related to interest). Individuals embrace these interest-informed roles across multiple stages in their life which feed into career-decision making via self-concept. Specifically, individuals will perceive their abilities, satisfaction, obligations, and interest throughout their life to make choices regarding career selection (Super, 1963).

**Self-Concept and Family.** Many multi-dimensional factors influence self-concept development, especially one's family (Harter, 1990, 1991; McClun & Merrell, 1998). Specifically, as individuals within a family unit develop and transition between stages, their roles, expectations, interest, and responsibilities change. These various family unit changes influence someone's perception of who they are by providing variety to their everyday lives that reshape how they perceive themselves. For example, a child developing into an adolescent might take more responsibility for their pets, which changes their self-concept to be more nurturing and responsible. Familial involvement might also influence a child's emphasis on academic achievement, which might offer the child opportunities to explore different options that will shape self-concept (Harter, 1990,

1991; McClun & Merrell, 1998). Perceived parenting behaviors also have been shown to influence self-concept indirectly. Specifically, parental warmth and firmness can build an individual's confidence and openness to new experiences. By increasing confidence and openness, individuals are likely to expose themselves to new environments that shape self-concept development (Buri, 1989).

**Vocational Identity.** Holland (1985) emphasized the importance of personality and environment fit concerning career. Specifically, an individual will receive the highest level of satisfaction whenever the environment of their career matches the personality and interest of the individual. Individuals and occupations each makeup specific traits, and the closer an individual's characteristics match the environment's traits; they will be more satisfied in their career. Further, individuals will seek out an environment that allows them to express their identity, interest, and roles (Holland, 1985). One's vocational identity includes developing a clear and consistent idea of one's goals and interests regarding their careers. An individual with a well-developed vocational identity is likely to report lower distress and more confidence in their ability to make decisions around career (Holland, Gottfredson, & Power, 1980). Much like self-concept, experiences and personality form the individual's vocational identity. In contrast to self-concept, vocational identity should remain relatively stable throughout the lifespan (Brown & Brooks, 1990). Thus, having a clear vocational identity alongside a well-developed self-concept will allow for individuals to make more congruent career choices.

**Vocational Development.** There are multiple, dynamic components to the vocational developmental stages and career maturity (Brown & Brooks, 1990). Individuals go through a multitude of lifelong developmental stages around their career

and vocational identity (Super 1990). Career maturity involves how individuals are ready to face these different developmental stages. Specifically, individuals utilize social and biological factors to meet the expectations for these stages. Two primary components of developing career maturity involve affective and cognitive development. For example, someone would need to manage distressing emotions to undergo the complexity of the growth stage. Individuals attempting to examine vocational development need to understand the various stages to be better able to explore career maturity. Specifically, vocational development occurs not solely due to specific activities but also due to the maturity and experience related to that developmental phase. Career maturity within vocational development involves exploring career, consistent interest, matching skills and interest, and showing motivation to the career developmental process (Super, 1994). Vocational development involves five distinct stages: growth, exploration, establishment, maintenance, and disengagement (Super, 1990).

The growth stage of vocational development begins at birth and continues into adolescence (Super, 1990, 1994). A primary component of the growth stage of development involves the child's natural curiosity. Specifically, curiosity leads young children to develop the motivation to ask others for information around vocations. The child chooses to utilize these individuals to satisfy their curiosity and become key figures within their vocational exploration. Further, these important role models often inform the child's self-concept. Specifically, these role models and other key figures are crucial to providing feedback to the individual developing self-concept. Feedback is one of the mechanisms in which all of one's developmental history, biological, and sociological factors synthesize into the self-concept. Thus, vocational development's growth stage's

primary purpose and function involves developing curiosity for a career with two substages that explore curiosity (Super 1990, 1994).

Fantasy, interests, and capacity are all dimensions of the growth stage of vocational development (Super 1990, 1994). During early to middle childhood, children engage in the fantasy dimension. These children engage in imaginary play around careers that are typically unattainable or unrealistic. As children age, they move away from the imaginary substage and into the interest substage. Children are developing more realistic perceptions of career at this substage, but these are based on casual interest and vague ideas. As children enter adolescence, they enter the capacity substage. During this substage, adolescents begin to develop more realistic interests and are more capable of vocalizing how their interests relate to that career (Super 1990, 1994).

As individuals enter late adolescence, they begin to move into the exploration stage of vocational development (Super 1990, 1994). A critical component of the exploration stage involves adolescents implementing decisions around career decision making. Within the exploration stage, the substages are tentative, crystallization, and specification. Tentative involves adolescents engaging in career decision making through their learning, part-time work, observing careers, or volunteering. Engaging in these tentative career explorations, adolescents will start to filter out unattainable or uninteresting careers. As unwanted careers are filtered out, adolescents entering young adulthood begin the crystallization substage. Crystallization involves getting additional resources (i.e., knowledge or specialized skills) to support their career choice. During an individual's late adolescence, they will enter the specialization stage, requiring further

training or determining whether an individual needs to reevaluate their career choices (Super 1990, 1994).

The establishment stage begins around the mid-20s until middle age and involves individuals recognizing their career (Super 1990, 1994). The establishment involves two substages, stabilization and advancement. The beginning of the establishment stage involves trial and stabilization by trying out several jobs within a given career. Once an individual finalizes a specific job, the next critical feature involves advancing to make professional and personal gains. The goal is to advance in a career by demonstrating skills or participation in more specialized training (Super 1990, 1994).

The fourth stage of Super's (1990, 1994) vocational developmental theory involves maintenance. This stage begins after the achievement substage and lasts until one reaches late adulthood. This stage involves professionals maintaining their work efficacy but might experience workplace conflict due to younger workers competing for accomplishment. Due to experience, professionals in the maintenance stage do not need to expend excessive energy in their careers as they did in early stages. Having more energy individuals in the maintenance stage can participate in recreational activities that later inform the disengagement stage.

The final stage involves disengagement in which an individual prepares for retirement to engage in leisure activity. Specifically, professionals begin to transfer their primary work duties to their colleagues or train their replacements. A vital component of the disengagement involves finding meaning in life to replace the time originally fill by career.

**Career Rainbow.** Individuals are at different stages of their career development throughout the lifespan (Super, 1980). Super (1980) utilized a Life-Career Rainbow to depict individuals' roles and stages across their lifespan visually. Super (1980) expanded the original Life-Career Rainbow to address variables that determine career decision making and the original model seemed rigid. Super (1980) discussed how Life-Space, Lifecycles, and Decision Points are involved in the career development process.

Life stages involve the role or roles an individual holds dependent on where they are in their lifespan. Individuals in an earlier stage (i.e., childhood) tend to have fewer roles than later developmental stages (i.e., adulthood; Super, 1980). Individuals will move between different roles throughout the lifespan depending on their current stage: child, student, leisurite, citizen, worker, spouse, homemaker, parent, and pensioner (Super, 1980). However, there are some alternative roles that not all individuals will engage in like worshipper or sibling (Super, 1980). Super (1980) discusses that some roles, like career titles (i.e., engineer), are socially determined. As individuals develop and maintain these roles, they are performed within four primary theaters: the home, the community, the school, and the workplace (Super, 1980). However, just like with roles, there are minor theaters (i.e., Church) that some individuals attend but not all. Further, there are also roles played in multiple theaters like role-playing a parent at home and being a parent in the workplace (Super, 1980). Having one role in multiple theaters can be positive or negative, depending on context (Super, 1980). For example, a worker's role in both the workplace and the home will cause problems for the family unit, but parents being in the workplace might diversify the workplace's perspective. Thus, as individuals develop and experience the world Super (1980) advocated that they are

assigned different roles that interact with the various contexts, or stages, around them that impact their development.

Two primary features of roles involve expectations and performance (Super, 1980). Expectations form from observers' expectations of the individuals and the expectations of the individuals themselves. Performance in roles involves finding satisfaction in the role or shaping the role concerning expectations. However, specific roles might change definitionally because of age, such that the child's role is different at younger ages compared to older ages. Being involved in particular roles allows for individuals to further develop their interest. For example, being in a leisure role or sometimes a child's role will enable individuals to explore things they find exciting, like their interests. In turn, individuals will pursue specific careers that allow for more time to engage in their interests or occupations that resemble their interests. An adolescent might choose a college and a major that resembled one of their club activities because they were interested in it (Super, 1980). For example, a high school student who joined a robot fighting club or coding club might choose a college with a good engineering program. Thus, roles play an essential part in career decision-making because they shape an individual's interest, shaping occupation choice.

### **Social Learning Theory**

Krumboltz (1979) advocated that an individual's learned experiences influence their traits, responses, and occupational understanding/choices. Further, these learned experiences shaping career choice also plays a role in the individual's understanding of what careers would provide satisfaction. Social learning theory focuses on understanding an individual's unique learning history. There are several types of learning that can shape

career decision making. Learning experiences occurring in an individual's environment is not the only factor in developing career decision making. Genetic and individuality also play a critical role in social learning theory. Specifically, the limitations one has biologically can eliminate certain occupations from being able to be chosen. Learning history and genetic factors eventually build into an individual's task approach skills. These task approach skills allow for an individual to engage in career or the career decision-making process. As individuals utilize their task approach skills, they will provide themselves generalized feedback to shape career decision making (Krumboltz, 1979).

There are three types of learning discussed in social learning theory: instrumental, associative, and vicarious (Krumboltz, 1979). Instrumental learning occurs as an individual is reinforced or punished for their behavior or cognitive skills. Associative learning involves learning through neutral events/stimuli pairing with an emotional event/stimulus. For example, an individual can learn aversiveness to hospitals due to losing someone important and transferring those negative emotions to where they died. The final type of learning is vicarious learning. Vicarious learning involves individuals being able to learn from observation of others or different sources (i.e., media, books, etc.). From these various learning types, individuals will evaluate their learning experiences to shape their understanding and decide on their careers. Individuals will reshape their understanding from these learning types through feedback from themselves or from others. These types of learning teach an individual while building task-approach skills (i.e., study habits), self-efficacy, and interest. As individuals express themselves through self-efficacy and interests, they will begin to evaluate components of career. For

example, an individual might try out a sport that they saw on television, practice to build their confidence, and then receive feedback from others to decide whether they should play the sport or not (Krumboltz, 1979).

Tracking one's learning history is complex (Krumboltz, 1979). It is theorized that every individual has a unique learning experience that guides their development and career. Antecedents, overt/covert behavioral responses, and consequences to those behaviors make up instrumental learning. Antecedents include one's genetics, aptitudes, conditions, and task approach skills. Cognitive, emotional, and observable behaviors are all included in the behavior section. Consequences of behavior have various effects, whether immediate or delayed, of the action and their impact on others. Individuals are more likely to repeat behaviors with more favorable outcomes rather than unfavorable outcomes. Associative stimuli can come from the interaction between individuals, media sources, and observation. Although these learning events can avoid undesirable stimuli, individuals can systematically influence their perception by pairing more positive stimuli together. Learning experiences, environmental factors, and genetic endowment can influence task approach skills (Krumboltz, 1979). Specifically, one's learning history and genetic endowment might restrict or enhance opportunities to utilize task approach skills. For example, if an individual has an endowment of lower intelligence, they will automatically be limited from specific experiences and occupations. Thus, genetics and unique predisposed individuality are essential in social learning theory (Krumboltz, 1979).

Although emphasizing external learning events, genetics, and one's unique abilities are critical to career decision making (Krumboltz, 1979). One's genetic

inheritance has the potential to limit specific vocational interests or experiences. One's race, sex, physical disabilities, or appearance can all influence vocational decision-making, and one's genetic inheritance can affect all of these. Social learning theory advocates that individuals with more privileged genetic makeups are exposed to more ideal situations that enhance their career decision making. For example, males are more encouraged to pursue lucrative STEM related careers than their female counterparts. Further, individuals who have a genetic aptitude for multiple factors like intelligence and musical skill will have an advantage for specific areas of career decision making. Genetic endowment can also place limits on an individual. Specifically, specific characteristics and traits make it harder or even impossible to perform specific abilities or occupations. Thus, a social learning theory component involves genetic inheritance, and the ways inheritance influences exposure to different situations and what a person may learn (Krumboltz, 1979).

Environmental conditions include many social and political factors typically outside of the individual's control and may or may not be utilized in career decision making (Krumboltz, 1979). One condition involves the number of job opportunities. Specifically, cultural or even historical factors influence whether specific jobs are available, like being a fisherman is primarily available in coastal areas. Another aspect involves training opportunities. Obtaining occupational training is done through various means, but the quantity and quality of these training opportunities are lower in certain cultures and geographical locations. Social policies influence career decision making. Individuals might be restricted in occupational choice until certain conditions are met or until legislation influences these policies. One concern many individuals base career

decision making on is the rate of return. Income and social rewards from employment vary and are a critical component in one's employment decision. Labor unions also influence career decision making by controlling the number of individuals allowed in a particular field. Physical events like natural disasters often affect economic resources and might influence people staying in a specific occupation. Technological developments and the training needed to operate that technology drastically changes careers and professions. Family resources and the demands of family values influence career occupation, alongside education often received. Thus, environmental conditions, learning history, and generic endowment affect career decision-making by developing task-approach skills (Krumboltz, 1979).

Task approach skills involve standards and values to work performance, habits, processing abilities, and emotional responsiveness (Krumboltz, 1979). Although not completely understood, these task approach skills are components of solving new problems and influence outcomes. Individuals are also able to modify their task approach skills to be more effective and efficient. Task approach skills are simply things that influence outcomes. The ability to recognize important decisions, define tasks, produce accurate self-observation, generating alternatives, gather critical information, determine the reliability of sources and plan/carry out career decisions are some of the most vital tasks (Krumboltz & Baker, 1973). The development of these specific, critical task approach skills depends on the individuals learning experiences. However, if an individual receives a negative evaluation or does not learn these specific skills, they will often engage in alternatives to process their career decision making. Task approach skills are a critical component to making decisions around career. Developing self-observed

and world-view generalizations aid in one's career decision-making development (Krumboltz, 1979).

Self-observation generalizations are how individuals typically evaluate their performance derived from learning experiences (Krumboltz, 1979). Concerning task approach skills, self-observation is an individual's approximation of whether their abilities and interests will measure up to a standard that they created. From these conclusions, an individual can derive the tasks or interests vital to them that stems from learning experiences and are useful in predicting future activity. In contrast, world-view generalizations involve individuals learning from their environment and making predictions around future environments. The accuracy of one's worldview depends upon the experiences and diversity within the evaluative environment. Thus, one's self-observation generalization will help them develop views about their abilities and interests, whereas one's worldview-generalizations will help them predict the ways they will interact in future environments (Krumboltz, 1979).

Social learning theory of career can be utilized in recognizing or examine environments that provide a learning experience to influence career (Krumboltz, 1979). There is no sequence to the social learning theory; instead, this theory advocates many routes to reach career satisfaction. Individuals must be exposed to various learning experiences regarding multiple identities to achieve maximum career satisfaction. A primary outcome of learning experiences related to effective career decision making involves developing self-efficacy. Self-efficacy involves developing a sense that one is capable is a crucial component of career decision making (Krumboltz, 1979).

Family plays a critical role in developing self-efficacy and career decision making (Alliman-Brissett, Turner, & Skovholt, 2004; Bandura et al., 2001). Specifically, familial expectations and parenting behaviors tend to shape the various domains around self-efficacy. For instance, family expectations and support around academics tend to establish a relation between self-efficacy and career choice for their children. Children with parents who support their aspirations build their overall confidence in their abilities to explore. By increasing the willingness to explore and engage in different domains, an individual can increase self-efficacy (Bandura et al., 2001). Parents modeling careers also play a critical role in their adolescent's career decision making (Alliman-Brissett et al., 2004). Children being able to observe or listen to their parents' capabilities within the workplace allows them to establish a more precise image to build self-efficacy. Specifically, observing one's parents engaging in career-related behaviors gives children the capability to examine if they can perform those abilities. This process is similar to children gaining feedback to shape self-efficacy and their career decision-making process (Alliman-Brissett et al., 2004). Thus, there is some evidence to support the family environment and parental behaviors influence Krumboltz's (1979) theory of social learning theory.

### **Circumscription and Compromise**

Self-concept is influenced across the lifespan by messages related to gender and socio-economic status (Gottfredson, 1981). The various ways in which an individual's self-concept goes through stages involve understanding power, accepting gender roles, and orienting unique self. A feature of these stages is learning how jobs are perceived as masculine/feminine and level of prestige. Overall, individuals make career decisions

around their self-concept matching the gender of a job and the prestige rather than interest, self-efficacy, and desire (Gottfredson, 1981).

Critical components are missing in many career theories that involve sex, intelligence, and socio-economic status on career aspirations (Gottfredson, 1981). Gottfredson (1981) explores the role one's perception of self (i.e., self-concept) plays alongside components that build this perception. Specifically, one's values, gender, and social roles lead to their developing self-concept. However, these varying components of self-concept are not always conscious to the individual but unconsciously influence them. Much like Super, Gottfredson (1981) discussed how self-concept components develop across the lifespan.

The starting developmental task involves orienting oneself to size and power, which begins during early childhood (Gottfredson, 1981). Orientation to size and strength involves children starting to understand adulthood (i.e., adults have careers). During middle childhood, children begin to understand the ways gender and sex influence career development during the orientation to sex roles stage. As children enter late childhood, their understanding of social roles and standing becomes more concrete and they develop expectations for their career in the social evaluation stage. Finally, children entering adolescents develop a higher awareness of their internal aspects (i.e., emotions and characteristics) and identities in the orientation to internal/unique self. During the earlier stages of development, children typically report overall positive feelings towards varying careers. However, as children grow, develop, and experience the world, they critically evaluate their compatibility with specific jobs (Gottfredson, 1981).

Children first begin eliminating specific job options based on their perception of jobs inappropriate for specific sexes, called sex type (Gottfredson, 1981). For example, a young male will likely be averse to a working career as a nurse because they view it as a feminine job. The next characteristic that children use to reexamine their occupational choices involves prestige. Specifically, youth will rule out occupations that do not match their perceived level of prestige, especially if they are below their social class. Further, kids at this point will also reject careers that they perceive outside of their ability levels. For example, a child from a high-income family might reject the idea of doing a job considered low prestige like being a fisherman. As children enter adolescence, they begin to turn internally to filter occupations. Specifically, adolescents utilize values and interest to continue eliminating aversive occupations and finalize occupational choice by observing occupation-fit amongst the jobs that were not eliminated due to prestige and sex. As individuals enter the workforce and face a barrier, they are more willing to sacrifice vocational interest than prestige than sex type. Individuals are more likely to sacrifice vocational interest over others due to prestige and sex type resonating closely with their self-concept. Individuals will continue to compromise on their occupation until they report being satisfied in their job, even if this is not supported by their perceived vocational interest (Gottfredson, 1981).

Due to the importance of prestige and sex type, Gottfredson (1981) reports a wide range of occupational imagery perceived as masculine, feminine, high prestige, and low prestige. Further, these different occupations were consistent across demographics and demonstrated a consistent idea of occupational images compared to early childhood, affirming Gottfredson's theory. Thus, a cognitive map that outlined that occupations are

formulated from self-concept specifically related to one's perceived sex type and prestige of each job is essential to understanding career theory (Gottfredson, 1981).

Some of the most prominent role models in an individual's life are their family, especially their parents (Basow & Howe, 1980). Role models greatly shape one's understanding of appropriate careers. Further, it is common that children attempt to model themselves after the parent of the same sex as they are than the opposite sex, especially around career. Specifically, adolescents will absorb the direct and indirect messages around appropriate careers from the same-sex parent. These messages might include information about jobs that are inappropriate or unattainable by people of that sex. We see that females are more influenced by their mothers than males are by their fathers. These messages drive some of the occupation choices late in development and provide evidence that sex type of careers influence career development, as Gottfredson suggested. Thus, family dynamics, especially parental role modeling, are critical to the career decision-making process (Basow & Howe, 1980).

### **Women in STEM**

There are more women enrolled in full-time college than their male counterpart. However, women make up only a minority in most STEM fields (National Science Foundation, NSF, 2016). Women enrolled in STEM are only higher than men in social science majors (54.8%). Otherwise, in degrees related to Economics (31.7%), Computer Science (18.7%), Engineering (20.9%), Mathematics/Statistics (42.4%), and Physical Science (19.3%), women continue to be underrepresented. Further, after graduating, women comprise of around 15% of those involved in science and engineering careers. As women continue to be underrepresented in STEM careers, there are also discrepancies in

the average salary between men and women in these fields. Specifically, for the median salary across all STEM fields, women make around \$66,000 compared to men making around \$90,000. Looking across different occupations, women's median salary is about 81% of what white men make doing the same jobs, such that it is not surprising that this trend continues into STEM fields. Thus, STEM career fields offer a wide variety of economic advantages, and women continue to be underrepresented and underpaid compared to their male counterparts (NSF, 2016).

Women are not only less likely to complete their STEM related degrees than their male counterparts, but struggle completing their STEM degrees than other degrees (Glass et al., 2013). Further, women are less likely to retain in their STEM occupations than men, which is theorized to be a contributing factor to the wage gap between genders in STEM. Regarding retention, women's social obligations around motherhood and being primary caretakers also contribute to their lower retention rates. Further, due to women not being as likely as men to be promoted in STEM careers they are more likely to leave due to dissatisfaction. Women leaving STEM related majors and careers tend to happen earlier in career development than later, most attributed to women needing to meet familial demands. Although there is some data to support that management in STEM fields still hold traditional sexist beliefs that women are less capable than men in STEM abilities, there is no evidence that supports women being less capable. Overall, it appears that not only are women's median salary in STEM fields significantly lower than men, but women also struggle with retention of STEM fields due to familial obligation and dissatisfaction with gendered stereotypes (Glass et al., 2013).

**Gender Inequality.** Women have continuously been placed or have chosen occupations that reflect more social aspects, have been lower-paying, and require less education than men (Capuzzi & Stauffer, 2012). Some examples of these occupations are beauticians or secretary. Further, these occupations are called colloquially “pink collared jobs” and continue to stereotype women in these jobs. For example, individuals might emphasize these jobs over more masculine jobs like STEM (Capuzzi & Stauffer, 2012). Although there has been an overall improvement in Women being better represented in non-pink collared fields, there is still much work to be done, especially in vocations requiring advanced degrees like STEM (Moen, 1992).

The majority of the information around women in the workforce and gender inequality involves White women (NSF, 2016). Specifically, there is evidence that as individuals move farther from privileged identities, they are more discouraged from entering into STEM fields. For example, Black women make up only 1-5% of STEM-related majors (NSF, 2016). Thus, there is a need for continued understanding and research within women of all identities and STEM to increase representation.

Several initiatives have been made, targeting the wage gap between women and men (Collins, 2009; Esmaili, 2007). The Equal Pay Act (EPA, Esmaili, 2007), the Equal Employment Opportunity Commission (EEOC, Collins, 2009; Esmaili, 2007), and the Lilly Ledbetter Fair Pay Act (Equal Employment Opportunity Commission, 2013) all have been critical in aiding in reducing the wage gap between genders. The Equal Pay Act of 1963 enacted federal laws prohibiting discrimination of wages based on gender (Esmaili, 2007). Further, as civil rights movements progressed, the EEOC was enacted to ensure that these federal laws and guidelines were followed and enforced. In more

modern times, the Lily Ledbetter Fair Pay Act was signed that overturned a Supreme Court ruling that limits how long individuals have to file against discriminatory behaviors (Equal Employment Opportunity Commission, 2013). However, even with these protections and initiatives, there is still discrimination and oppression of women in the workforce.

**Sexism in Career.** Different forms of sexism can happen in the workforce, hostile and benevolent (Glick & Fisk, 1996; 2001). Hostile sexism refers to how someone non-male-identified is portrayed negatively, which results in a threatening workplace atmosphere. Some ways hostile sexism appears in the workplace is through policies that place women at a disadvantage, sexual phrases towards women, sexual behaviors towards women, or inferiorness in women. Benevolent sexism refers to the ways individuals treat women as things that need protection or admiration from men. Although on the surface, benevolent sexism appears unproblematic, however, benevolent sexism fosters subtler forms of prejudice. These subtle forms of sexism still allow and advocate for stereotyped traditional roles and an imbalance of power between men and women (Glick & Fisk, 1996; 2001). A byproduct of benevolent sexism is proxy privilege. Proxy privilege refers to how privileged White, straight, cisgender men of power have a duty to be gatekeepers in giving and taking away minority groups' power. For instance, a man might choose to give a woman power and then not allow them access to that power. Benevolent sexism enables for women who seek out their power to be treated poorly because they are not allowing someone to give them that power (Liu, 2017).

Even before the workplace, women seeking STEM careers and enrolled in STEM majors are likely to experience bias and discrimination (Glick & Fisk, 1996;

2001). Specifically, spotlighting refers to how women are signaled out and made to feel distressed in school. The first form of spotlighting involves overt hostile sexism, where females students are explicitly told and sent inappropriate materials. Although overt, hostile sexism is reported to be lower in STEM programs than in the past, women still suffer from its effects today. Another type of sexism in STEM programs is covert, hostile sexism. Covert, hostile sexism involves men unintentionally and sometimes unconsciously sending direct messages around women not being welcomed in STEM fields. For example, this might appear as professors only using masculine language, not having professional woman role models, or only providing male-dominated examples. The final way sexism appears in STEM fields involves how women are singled out that make them feel unwanted through benevolent sexism. Benevolent sexism appears as males in STEM, believing that women will struggle with STEM classes and need protection or additional guidance. Specifically, women feel unwanted or disheartened by their male colleagues believing they need additional help and this is considered one of the primary barriers to women being involved in STEM today (Glick & Fisk, 1996; 2001). Thus, sexism in STEM-related majors has changed over time but still exists today; this sexism prevents women from developing interest and retention in STEM majors.

### **Family Dynamics**

Families have a complex, dynamic interaction that influence many domains of the developing person (Merz et al., 2009; Merz, Schulze, & Schuengel, 2010; Thomas, Liu, & Umberson, 2017). Specifically, individuals in a family have complex marital histories, different interpersonal relationships with their children, external pressure, and many obligations while relying on the social support that comes from family (Thomas et al.,

2017). Despite the complexity, the family becomes increasingly essential as individuals age due to their influence on psychological wellbeing. However, a poorly established family environment or children with maladaptive issues harms wellbeing. Family environment and dynamics not only affect psychological wellbeing (Thomas et al., 2017) but also a variety of other domains like cognitive abilities (Bullock & Pennington, 1988), self-esteem (Holdnack, 1992), attachment (Kennedy), career indecision, vocational identity, self-concept (Moos & Moos, 2009), and leisure activities (Cassidy, 2005). Thus, the family is an essential factor in a wide variety of domains of life and understanding the different ways family dynamics interact are crucial.

There are many perspectives that can be taken when attempting to understand family dynamics (Bowen, 1976; Minuchin, 1974). One view involves attempting to understand the family from a structural approach or understanding the relations between the parts and the whole family (Minuchin, 1974). Minuchin (1974) discusses three dimensions to understanding family dynamics: boundary, alliance, and power. Boundary refers to the rules that dictate who and how an individual participates in the family. These boundaries also influence the quantity and quality of the interactions between family members. Alliance refers to how members of a family attempt to connect or disconnect from one another. Due to the complexity of families, these varying connections and disconnections form different family relations. For example, two members of a family might triangulate on a third member. Power involves the influence each family member holds, such that each family member can hold power or only one member can. The structural family's goal is to balance power across family members equally. Structural family advocates that healthy families are high on alliance while minimizing power

differentials and supportive boundaries (Minuchin, 1974). Healthier familial environments tend to support more commitment to the roles individuals participate in throughout the lifespan. Specifically, individuals who have supportive and healthier family environments are more willing to explore roles to commit to than those who come from unhealthy families. Further, healthy family interactions support and facilitate vocational identity development (Jowdy, 1994). However, too stringent boundaries within the family unit will prevent adolescents from exploring alternatives and impede them in making healthy vocational decisions (Bratcher, 1982)

In contrast to structural therapy, family systems theory involves understanding the family regarding everyone's specific function (Bowen, 1976). Bowen theory argues that the family is an emotional unit and it attempts to understand the complex family system. Specifically, members of a family are emotional beings that influence one another, and it is important to examine the ways in which family members influence the larger family system. There are several components to family system theory: triangles, nuclear family emotional process, family projection process, differentiation of self, multigenerational transmission, and emotional cutoff. Triangles refer to two members working together while isolating a third member. By triangulating onto the third member, there is an increase in family tension. The nuclear family process involves how the family attempts to solve family conflicts. For example, individuals might distance themselves emotionally from one another when tension arises. The family projection process refers to how parents try to transmit their issues onto their children. For example, an anxious parent might unconsciously transmit symptoms of anxiety to their children. Differentiation of self (discussed later) describes how individuals attempt to be their own

person outside of their family, as well as individuate within the family. Multigenerational transmission involves the ways emotions previously influenced the family throughout the family history. Emotional cutoff involves the tactics individuals attempt to use to deal with unresolved familial issues (Bowen, 1976).

Through providing learning experiences (Krumboltz, 1979) and sex type messages (Gottfredson, 1981), families have been shown to influence career development. Family cohesion and expressiveness have been necessary for the development of vocational identity. Specifically, more expressive families aided in an individual's willingness to explore and commit to specific vocational ideas. Further, a vital component of obtaining vocational identity involves a healthy separation from family that still allows for support and autonomy (Penick & Jepsen, 1992). Family closeness also limits the family's anxiety, which later minimizes anxiety during career decision-making for the adolescent (Larson & Wilson, 1998). Moos & Moos (2009) examined the family environment system to develop and describe the variety of components that make up family environments.,

### **Family Environment System**

Early childhood family environment is critical for developing children (Moos & Moos, 1976, 2009). Moos and Moos (2009) discussed understanding the family environment involves perceiving their actual, preferred, and expected family environment. The real family environment involves understanding the current perception of the family. The preferred or ideal family environment involves understanding what family characteristics one would prefer. The expected family involves the perception of what someone hopes they will be. The caregivers' characteristics/coping, children's

characteristics/coping, and conflict with the family all feed into the family environment's development, influencing an individual's development. The Family Environment involves three primary dimensions: relationships, personal growth, and systems maintenance (Moos & Moos, 1976, 2009). The relationship and system maintenance dimensions examine the internal functioning of the family. In contrast, the personal growth dimension reflects the family and social context (Moos & Moos, 2009).

The relationship dimension examines the family's overall cohesion, expressiveness, and conflict (Moos & Moos, 1976, 2009). Cohesion refers to how family members express warmth, support, concern, and commitment to one another. Cohesion in the family looks like members helping each other out in need or providing verbal/physical support. Family cohesion has been shown to influence cognitive development, temperament, self-esteem, attachment, coping, and career-decision making (Moos & Moos, 2009). Expressiveness involves how family members express emotions, encourage expression, and offer encouragement. Expressiveness involves family members feeling comfortable enough to discuss individual or family issues. Familial expressiveness has been shown to influence cognitive development, self-esteem, attachment, and anxiety (Moos & Moos, 2009). Conflict involves how family members express anger or aggression between each other that causes tension in the family unit (Fowler, 1981; Moos & Moos, 2009). Conflict operates poorly in the family environment, such that high conflict looks like family members disengage from one another. Familial conflict has been shown to influence social networks, coping skills, anxiety symptoms, substance use, and sexual deviance (Moos & Moos, 2009).

The personal growth dimension involves the family's independence, achievement orientation, intellectual-cultural orientation, active recreational orientation, and moral-religious emphasis (Fowler, 1981; Moos & Moos, 2009). Independence refers to how family members assert self-sufficient behaviors, make individual decisions, or be assertive. Independence operates as families supporting their members to be individuals and not be fully fused with the family. Personal independence has been shown to influence an individual's temperament, self-esteem, college adjustment, autonomy, life transitions, and anxiety (Moos & Moos, 2009). Achievement orientation involves how different activities are either competitive or achievement-oriented. Achievement orientation involves family members advocating for success or competing for success amongst family members. The intellectual-cultural orientation is how social, intellectual, cultural, and political activities are important to the family unit. The intellectual-cultural orientation operates by family members engaging in conversation or activities that promote culture or politics. An orientation with an intellectual-cultural focus influences an individual's cognitive abilities, temperament, attachment, leisure, and motivation in academics (Moos & Moos, 2009). The active recreational orientation involves how families take part in activities of leisure or recreation. The active-recreation orientation operates in the family by members choosing to engage in leisure activities like inviting friends for dinner, family vacations, or playing sports. Orientation to recreations influences temperament, self-esteem, attachment, friendship, social networks, and preferred leisure activities (Moos & Moos, 2009). The moral-religious emphasis involves how family members include or incorporate religious or ethical values (Fowler, 1981; Moos & Moos, 2009). The moral-religious orientation develops by family members

communicating what is right and wrong or family members engaging in spiritual activities like going to church. Orientation toward moral or religious ideals within the family influences self-esteem, substance use, and sexual deviance (Moos & Moos, 2009).

The system maintenance dimensions involve organization and control (Fowler, 1981; Moos & Moos, 2009). Organization involves how the family utilizes order when structuring aspects of their life, like family responsibilities. The organization dimension operates in the family by determining roles, obligations, and expectations between members. Organizations within the family unit have been shown to influence temperament, self-esteem, attachment, coping skills, academic motivation, and career decision-making. Control involves how the family is a hierarchy and how family members order one another (Fowler, 1981; Moos & Moos, 2009). Control in the family operates by establishing boundaries and power between family members. Familial control has been shown to influence attachment, coping skills, anxiety symptoms, deviant behavior, and independence (Moos & Moos, 2009).

**Family Environment and Career.** Family environments influence vocational decision-making and career identities (Hargrove et al., 2002; Hargrove et al., 2005; Penick & Jepsen, 1992). Specifically, family cohesion and expressiveness are directly related to vocational decision-making, self-concept development, vocational planning, and interests (Hargrove et al., 2005). Family cohesion and expressiveness promote adolescents to be more explorative developing careers through confidence (Hargrove et al., 2005; Johnson, Buboltz, & Nichols, 1999; Penick & Jepsen, 1992). Supportive familial interactions like familial cohesion, familial expressiveness, and inversely familial conflict build the confidence youths need to make career decisions regarding their

developmental period. Individuals will also internalize the messages their family members express around career, such that these messages will contribute to their identity and vocational goals. For example, families may openly express their career self-efficacy allowing children to build confidence in their abilities to help with vocational goal building. However, inappropriate or discouraging familial messages can distance individuals from making vocational goals (Hargrove et al., 2005; Johnson et al., 1999; Penick & Jepsen, 1992).

How family members organize their dynamics inform their vocational identity. Specifically, families teach their youths to organize or limit themselves in their career abilities, interest, and developmental tasks. For example, families high on control might limit individuals from building the autonomy needed to make career-decisions. Families that are also supportive and loving provide the environment needed for vocational identity development. Specifically, supportive families provide the confidence children need in order to explore vocational alternatives. These supportive cohesive families advocate for developing autonomy, allowing for a stable image to be created (Puffer, 1998). Further, families that are also expressive about family dynamics, emotions, and career expectations assist in developing vocational identity of the children. By being expressive and allowing conversations, individuals are more open to discussing vocational interests and ideas within their families. There is an increase in vocational identity development through expressive exchanges (Johnson, Buboltz, & Nichols, 1999). Although family cohesiveness and expressiveness influence vocational interest, familial control and organization do not play a large role (Hargrove et al., 2005). Thus, familial

organization and control might shape how individuals in small ways approach the exploration process (Parker and Jepsen, 1992).

Personal growth also plays a critical role in the career decision-making process (Hargrove et al., 2002; Whiston & Keller, 2004). Personal growth variables are shown to be related to one's career self-efficacy. Family environments that expose children to various cultural, intellectual, and relationships tend to increase an individual's self-efficacy. Specifically, families that encouraged healthy doses of competition are more likely to help their children develop a clearer vocational identity because it aids in exploration. Further, families that emphasize academics encourage their children to engage in career exploration earlier than their peers. Engaging in earlier career exploration creates career goals, and having these goals motivates students improve their academic performance (Hargrove et al., 2002). Familial focus on intellectual and cultural experiences increases the likelihood of adolescents being exposed to events that aide in the development of self-concept and self-efficacy. Intellectual-cultural experiences likely allow an individual to hold a clearer and accurate idea of their abilities to make career decisions that reflect their goals (Hargrove et al., 2002). However, individuals who have high levels of independence from one's family seem to inversely affect their self-efficacious attitude towards career orientation (Whiston & Keller, 2004). It appears that students who perceived parents as overcontrolling and their family environment as more organized did not require as much support in the career decision-making process as disorganized families. Further, women approach career conflict more openly and feel less confused about making these decisions than men with higher perceived control (Whiston & Keller, 2004). Thus, continuing the evidence that complete independence from family

causes problems between family and career development, whereas some autonomy and differentiation are healthy (Hargrove et al., 2002).

Career expectations and aspirations are influenced by family dynamics (Schulenber, Vondracek, & Crouter, 1984). Well-resourced families are more likely to be able to provide opportunities to their children that builds self-efficacy around career decision making. For instance, children and adolescents who believe they will not have the resources to succeed in a particular career will be discouraged from committing to that career. Family support also builds career self-efficacy, such that supportive parent-child interactions builds the child's overall confidence and self-efficacy. Children with higher levels of confidence and self-efficacy are more willing to engage in the career decision making process. Whereas, family and friends being unsupportive of one's career expectations tend to discourage a child's career aspirations (Schulenber et al., 1984).

Hargrove et al. (2005) and Kerpelman & Schvaneveldt (1999) discussed many gendered factors between family environment and vocational interest. Parents with more progressive, flexible views on gender are more likely not to enforce sextyped roles on their children's career decision making. Females were more likely to engage in vocational planning (i.e., entering workforce during adolescence) than males because females were allowed to be more expressive around career as they were developing, increasing later vocational planning. Females orientation to vocational planning might be due to their more developed interest in various intellectual and cultural activities. Alongside a more sophisticated interest developmental process females recognized the role values played in career-decision making. However, females also viewed their family environments as more expressive angrily and filled with conflict which typically decreases the career

development process. Potentially, this family conflict enables females to further differentiate from the family enough to make more autonomous career decisions (Hargrove et al., 2005). Thus, a deeper examination of family environments influence on career decision making, self-efficacy, and self-concept development while accounting for gender differences is needed.

### **Differentiation of Self**

An individual's capabilities within a family system to make decisions while advocating for their thoughts or values with minimal external influence is known as differentiation of self (Bowen, 1972, 1974). The process of an individual becoming differentiated from their primary caregiver involves distancing themselves socially, emotionally, and physically. Developmentally, children should be highly dependent upon their families early in life. However, as children grow and develop, they become more independent and complex individuals who can differentiate from their family. Specifically, differentiating from the family involves children asserting their personalities, values, and ideas into the family unit without being dependent on them. Although children can be independent and become more differentiated, they must remain connected within the family unit. Healthy differentiation of self appears as someone who advocates their own emotions or opinions without their family controlling or influencing them. Further, individuals capable of advocating for their own emotions without familial involvement tend to understand their emotions more clearly (Bowen, 1972, 1974).

Individuals with high self-differentiation from their families will seek a balance between family opinions and their desires (Bowen 1972, 1974). Specifically, differentiated individuals might seek guidance from family members but not be overly

reliant or dependent upon the family unit. Bowen (1972, 1974) advocated that individuals highly dependent would be termed fused. Fused individuals are often driven by anxiety, such that they are in constant conflict between their own and their family's desires. One-way fused individuals might manage their internal conflicts and anxieties is by sacrificing themselves and overindulging their interpersonal relationships. Specifically, these individuals will place their anxieties on others by being overly-fused with them and being unable to separate. Unfused or differentiated individuals are more flexible and able to manage their distress while freely pursuing desires. Self-differentiated individuals pursue their goals unburdened by others and are confident enough not to withdraw from criticisms. Further, self-differentiated individuals have the capabilities to request help from others while maintaining independence and autonomy. In contrast, fused individuals cannot request help from others without requiring others to make choices for them. A significant component of differentiating from one's family involves developing a concrete vocational identity alongside making decisions around their careers (Bowen 1972, 1974).

**Identity Development.** James Marcia (1966) expanded upon the original conceptualizations of identity development (Erikson, 1968). Specifically, this expansion involved identifying the dimensions to identity development: in-depth exploration and commitment. Identity "crisis" refers to how someone would be willing to deeply explore different identity domains like religion, vocation, and politics. In contrast, commitment involves the perceived level of commitment to a particular ideology (Marcia, 1966). Based on varying levels of commitment and in-depth exploration, there are four identity statuses: identity achievement, identity diffusion, identity moratorium, and identity

foreclosure (Bosma & Kunnen, 2001; Marcia, 1966; Meeus, 2011). Those with identity achievement status have explored alternatives and committed to those alternatives. Being identity achieved involves feeling clarity around one's self and typically is a sign of healthy development. In contrast, identity diffused individuals are not willing to explore alternatives nor committed to any identity. Diffused individuals are likely to be characterized as being lost and unengaged with any sense of self. Foreclosed individuals are likely to be committed to an identity without ever exploring alternatives. These individuals might appear uncertain or unhappy about their identities but continue to commit to it anyway. The final identity status involves exploring alternatives but never committing to any identities. These individuals would most likely be considered highly uncertain in their life while floating between different ideas (Bosma & Kunnen, 2001; Marcia, 1966; Meeus, 2011)

**Differentiation of Self and Career.** Differentiation of self relates to career and career decision making (Johnson et al., 2014; Kinnier et al., 1990; Zingaro, 1983). Further, individuals differentiating from self occurs developmentally around the same time as career decision making. Developmentally, individuals attempt to express their autonomy and themselves in their early adulthood, which is when major career decisions need to be made. As such, college-aged students are in a critical place where they differentiate away from family while attempting to figure out vocational issues (Lawson, Gaushell, & Karst, 1993). Individuals who were not fused or had high differentiation of self were more likely to form stronger vocational identities. Specifically, individuals who can express themselves and set boundaries with their family members are more likely to explore options that influence vocational identity. In contrast, fused individuals hold

weaker identities due to the inability to separate familial expectations (Johnson et al., 2014; Kinnier et al., 1990; Lopez, 1989). Specifically, because individuals cannot assert their authority in the family unit, they are more likely to follow the family's desires rather than their vocational desires. A weak vocational identity and a fused differentiation make career decision making more challenging. Specifically, fused individuals will struggle to make career decisions because they will be torn between their desires and meeting family expectations (Johnson et al., 2014). Individuals with low self-differentiation tend to have more career decision-making issues than others (Zingaro, 1983). Examining vocational identity status and differentiation of self illuminates the influencing effects of differentiation of self. Fused individuals are more likely to be in foreclosed identity status with a career (Nauta & Kahn, 2007). Specifically, fused individuals are overly involved with their families, such that they reject exploring alternatives other than their family's narrative. Family messages for the foreclosed individuals will discourage individuals from exploring alternatives in a career, which in turn keeps them in the foreclosed status (Nauta & Kahn, 2007).

One-way low differentiation of self influences career decision making is through familial messages. The family's messages around a member individualizing and what they individualize in (i.e., career) influences career exploration, career decision-making, and self-concept. Specifically, messages might promote distress or discouragement within the individual that prevents career exploration and decision making (Hargrove et al., 2002). These problematic family experiences cause distressing emotions, like anxiety, that influence the relation between differentiation of self and career (Larson & Wilson, 1998). Specifically, anxiety was shown to mediate, or explain, the relation between

differentiation and career, such that how someone handles anxious emotions influences these relations. Undifferentiated, anxious individuals are too busy handling their distress that they cannot focus on career development and decision making (Larson & Wilson, 1998).

Several reasons within the family continue the cycle of self-differentiation influencing vocational development (Bratcher, 1982). Boundaries, rules, and familial values all play a roll in the differentiation of self and vocational development. Families with inflexible and inappropriate boundaries within the family unit further fuse adolescents to their families. As individuals continue to fuse to their families due to poor boundaries, they become less able to make career-decisions based on poorly developed self-concept. Specifically, these adolescents will continue to make career decision based on family expectations rather than their desires. Family enforcing conformity with these boundaries and expectation will further fuse adolescents to the family. The need to conform to the family conflicting with the desires of the individual will stimulate distressing emotions. Unable to manage the distressing emotions from poor self-differentiation and society continue to demand decisions in career, individuals will rely on the family to make those choices. Fully fused adolescents become over-reliant on their family needing the family to continue making career decisions for them. Typically, psychological interventions are needed to increase the individual's self-differentiation to make or explore careers (Bratcher, 1982).

### **Attachment**

In simple terms, attachment is the emotional bond between a child and their guardian(s) formed from their dynamic, dyadic interaction (Bowlby, 1969, 1973, 1980).

Bowlby proposed that as individuals develop, they begin to formulate cognitive representations of self-worth and other-trustworthiness originating from child-guardian attachment. Bowlby named these cognitive representations as internal working models (IWM) of attachment. Theories of human attachment and internal working models originated from observing animals' behaviors (Bowlby, 1969).

Attachment theory originates from observations made from animals' imprinting and comfort-seeking behaviors (Harlow & Zimmermann, 1959; Lorenz, 1935, as cited in Bowlby, 1969). Bowlby (1969) developed ideas about how attachment theory occurs in human infants. Further, experiments were formed to understand infants' proximity and comfort-seeking with their maternal caregivers (Ainsworth & Bell, 1970; Main & Solomon, 1990, as cited in Berk, 2014). These experiments built the foundations for the cognitive representations for self and other worthiness (Bartholomew and Horowitz, 1991).

**Historical foundations.** Lorenz (1935, as cited in Bowlby, 1969) proposed animals, like ducklings and goslings, have a biological predisposition to develop an intense emotional bond with something that represents safety. This process of developing bonds and emulating characteristics of the attached object is known as imprinting (Lorenz, 1935, as cited in Bowlby, 1969). Lorenz observed that newborn animals would instinctually follow the first object that moved, indicating an intense bond between the newborns and the object followed. Lorenz utilized himself and alternative objects (balloons, cardboard, etc.) in several experiments to emulate a “mother” and demonstrate imprinting behaviors. Lorenz’s research sparked the desire to understand if humans would engage in imprinting behaviors if humans, like other mammals. Lorenz’s results

and the desire to understand human imprinting behaviors were critical to understanding the importance of attachment in animals and humans.

Harlow and Zimmermann (1959) furthered the understanding of the role attachment plays in animal behavior, and their research-informed attachment theory. Harlow and Zimmermann's experiment exposed baby monkeys to a cloth monkey or a wired monkey that produced milk. Specifically, Harlow and Zimmermann wanted to understand if baby monkeys would spend more time with the cloth monkey that represented comfort or spends more time with the wired monkey that produced food. On average, the baby monkeys spent more time with the cloth monkey than the wire monkey (Harlow & Zimmermann, 1959). Harlow and Zimmermann placed baby monkeys in an unknown or threatening situation. The monkeys sought comfort from the cloth monkey. These results demonstrate an animal's preference for something that provides comfort and warmth over something that provides nourishment (Harlow & Zimmermann, 1959). Thus, Bowlby (1969, 1973, 1980) utilized these works on animal imprinting behavior to formulate his attachment theory regarding humans.

**Original Theory.** Bowlby (1969) proposed eight primary tenets to imprinting behaviors in humans. The first tenet involves infants slowly discriminating stimulus arousal to specific attached individuals. The next tenet Bowlby suggests, human infants will eventually hold a bias to respond to particular stimuli over others. The third tenet involves the ways infants develop a stronger bond with those they spend more time together. The fourth tenet involves infants discriminating between familiar faces and unfamiliar faces. The fifth tenet advocates a sensitive period within the first year where infants develop an attachment with a guardian. The sixth tenet argues that the sensitive

period in forming an attachment happens several weeks after birth. The seventh tenet involves infants having a fear response to strangers after attachment has occurred. The final tenet involves infants who develop attachments and tend to demonstrate a consistent preference to the attached individual. Thus, Bowlby's tenets explore the overarching principles of human attachment that provide a general guideline to infantile attachment, and Bowlby outlines the developmental sequence to attachment between child and caregiver (Bowlby, 1969, 1973, 1980).

Bowlby (1969) discussed four phases in which infants and their caregivers develop an attachment. The first phase of developing attachment involves the newborn starting to discriminate between familiar and unfamiliar individuals. Still, due to underdeveloped auditory and visual capabilities, the infant struggles with this fundamental discrimination. The second phase involves infants being able to discriminate prominent individuals more actively in the environment, particularly one or two key figures. The third phase consists of the infant beginning to develop the capabilities to respond to their primary caregivers. Infants start to utilize caregivers as a secure base to explore unfamiliar environments. The fourth and final phase involves the infant-caregiver developing a more reciprocal relationship in which they influence one another. By continuing to have a directional, dynamic relationship the attachment between caregiver-infant continues to grow. Bowlby (1969) discussed head-turning, reflexes, orientation behaviors, and smiling as all potential infant-caregiver attachment indicators. However, Bowlby was not the only individual attempting to understand infant-caregiver attachment behaviors.

**Ainsworth Strange Situation.** Ainsworth and Bell (1970) experimented to understand different forms of attachment known as the strange situation. In this experiment, Ainsworth and Bell had mothers with one-year-olds come into a strange room filled with various toys. They would give the mother and infant several minutes to adjust before having a stranger enter the room and attempt to engage with the infant. They then asked the mother to leave the room and had the stranger continue interacting with the kid until they had the mother return. Ainsworth and Bell measured exploratory behaviors, crying behaviors, searching behaviors during separation, proximity-seeking behaviors, and resisting behaviors to measure attachment. One key finding of this research demonstrated proximity related to the attached object (the mother), such that the infant who demonstrates strong attachment would utilize the mother as a secure base to explore their surroundings. The reaction of the infant upon being separated from the mother and the infant's reaction upon reunification.

Based on the infant's proximity and contact behaviors, Ainsworth and Bell (1970) discussed three primary attachment styles: secure, insecure-anxious, insecure-avoidant. Secure infants appeared distressed upon being separated from their maternal caregivers. However, they were consolable upon reunification. Insecure-anxious infants were distressed upon being separated from their caregiver and remained inconsolable. Insecure-avoidant infants appeared ambivalent to the caregiver leaving and during the reunification process (Ainsworth & Bell, 1970). After Ainsworth & Bell's research, Main & Solomon (1990, as cited in Berk, 2014) discuss infants who demonstrated disorganized attachment. Specifically, these infants appeared almost fearful of their caregivers and behaved contradictory upon reunification. Thus, Ainsworth and Bell (1970) and later

researchers demonstrated observable attachment theory behaviors that highlighted different categories to attachment to understand the role of attachment in development.

### **Internal Working Model**

Bowlby (1969, 1973, 1980) discussed that attachment is the emotional bond between infant-caregiver, whereas internal working models are the cognitive road maps representing an individual's interactions in interpersonal relationships. Specifically, Bowlby discusses these cognitive road maps having two components: a model of self and a model of others (Bowlby 1969, 1973, 1980).

The model of self characteristics involves perceiving an individual's worth of love, especially from their primary caregivers (Bowlby, 1969). A primary component to the development of one's model of self involves their sense of agency. Infants and young children's sense of agency stems from situations during childhood that allow them to control the environment. Specifically, exercising control over one's environment builds the cognitive representation that an individual is worthy because they have power. For example, an infant whose cries change the caregiver's behavior provides the infant with the narrative they are important enough to change the environment. A negative model refers to an anxious dimension of attachment. Individuals with high attachment anxiety tend to struggle with validating themselves and rely on intimate partner validation (Bowlby, 1969, 1973).

In contrast, others' models' characteristics involve the perception of others' trustworthiness (Bowlby, 1969, 1973). A primary component to developing one's model of other starts with the trust between the caregiver and the child. Specifically, as a caregiver provides or does not provide for the child's basic needs, their trust that others

will be there for their basic needs develops. Whenever a caregiver does not provide for one's basic needs, children learn to dismiss or become fearful of others. For example, an infant in distress with unmet needs will develop a sense of rejection and distress due to that rejection. Developing a negative model of others tends to emphasize avoiding interpersonal relationships and intimacies. Thus, an individual's internal working model of attachment is measured by understanding their levels of anxiousness and avoidance in their attachment models (Bowlby, 1969, 1973).

Bartholomew and Horowitz (1991) discussed how attachment styles in childhood mature over time and become cognitive representations that activate during interpersonal interactions. Depending on one's anxiety and avoidance levels determines which of the internal working models they fall under secure, dismissing, preoccupied, and fearful. An individual who has low anxiety and avoidance has secure internal working models, such that secure relationships involve reciprocal communication, appropriate boundaries, and trust between partners. An individual with low anxiety but high avoidance has dismissive internal working models, such that they avoid their interpersonal relationships, have unclear communication, and often invalidate their partners. An individual with high anxiety but low avoidance is considered to have preoccupied internal working models. They are anxious in interpersonal relationships, appear needy, and are typically overly emotional. An individual with high anxiety and avoidance has fearful internal working models. They sabotage relationships due to their craving love but rejecting intimate relationships for fear of isolation. Thus, individuals have complex interpersonal histories that informed their cognitive representations of self and others that continue to evolve today (Bartholomew and Horowitz, 1991).

**Role of Attachment and IWM.** Since establishing the theoretical foundation to attachment and internal working model theory, research into an attachment on different areas like relationships, career, identity, and behavioral issues has begun. One of the main factors influenced by attachment models in romantic relationships (Li & Chan, 2012). Specifically, Li and Chan discussed how insecure attachment models, anxiety, and avoidance had been shown to have detrimental effects on relationships. Avoidance shows a stronger effect on relationship satisfaction, such that individuals with dismissive partners tend to report lower relationship satisfaction. Surprisingly, anxiety did not show any influence on the connectedness between partners. Li and Chan discussed anxiety's intense need for connection alongside their fear of being rejected for their intensity creates a balancing effect on connectedness. Those with a preoccupied internal working model typically causes distress in their interpersonal relationships due to more conflicts between partners (Li & Chan, 2012).

**Attachment and career.** Attachment has a relevant and unexpected role in career exploration (Blustein, Prezioso, & Schultheiss, 1995; Ketterson & Blustein, 1997). Ketterson and Blustein (1995, 1997) discuss the importance of secure attachment and internal working models within career development regarding exploration, satisfaction, and work mastery. These relations between attachment and career development stem from the early, healthy experiences of childhood-parent interactions. Exposure to parents' connection with their careers during these formative attachment stages informs later career development. For example, children with a stronger attachment to their parents observe their parents' work behaviors and report higher levels of career mastery themselves later in development (i.e., concentration at work). The consensus involves that

those highly and securely attached to their primary caregivers are more willing to explore career options. College students were more likely to explore riskier career options than their insecurely attached peers. Specifically, securely attached individuals have a safe base to return to if something happens when taking career risks. Securely attached individuals are more likely to commit and be resilient during the career decision making process due to having their safe base. In contrast, insecure individuals are more likely to be career inactive and not explore any career options (Larson & Wilson, 1998). Another conclusion involves securely attached individuals being more likely to have adaptive, healthy relationships in the workplace which improves career satisfaction and retention. Thus, it is critical to continue examining the role attachment style plays on career exploration (Blustein et al., 1995; Ketterson & Blustein, 1997).

Psychological separation and attachment work together in career decision making (Blustein, Waldbridge, Friedlander, & Palladino, 1991). Individuals who report healthy attachment and separation from their parents are less likely to struggle with career indecision. However, females were more likely to be influenced by attachment from both parents, whereas males were more likely to be influenced by father attachment (Blustein et al., 1991). Maternal attachment tends to be more associated with perceived self-exploration around career. Specifically, individuals who felt secure in their attachment to their mother were more willing to deal with the anxiety associated with career exploration. Further, individuals were more likely to recognize the importance of making career decision-making and be more involved in the process due to maternal attachment (Germeijs & Verschueren, 2009).

Familial cohesion is theorized to be a measure examining underlying attachment between family members (Eigen, Hartman, & Hartman, 1987). Further, an increase in the emotional bonding of a family helps with career decision making. Specifically, highly bonded families did not have to manage family dysfunction that typically interferes with career development. Early childhood bonding provided the environment needed to create stable decisions around career across the lifetime by creating a sense of safety. Further, healthy bonding in families allowed for the freedom to explore making decisions without fear of rejection from those decisions (Eigen et al., 1987). Individuals will also be more willing to discuss career issues with their family to reach decisions in career if there is healthy attachment (Larson & Wilson, 1998)

Braunstein-Bercovitz et al. (2012) discuss that insecurely attached individuals typically experience difficulties in career decision making. Specifically, factors like self-efficacy and self-worth mediate the relation between attachment and career-decision making. Anxious attachment disrupts the ability of an individual to organize and collect their thoughts related to their career. Although shown to be disruptive to career decision making, avoidant attachment does not have a clear pathway to why avoidant attachment influences career (Braunstein-Bercovitz et al., 2012).

Samuolis et al. (2001) discussed the role of attachment on the perception of identity development. Maternal and paternal affection plays a role in identity development for young adults. Specifically, attachment plays a role in the dimensions of identity formation, commitment and exploration. Women were more likely to have more secure attachments to both maternal and paternal figures, such that women had a more achieved identity status than male participants. Samuolis et al. (2001) believed that a

primary contribution to women's more achieved identity status came from their higher willingness to explore alternatives. An alternative to current research, Samuolis et al. (2001), discussed that their results favored maternal attachment as more influential to identity development than paternal attachment.

### **Parenting Behaviors**

Parents have continuously modified how they shape behavior and characteristics within their children (Baumrind, 1966). Most parenting behaviors are based on religious or personal perspectives, rather than science. Historically, Freud's psychoanalytic perspective was one of the few theories that discussed parental influence on childhood behaviors (Baumrind, 1966). Baumrind (1966, 1996) discussed an alternative approach to parenting behaviors based on direct observation of parent-child interactions. Specifically, Baumrind (1966, 1996) discusses how parental responding and appropriate parental demandingness are the dimensions to parenting behaviors.

Parental responding involves behaviors that reflect on how to emphasize autonomy. Parents being attuned to their child's emotional needs and teaching regulation will build autonomy (Baumrind, 1996). Baumrind discussed how parental responsiveness relates to warmth, clear communication, parent-child attachment, and rapport exhibited by the parent toward the child. Warmth involves the emotional love a parent gives their child, such that children build skills related to empathy and allowing them to connect. Clear communication involves the parent emphasizing their person rather than their position, such that parent-child interact together rather than parents asserting authority over the child (Baumrind, 1996). Attachment involves the emotional bond between parents and children (Bowlby, 1969), such that securely attached children represent the

healthy responding (Baumrind, 1996). Rapport involves the level of synchrony between parent and child, such that children and their parents can develop some sort of behavioral expectation within their interactions (Baumrind, 1996).

In contrast, parental demandingness involves how parents hold appropriate expectations of their child (Baumrind, 1996). Specifically, demandingness involves parents confronting their children and monitoring their activities without manipulation and engaging in conflict. Confrontation involves parents being firm with their children but not coercive in their interactions. A confrontive approach to child-rearing tactics teaches children pro-social behaviors, whereas a coercive approach teaches children anti-social behavior and internalize their distress. Monitoring parental behaviors involve establishing clear expectations and supervising children to aid in the development of self-regulating behaviors. Appropriate parental monitoring minimizes inappropriate conduct behaviors of children, especially boys. One-way parents enforce demandingness on their children is through discipline behaviors. Specifically, discipline from the parent is utilized in directing the child towards specific goals or modify behaviors. Managing behaviors through discipline requires parents to reinforce the appropriate behavior after discipline has occurred. Thus, through observation, Baumrind (1966, 1996) outlined responsiveness and appropriate demandingness are the dimensions to parenting behaviors, such that there are four specific types of parenting.

Parents who demonstrate high levels of both responsiveness and appropriate demandingness fall into the authoritative category (Baumrind, 1966, 1996). Parents in the authoritative category view the child as maturing individuals who need parental interactions to help guide them into adulthood. Specifically, parents in the authoritative

category explain utilizing clear communication and healthy expectations to shape children's development across the lifespan. Authoritative parents encourage give and take relationships, such that the child is allowed to express their individuality and perspective while respecting the parent's firm boundaries (Baumrind, 1966, 1996). In contrast, uninvolved parents have low responsiveness and demandingness (Maccoby & Martin, 1983). Uninvolved parenting behaviors are typically characterized by intense dysfunction within parent-child interactions. Typically, uninvolved parenting behaviors in the extremes are consistent with abusive and neglectful behaviors. Observationally, these children are not responsive to their parents' absence and tend to be fearful of engaging with their environment whenever their parents are around (Maccoby & Martin, 1983).

Permissive parents demonstrate high levels of responsiveness but low demandingness (Baumrind, 1966). Specifically, permissive parents react to their child's impulses with affirmation and acceptance. However, these parents strive to be an unlimited resource for their children and not an appropriate adult to emulate. Typically, these parents utilize manipulation rather than discipline to maintain their child's behaviors, such that these children must rely on themselves to develop self-regulation. In contrast, parents who demonstrated low responsiveness but high demandingness are categorized in the authoritarian zone. Parents in the authoritarian zone value controlling their children's actions and emphasize an absolute standard. Authoritarian parents restrict autonomy and engage in a power-hierarchical relationship with their children. Although these parents do not resort to manipulation to discipline and shape their children's behaviors, they do not provide the emotional responsiveness that promotes self-regulation, empathy, and pro-social behavior (Baumrind, 1966). Thus, Baumrind's theory

of parenting behaviors came from direct observation but did not include how a child's perspective of their parent's behaviors influence these categories (Baumrind, 1966).

Parker and colleagues (1979) emphasized how emerging adults retrospectively perceive their parent's behaviors. Parker et al. (1979) discussed that parenting dimensions from the perception of young adulthood involve parental warmth and parental over-control. Perceived parental warmth involves how parents behave affectionately and caring towards children. In contrast to Baumrind (1966), Parker and colleagues (1979) discuss how adolescents and young adults reflect on their parents' behavior. Children tend to view their parents retrospectively as more over-controlling rather than appropriately demanding. Specifically, adolescents and young adults view their parents' attempts to be firm as intrusive, controlling, and obedient demanding. Based on this idea of parental warmth and parental over-control, Parker and colleagues determined different parent typologies than Baumrind. Adolescents who perceived their parents as having high levels of affection and low over-control are characterized as optimal bonding. In contrast, adolescents who perceived their parents as having low affection and no control were characterized as weak or absent bonding. Adolescents who perceived their parents as highly overprotective and affectionate are characterized as an affectionate constraint. In contrast, adolescents who perceived their parents as overprotective but with little affection were characterized as affectionless control (Parker et al., 1979). However, factors like parental support influence the amount of over-control adolescents to perceive when reflecting on their parents' behaviors (Padilla-Walker et al., 2008).

**Parenting and Career.** Parents and parenting styles play a significant role in career development (Li & Kerpeleman, 2007; Vignoli et al., 2005; Young, 1994). During

early childhood, parents' roles concerning career involve shaping what career is for the child. Further, early childhood involves children asking parents to understand the way career development works (Peterson et al., 1996). Adolescents' perception of their parent's level of warmth and firmness plays a critical role within their career development. Specifically, adolescents report the need and desire to have parents influence their career development and self-concept by shaping and supporting their interests and values. However, adolescents also need some space to develop their autonomy to make decisions on career exploration. There must be a balance between parental support and the development of adolescent autonomy in respect to career decision making. Specifically, this autonomy grants space allowing for individuals to more deeply reflect on career development strengthening vocational identity, indicating the importance of individuals being able to differentiate themselves from their family (Li & Kerpeiman, 2007).

Parental support also increases the likelihood that adolescents and young adults will discuss vocational issues and exploration with their primary caregivers (Otto, 2000; Paa & McWhirter, 2000). Although individuals were more likely to consult with their mothers about career exploration, fathers still played a significant role. Both mothers and fathers provided helpful insight into a career (Otto, 2000). Adolescents and young adults also discussed that familial support continued to play a role in continuing their education to expand their career opportunities (Otto, 2000; Paa & McWhirter, 2000). Thus, healthy parental-child interaction concerning career involves a closeness level that also allows for support and separation to a healthy developing self (Li & Kerpeiman, 2007).

Concerning parenting style roles on career development, authoritative parents (those high on warmth and demandingness) are more likely to communicate and support their children to increase willingness to explore career options (Vignoli et al., 2005). Parental warmth and firmness stimulate adolescent vocational interest and increases overall self-concept. This warmth and firmness also increase adolescents' autonomy, increasing their overall career development (Vignoli et al., 2005). Authoritative parenting also builds self-esteem and autonomy in their children regarding career decision making. The warmth and firmness of authoritative parenting allow children to feel confident and motivated to make career decisions. Authoritative parents also facilitate higher academic performance and extracurriculars that increase access to various opportunities which later shape career decision making (Steinberg, Elmen, & Mounts, 1989). In contrast, neglectful parents that are either too firm, too supportive, or neither firm nor supportive do not stimulate career exploration in their adolescents. Specifically, neglectful parents who are uninvolved in their adolescent's life do not provide limitations which stimulate specific interest individuals have around different occupations (Vignoli et al., 2005).

Parental careers and parental career indecision influence their children's future indecision (Fieldman, 2003). Parents that reported low-income jobs alongside insecurity around career would transmit those issues to their children. Specifically, children would report negative attitudes towards career development and self-concept stemming from their parent's insecurities. Further, these negative feelings around career development create disturbances and distractions in an individual's vocational development (Fieldman, 2003). Parents unbothered by their career insecurities are more like to engage with their children around career planning. Adolescents whose parents are more involved in this

career decision-making process have more salient vocational identities, career self-concept, and self-efficacy in career development (Kush & Cochran, 1993).

In line with social learning and Gottfredson's theory of gender roles on career exploration, parenting styles influence career exploration and self-concept (Kerpelman & Schvaneveldt, 1999; Vignoli et al., 2005). Specifically, adolescents who perceived their parents as unsupportive and uninvolved had reinforced gender stereotypes and increased anxiety around career exploration. Males were more likely to select unsatisfying, masculine jobs when they perceived parents as unsupportive and be more anxious about failing in career exploration than females. However, females were more motivated by anxiety based on problematic parenting to explore career alternatives than their male counterparts (Vignoli et al., 2005). There is evidence to suggest that as much as parents influence children's gender roles, children's perception of their parent's gender roles can change family dynamics. Children with parents whose gender roles were flexible also view their parents as more involved and satisfied within the family unit (Kerpelman & Schvaneveldt, 1999).

### **Experiential Avoidance**

Acceptance and Commitment Therapy (ACT) advocates that one of the primary goals is to disentangle individuals from their minds (Hayes et al., 1999; Wilson, 2008). Experiential avoidance involves how individuals attempt to distance themselves from unwanted, private experiences (Hayes et al., 1999; Wilson, 2008). Different internal, private events include emotions, cognitions, sensations, memories, thoughts, and preemptive behavioral reactions. Further, experientially avoiding difficult emotions increase the frequency of attempting to avoid these same events from happening again.

Often, experiential avoidance is broken down into emotional avoidance and cognitive avoidance to identify the specific type of events an individual is attempting to escape (Hayes et al., 1999).

Hayes et al. (1999) discuss that individuals do not just attempt to avoid situations that appear challenging, but the cognitions and emotions that come with them as well. As such individuals will attempt to avoid situations that induce these same cognitions and emotions. In nonverbal organisms, anxiety promotes adaptiveness since being anxious protects a creature from dangerous events. Amongst verbal organisms, specifically humans, the ability to communicate about one's anxieties creates a heightened predisposition. For example, an individual struggling with addiction will likely experience experiential avoidance as their verbal links establish external stimuli to substance use distress. These verbal links that are typically non-threatening are paired with distressing responses enough times to make the non-threatening more threatening. Attempting to avoid these distressing experiences has been shown to increase distress, obsession, depression, and anxiety (Hayes et al., 1999; Wegner et al., 1991).

Typically, experiential avoidance emphasizes rule-governed behavior, which attempts to limit an individual in what they can experience to avoid distress. However, consequences of avoiding distressing experiences tends to lead to more distress (Hayes et al., 1999). Rule-governed behavior emphasizes the event be avoided, but rule-governed behavior cannot help an individual avoid additional distressing emotions and cognitions. At first, making rules that advocate avoidance tends to benefit the individual because they are distracted. However, individuals are unable to engage in these avoidance tactics for long periods of time, no longer maintaining the disruption. Once an individual disrupts

their avoidance tactics, they will attempt to reconnect with their avoidance behaviors, and by doing so, they will create a cycle that continues to amplify distress. There are several situations in which one's attempt to avoid their distressing, private events no longer work in meaningful ways (Hayes et al., 1999).

The first reason experiential avoidance will fail involves attempting to deliberately control cognitions or emotions often contradict the individual's goals (Hayes et al., 1999). Specifically, thought suppression and emotion regression have consistently been shown to promote thoughts and emotions related to the ones attempting to be suppressed (Craske et al., 1990; Hayes et al., 1999; Wegner & Zanakos, 1994). The steady resurgence of these thoughts and emotions creates a situation that makes avoidance impossible for the individual (Hayes et al., 1999). The next reason experiential avoidance fails is the process of not being able to be ruled governed. Specifically, environments that initially caused the distress will likely continue to cause the distress regardless of the amount of avoidance an individual attempts to do. Being conditioned from the original distressing event continues to cause that distress to come up in other areas despite avoidance tactics (Hayes et al., 1999).

Another way experiential avoidance fails is individuals can attempt to change but attempting to change develops unhealthy avoidance (Hayes et al., 1999). Specifically, individuals cannot change painful experiences that have happened and attempt to avoid situations that remind them of those events. However, by avoiding situations in life, individuals are likely to experience alternative negative emotions anyway. Another reason avoidance fails is that events remain unchangeable no matter how much individuals attempt to avoid those distressing feelings. ACT argues that individuals must fully

express those feelings to move on from unchangeable, distressing experiences. The final way experiential avoidance fails is due to the change being a form of behavior contradiction. Many individuals will attempt to avoid distress by doing the opposite and expecting to feel the effect of behaving with that feeling. For example, an individual might desire to feel “confident” in response to feeling insecure, but those individuals are often unwilling to be confident and just want to feel confident. Thus, experiential avoidance is not immune to failing on its own, and experiential avoidance is a problem for the individual (Hayes et al., 1999).

One direct cost to experiential avoidance is that it distances oneself from their learning history (Hayes et al., 1999). Distancing oneself from their learning history can be incredibly problematic. For example, an individual who experiences abuse might benefit from anxiety that communicates safety concerns in a similar situation. Still, experiential avoidance would distance someone from those emotions, putting them at a higher safety risk. The second problem to experiential avoidance is that purer forms of avoidance make people unaware of a problem going on at all. Specifically, these individuals distance themselves so far from their distress; it ultimately leaves their awareness. These problems of experiential avoidance work together. An individual distancing themselves from their learning history enables them to distance enough to be no longer aware of their distress. By not being aware of their continued distress they continue to ignore their learning history, which will continue to decrease their overall awareness. Decreasing awareness and utilization of learning history are not adaptive as many of these traits keep individual safe. Thus, experiential avoidance involves how individual distances themselves from distressing emotions and cognitions. As individuals

avoid the things that distress them, they are also moving further away from the things that matter (Hayes et al., 1999).

**Experiential Avoidance and Family.** Ross, Hinshaw, and Murdock (2016) discuss the limiting information around experiential avoidance and family. Experiential avoidance plays a role within understanding family dynamics and the increased need to understand the role experiential avoidance plays in maladaptive experiences. Specifically, experiential avoidance is the potential underlying process between early family dynamics and later maladaptive outcomes, differentiation of self, or emotionally cutting off family members. The idea of avoidance and family being related comes from the idea they operate on the same continuum of togetherness and separateness. As individuals experience discord in the family dynamic, it is typical to avoid these challenging and painful experiences and disconnect further. Due to this disconnection, individuals with high experiential avoidance in the face of family discord are likely to struggle with their developing sense of self. Specifically, individuals who have insecure attachment experience challenging, anxious and avoidant emotions that someone will avoid. Due to this avoidance of challenging emotions, the sense of self is unable to solidify. Thus, experiential avoidance is utilized to protect oneself from the challenges that come from maladaptive and insecure childhood experiences within the family, and therapies like ACT are utilized to reduce avoidance and increase overall wellbeing (Ross et al., 2016).

**Experiential Avoidance and Career.** Although there is limited to no information on the relationship between experiential avoidance and career development, some indirect effects provide evidence to a potential relationship between them. Specifically, secure and insecure attachment has been shown to directly influence career exploration,

career self-efficacy, and vocational identity (Blustein et al., 1995; Ketterson & Blustein, 1997; Braunstein-Bercovitz et al., 2012; Samuolis et al., 2001). Such that, insecurely attached individuals are busy dealing with their own distressing emotions that interfere with their ability to commit and handle the career decision-making process (Braunstein-Bercovitz et al., 2012; Samuolis et al., 2001). It is also understood that experiential avoidance has a relation with attachment and family dynamics, such that experiential avoidance is the potential underlying mechanism behind managing distress from early childhood dynamics. Further, experiential avoidance also disrupts the developing sense of self, a critical component of vocational identity development (Ross et al., 2016). Thus, there is some evidence that experiential avoidance might influence career exploration and development due to the complicated feelings individuals want to avoid insecure attachment and maladaptive family dynamics.

### **This Present Study**

The current study examined the relationship experiential avoidance has on early family dynamics (i.e., family environment, differentiation of self, attachment, and perceived parenting) and perceived motivation in STEM. Negative emotions arise from distressing early family dynamics, and these negative emotions negatively influence career development. This study examined the potential moderating effects of experiential avoidance on the relationship between early family dynamics and STEM motivation.

Family environments influence vocational decision-making and career identities (Hargrove et al., 2002; Hargrove et al., 2005; Penick & Jepsen, 1992). Specifically, family cohesion, expressiveness, and inversely familial conflict are related to vocational

decision-making, self-concept development, vocational planning, and interests (Hargrove et al., 2005). Based on this evidence the following hypotheses were made:

*Hypothesis 1.* Familial cohesion and expressiveness will be positively related to STEM motivation, such that higher scores of cohesion and expressiveness will be associated to higher STEM motivation.

*Hypothesis 2.* Familial conflict will be negatively related to STEM motivation, such that higher scores of familial conflict will be associated with lower STEM motivation.

Differentiation of self relates to career and career decision making (Johnson et al., 2014; Kinnier et al., 1990; Zingaro, 1983). Individuals who were not fused or had high differentiation of self were more likely to form stronger vocational identities. Based on this evidence the following hypotheses were made:

*Hypothesis 3.* Differentiation of self will be positively related to STEM motivation, such that higher scores of differentiation of self will be associated to higher STEM motivation.

Securely attached individuals are more likely to commit and be resilient during the career decision making process due to having their safe base. In contrast, insecure individuals are more likely to be career inactive and not explore any career options (Larson & Wilson, 1998). Based on this evidence the following hypotheses were made:

*Hypothesis 4.* Anxious and Avoidant attachments will be negatively related to STEM motivation, such that lower scores of anxious and avoidant attachments will be associated to higher STEM motivation.

Adolescents' perception of their parent's level of warmth and firmness plays a critical role within their career development. Specifically, adolescents report the need and desire to have parents influence their career development and self-concept by shaping and supporting their interests and values. However, adolescents also need some space to develop their autonomy to make decisions on career exploration. There must be a balance between parental support and the development of adolescent autonomy in respect to career decision making. Based on this evidence the following hypotheses were made:

*Hypothesis 5.* Perceived parental support/care will be positively related to STEM motivation, such that higher scores of parental support will be associated to higher STEM motivation.

*Hypothesis 6.* Perceived parental overcontrol will be negatively related to STEM motivation, such that higher scores of parental control will be associated to lower STEM motivation.

Although there is limited to no information on the relationship between experiential avoidance and career development, some indirect effects provide evidence to a potential relationship between them. Insecurely attached individuals are busy dealing with their own distressing emotions that interfere with their ability to commit and handle the career decision-making process (Braunstein-Bercovitz et al., 2012; Samuolis et al., 2001). Based on this general theory the following hypotheses were made:

*Hypothesis 7.* Experiential avoidance will moderate the relation between early family environment (i.e., familial cohesion, familial expressiveness, and familial conflict) and STEM motivation, such that higher scores of experiential avoidance will amplify the

negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation.

*Hypothesis 8.* Experiential avoidance will moderate the relation between differentiation of self (i.e., I-position & fusion to others) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation.

*Hypothesis 9.* Experiential avoidance will moderate the relation between attachment (i.e., anxious attachment and avoidant attachment) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation.

*Hypothesis 10.* Experiential avoidance will moderate the relation between perceived parenting (i.e., perceived parental care and overcontrol) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation.

## **Chapter Two:**

### **Methods**

#### **Participants**

This study was reviewed and approved by the University Institutional Review Board. Three-hundred and fifty-nine college students enrolled in a mid-sized southern university were asked to participate in the research project. Of the original 359 participants, 103 participants were removed from data analysis due to not completing 20% or more of the survey. Of the remaining 256 participants, 25 individuals had significant outliers identified utilizing Mahalanobis distance. As such, they were removed from the study, this leaves a total of 231 remaining participants. Participants were asked to identify their current major and whether they have taken introductory classes for their major. Surveys were administered to STEM related classes. The NSF (2016) outline the following majors as STEM majors: Psychology, Biology, Social Science, Computer Science, Engineering, Mathematics, Statistics, and Physical Science. Census data of the surrounding area involves: 50.9% Female Identified, 49.1% Male Identified, 46% White, 48.2% Black, 2.8% Asian, 1.7% Hispanic or Latino, 1.9% Multiracial, and .1% American Indian. The survey was administered via PsychData through a link distributed to instructors teaching STEM classes to give to students. Participation was voluntary and

some students might have been offered extra credit for participating at the recorded instructor's discretion.

### **Instruments**

**Demographics.** Participants were given a general demographics questionnaire. This questionnaire asked the participant's age, sex assigned at birth, gender identity, race/ethnicity, family income, sexual orientation, grade point average, academic rank, and major. Participants were asked to identify the gender of their primary caregiver to be used to analyze the Parenting Behavior Inventory.

**STEM career motivation.** The Science Motivation Questionnaire II (SMQ-II) is a 25-item questionnaire that asks about scientific interests and motivations among college students (Glynn, Brickman, Armstrong, & Taasobshirazi, 2011). The SMQ-II has five primary dimensions: intrinsic motivation, career motivation, self-determination, self-efficacy, and grade motivation. Items are measured on a 5-point Likert-scale that ranges from 0 (never) to 4 (always). Sample items include, "I enjoy learning science" and, "I am confident I will do well on science labs and projects". A total score is made by adding up all of the scores to indicate total career motivation. Chronbach's alpha values along the five factors showed intrinsic motivation ( $\alpha = .89$ ), career motivation ( $\alpha = .93$ ), self-determination ( $\alpha = .85$ ), self-efficacy ( $\alpha = .90$ ) and grade motivation ( $\alpha = .83$ ) to have sufficient internal reliability to qualify as dependable factors for this model. In this study, the internal reliability of the total STEM motivation score was .97. The SMQ-II is reported to have criterion-related and construct validity (Glynn et al., 2011).

**Family Environment Scale.** The Family Environment Scale (FES) is a three-part, 90 questions per part, True or False questionnaire (Moos & Moos, 2009). The three-

parts measure the ten subscales of the family environment and involve the Real Form (Form R), Ideal Form (Form I), and Expectations Form (Form E). The Real Form involves participants describing their perception of the current family environment. The Ideal Form involves participants describing the type of family they prefer. The Expectations Form involves participants describing the expectations of what their family will be like. The answers for the participants are added together for their respective subscales. Each of these forms has three dimensions: relationship dimension, personal growth dimension, and system maintenance dimensions. Across the different dimensions Moos & Moos (2009) discusses the FES has construct, content, and discriminate validity across all of the dimensions.

The relationship dimension involves cohesion, expressiveness, and conflict. Family cohesion involves the degree of commitment and support of a family. An example item of familial cohesion involves “Family members really help and support one another.” The test-retest reliability of the cohesion subscale is .86. In this study, a Kuder-Richardson 20 test identified the reliability of the familial cohesion subscale was .32, indicating poor reliability. The familial cohesion subscale had an original mean of 6.69 (*S.D.* = 2.17). Familial expressiveness involves how family members encourage emotional expression. An example item of familial expressiveness involves “Family members often keep their feelings to themselves.” The test-retest reliability of the expressiveness subscale is .73. In this study, a Kuder-Richardson 20 test identified the reliability of the familial expressiveness subscale was .16, indicating poor reliability. Familial expressiveness subscale had an original mean of 5.13 (*S.D.* = 1.99). Familial conflict involves the amount of perceived conflict within a family unit. An example item

of familial conflict involves “We fight a lot in our family.” The test-retest reliability of the conflict subscale is .85. In this study, a Kuder-Richardson 20 test identified the reliability of the familial cohesion subscale was .31, indicating poor reliability. The familial conflict subscale had an original mean of 3.57 (*S.D.* = 2.18)

The personal growth dimension involves independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, and moral-religious emphasis. Independence involves the extent to which family members are assertive and self-sufficient. An example of independence involves “We don’t do things on our own very often in our family.” The test-retest reliability of the independence subscale is .68. Achievement orientation involves the extent to which activities are thrown into a competitive frame. An example of an achievement orientation subscale involves “We feel it is important to be the best at whatever you do.” The test-retest reliability of the achievement orientation is .74. Intellectual-cultural orientation involves the level of political or cultural activities within a family system. An example of an intellectual-cultural subscale involves “We often talk about political and social problems.” The test-retest reliability of the intellectual-cultural is .82. Active-recreational orientation involves the perceived level of participation of social activities within a family. An example of the active-recreational subscale involves “We spend most weekends and evening at home.” The test-retest reliability of the active-recreational subscale is .77. Moral-religious emphasis involves the way ethical values are involved in the family dynamic. An example of the moral-religious subscale involves “Family members attend church, synagogue, or Sunday school fairly often.” The test-retest reliability of the moral-religious subscale is .80.

The system maintenance dimension includes the organization and control subscale. The organization subscale involves the importance of a clear structure in the family. An example of the organization subscale involves “We often seem to be killing time at home.” The test-retest reliability of the organization subscale is .76. The control subscale involves the number of rules emphasized in the family environment. An example of the control subscale involves “Family members are rarely ordered around.” The test-retest reliability of the control subscale is .77.

**Differentiation of Self Inventory.** The Differentiation of Self Inventory (DSI) is a survey that measures four dimensions of differentiation of self: emotional reactivity, emotional cut-off, fusion of others, and I position (Skowron & Friedlander, 1998). The format of the DSI is a 43-item, 6-point (1 = not at all true for me and 6 = very true of me), Likert-type questionnaire. The emotional reactivity subscale includes 12-items that measures emotional responsiveness to the environment. An example item of the emotional reactivity subscales is “When someone close to me disappoints me, I withdraw from him or her for a time.” The emotional reactivity subscale had an original mean of 3.69 (*S.D.* = 0.88). The emotional cutoff subscale involves 11-items measuring feeling threatened when others become close. An example item on the emotional cutoff subscale is “I have difficulty expressing my feelings to people I care for.” The emotional cutoff subscale had an original mean of 4.53 (*S.D.* = 0.79). The fusion with other subscale includes 9-items that measure being overly involved with others emotionally. An example of the fusion with other subscale is, “It’s important for me to keep in touch with my parents regularly.” The fusion to others subscale had an original mean of 2.92 (*S.D.* = .71). The I position subscale involves 11-items measuring the individual's development

of self or “I.” An example item of the I position subscale is, “I tend to remain pretty calm even under stress.” The I-position subscale had an original mean of 4.08 (*S.D.* = 0.85). The DSI's internal reliability ranges from .74 and .88 and has divergent validity from measures of anxiety (Skowron & Friedlander, 1998). In this study, the internal reliability of the fusion with others subscale was .63 and for the I-position subscale was .76.

**Experiences in Close Relationships-Revised.** The Experiences in Close-Relationships-Revised (ECR-R) is a revised version of the original measure using Item Response Theory that measures an individual's perceived attachment (Fraley, Waller, & Brennan, 2000). The format of the ECR-R is a 36-item, 7-point (1 = strongly disagree and 7 = strongly agree), Likert-type questionnaire that examines the two dimensions of attachment: anxiety and avoidance. The anxiety dimension and avoidant dimension each have 18 questions associated with them. The scores of each dimension are averaged with higher scores indicating more anxiety or avoidance. The anxiety dimension examines the level of over-dependence or over-involvement an individual is in their interpersonal relationships. An example item of the anxiety dimension is “I often worry that my partner will not want to stay with me.” The test-retest reliability of the ECR-R anxiety dimension is between .91 and .94, indicating good reliability. In this study, the internal reliability of the anxious dimension was .92. The anxious attachment subscale had an original mean of 3.56 (*S.D.* = 1.12). The avoidance dimension examines the level of perceived trustworthiness of their romantic partners. An example item of the avoidant dimension is “I find it relatively easy to get close to my partner”. The test-retest reliability of the ECR-R avoidant dimension is between .90 to .91, indicating good reliability. In this study, the internal reliability of the avoidant attachment dimension was .93. The avoidant

attachment subscale had an original mean of 2.92 (*S.D.* = 1.19). The ECR-R has good construct or content validity when compared to other measures of attachment (Fraley et al., 2000).

**Parenting Behaviors Inventory.** The Parental Bonding Instrument (PBI; Parker et al., 1979) examined participants' recall of their parents' parenting behaviors before the age of 16. Format of the PBI is a 25-item, 4-point (0 = very unlike and 3 = very like), Likert-type questionnaire measuring two dimensions of parental bonding, including support/care (12 items) and overprotectiveness (13 items). In this study, the participants only completed the measure once for their identified most important parental figure. An item on the PBI that measures for support from the parent is "frequently smiled at me." An item on the PBI that looks at the dimension of overprotectiveness is "tried to make me feel dependent on her/him." The parental care dimension had a mean of 37.45 (*SD* = 6.20), and an internal reliability of .76; in this study the internal reliability of the parental care dimension was .93. The overprotection dimension had a mean of 28.76 (*SD* = 7.20), and an internal reliability of .74; in this study the internal reliability of the parental overprotection dimension was .82. The PBI has reported to have good concurrent validity (Parker et al., 1979).

**The Multidimensional Experiential Avoidance Questionnaire.** The Multidimensional, Experiential Avoidance Questionnaire (MEAQ; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011) is a multidimensional survey of experiential avoidance. Format of the MEAQ is a 62-item, 6-point (1 = strongly disagree and 6 = strongly agree), Likert style questionnaire that examines six dimensions of experiential avoidance: behavioral avoidance, distress aversion, procrastination,

distraction/suppression, repression/denial, and distress endurance. The behavioral avoidance dimension includes 11 questions that examine the ways someone might physically avoid their distress. The internal consistency of the behavioral avoidance dimension is .90. An example item of behavioral avoidance is “I won’t do something if I think it will make me uncomfortable.” The distress aversion dimension includes 13-items that measures the desire not to experience distress. The internal consistency of the distress aversion dimension is .89. An example item on the distress aversion scale is “If I could magically remove all of my painful memories, I would.” The procrastination dimension includes 7-items that measure how often the individual delays doing uncomfortable tasks. The internal consistency of the procrastination dimension is .89. An example item on the procrastination dimension is “I tend to put off unpleasant things that need to get done.” The distraction & suppression dimension includes 7-items that measure how individuals distract from distressing experiences. The internal consistency of the distraction/suppression dimension is .86. An example item on the distraction/suppression dimension is “When something upsetting comes up, I try very hard to stop thinking about it.” The repression/denial dimension includes 13-items that examines how individuals distance from unwanted emotional experiences. The internal consistency of the repression/denial dimension is .88. An example item on the repression/denial dimension is “I sometimes have difficulty identifying how I feel.” The distress endurance dimension has 11-items that examines how long individuals are willing to experience distressing emotions. The internal consistency of the distress endurance dimension is .82. An example item of the distress endurance dimension is “People should face their fears.” A total score for the MEAQ is obtained by adding all the

dimensions together, with higher scores on the MEAQ indicate more or higher experiential avoidance. MEAQ has high convergent and divergent validity when compared to other measures of experiential avoidance (Gómez et al., 2011). In this study the internal consistency of the MEAQ total score was .92.

## Chapter Three:

### Results

The following section will present information around descriptive statistics, correlation analyses, and regression models for each hypothesis. Table 1 presents results about the demographics of the sample. In terms of gender 29.9% (69) identified as a man, 68.0% (157) identified as a woman, and 2.1% (5) identified as other or as a transgender person. The mean age in years was 20.14 ( $SD = 3.94$ ). Participants identified their ethnicity 81.0% White (187), 11.3% Black/African American (26), .9% Asian (2), 3.9% Hispanic/Latinx (9), .4% Native American (1), .9% Biracial (2), and 1.7% Other/Not Specified (4). For school status: 38.5% First-year students (89), 24.2% Sophomores (56), 19.5% Juniors (45), 16.0% Seniors (37), .9% Graduate (2), and .9% Other/Not Specified (2). For household income: 4.3% reported making less than 20,000 (10), 9.5% reported making between 20,000 and 34,999 (22), 13.0% reported making between 35,000 and 49,999 (30), 24.2% reported making between 50,000 and 74,499 (56), 18.2% reported making between 75,000 and 99,999 (42), 30.3% reported making over 100,000 (70), .4% chose not to specify (1). In terms of relationship status, 46.3% identified as single (107), 15.6% identified as casually dating (36), 32.0% identified as in a committed relationship (74), .9% identified as engaged (2), and 5.2% identified as married (12). In terms of sexual orientation, 88.3% identified as heterosexual (204), .9% identified as lesbian (2),

3.0% identified as gay (7), 5.2% identified as bisexual/pansexual (12), 2.2% identified as questioning (5), and .4% identified as other/nbot Specified (1). Table 2 presents means, standard deviations, and reliability of the variables in the study. Participants identified the mean of their current GPA was 3.42 ( $SD = .51$ ). For STEM Motivation the mean was 92.48 ( $SD = 20.68$ ,  $Alpha = .97$ ), for Familial Cohesion the mean was 2.92 ( $SD = 1.50$ ,  $Alpha = .32$ ), for Familial Expression the mean was 3.60 ( $SD = 1.55$ ,  $Alpha = .16$ ), for Familial Conflict the mean was 5.02 ( $SD = 1.62$ ,  $Alpha = .31$ ), for Fusion to Others the mean was 3.00 ( $SD = .71$ ,  $Alpha = .63$ ), for I-position the mean was 3.88 ( $SD = .78$ ,  $Alpha = .76$ ), for Anxious Attachment the mean was 3.40 ( $SD = 1.20$ ,  $Alpha = .92$ ), for Avoidant Attachment the mean was 3.09 ( $SD = 1.18$ ,  $Alpha = .93$ ), for Parental Care the mean was 2.20 ( $SD = .67$ ,  $Alpha = .93$ ), for Parental Overprotection the mean was 1.14 ( $SD = .51$ ,  $Alpha = .82$ ), and for Experiential Avoidance the mean was 204.17 ( $SD = 36.99$ ,  $Alpha = .92$ ).

Table 1

*Demographic Percentages*

Baseline Characteristic		n	%
Gender			
	Man	69	29.9
	Woman	157	68.0
	Other/Trans	5	2.1
Ethnicity			
	White	187	81.0
	Black/African American	26	11.3
	Asian	2	.9
	Hispanic/Latinx	9	3.9
	Native American	1	.4
	Biracial	2	.9
	Other or N/A	4	1.7
School Status			
	First-year Student	89	38.5

Baseline Characteristic	n	%
Sophomore	56	24.2
Junior	45	19.5
Senior	37	16.0
Graduate	2	.9
Other or N/A	2	.9
Household Income		
<20,000	10	4.3
20,000 to 34,999	22	9.5
35,000 to 49,999	30	13.0
50,000 to 74,999	56	24.2
75,000 to 99,999	42	18.2
> 100,000	70	30.3
N/A	1	.4
Relationship Status		
Single	107	46.3
Casually Dating	36	15.6
Committed	74	32.0
Engaged	2	.9
Married	12	5.2
Sexual Orientation		
Heterosexual	204	88.3
Lesbian	2	.9
Gay	7	3.0
Bisexual	12	5.2
Questioning	5	2.2
Other or N/A	1	.4

*Note.* N/A = Not Specified.

Table 2

*Survey Means, Standard Deviations (SD), and Cronbach Alpha.*

Variable	Mean	SD	Alpha
Age	20.14	3.94	
GPA	3.42	.51	
STEM Motivation	92.48	20.68	.97
Familial Cohesion	2.92	1.50	.32
Familial Expression	3.60	1.55	.16
Familial Conflict	5.02	1.62	.31
Fusion to Others	3.00	.71	.63
I-position	3.88	.78	.76
Anxious Attachment	3.40	1.20	.92

Variable	Mean	SD	Alpha
Avoidant Attachment	3.09	1.18	.93
Parental Care	2.20	.67	.93
Parental Overprotection	1.14	.51	.82
Experiential Avoidance	204.17	36.99	.92

### Correlation Matrix

Correlation analyses were conducted to examine the relationships among the variables in the study. Only the correlations related to the hypotheses are discussed here (see Table 3). Neither familial cohesion nor familial expression had a significant relation to STEM motivation. Further, results indicated that STEM motivation was positively correlated with familial conflict. Results indicated that STEM motivation was positively correlated to one's perceived I-position. Whereas STEM motivation was negatively correlated with fusion to others.

STEM motivation was negatively correlated only with one's perceived avoidant attachment, whereas anxious attachment had no significant relation to STEM motivation. STEM motivation was positively correlated with perceived parental care, and STEM motivation was negatively correlated with perceived parental overprotection.

Results indicated that familial cohesion, familial expression, familial conflict, fusion to others, I-position, anxious attachment, avoidant attachment, perceived parental care, and perceived parental overprotection was significantly related to experiential avoidance. Familial expressiveness and familial conflict were both negatively correlated with experiential avoidance. Also, I-position negatively correlated with experiential avoidance. Both anxious attachment and avoidant positively correlated with experiential avoidance. Perceived parental care was negatively correlated with experiential avoidance.

Perceived parental overprotection was positively correlated with experiential avoidance.

STEM motivation was negatively correlated with experiential avoidance.

Table 3

*Correlation Table of Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. SM	-										
2. FCoh	.05	-									
3. FE	.09	.26**	-								
4. FCon	.19**	.31**	.33**	-							
5. FtO	-.23**	-.07	.02	-.18**	-						
6. I-position	.21**	.03	.19**	.21**	-.12	-					
7. AnxA	-.06	.06	-.14*	-.07	-.09	-.32**	-				
8. AvoA	-.27**	-.04	-.16*	-.13*	.38**	-.39**	.31**	-			
9. PC	.21**	-.18**	.19**	.19**	-.40**	.36**	-.29**	-.43**	-		
10. PO	-.20**	.01	-.21**	-.12	.10	-.46**	.28**	.34**	-.49**	-	
11. ExpAvo	-.15*	.32	-.24**	-.22**	.04	-.43**	.43**	.32**	-.41**	.42**	-

*Note.* \*  $p < .05$ ; \*\* $p < .01$ . SM = STEM Motivation; FCoh = Familial Cohesion; FE =

Familial Expressiveness; FCon = Familial Conflict; FtO = Fusion to Others; AnxA =

Anxious Attachment; AvoA = Avoidant Attachment; PC = Parental Care; PO = Parental

Overprotection; ExpAvo = Experiential Avoidance.

### Multiple Regression

Multiple linear regressions were run to examine the amount of variance explained by child-caregiver dynamics for STEM motivation. Assumption testing was completed utilizing the recommendations of Field (2018). The assumption of Normality was tested by observing the QQ-plots of studentized residuals and visual inspection determined that the assumption was met. The assumption of independence was analyzed by utilizing a Durbin-Watson test, which indicated the assumption was met (*Durbin Watson* = 1.767). The assumption of linearity was met utilizing a scatter plot of residuals,

which visual inspection indicated the assumption was met. The assumption of homoscedasticity was assessed by visual inspection of a plot of standardized residuals versus unstandardized predicted values, which indicated the assumption was met. The assumption of multicollinearity was met utilizing VIF and Tolerance scores, which indicated the assumption was met due to VIF being less than 10 and Tolerance being greater than .01.

**Hypothesis One.** Hypothesis one stated familial cohesion and expressiveness will have a positive relation to STEM motivation, such that higher scores of cohesion and expressiveness will be associated with higher STEM motivation. A multiple regression was run to examine hypothesis one with familial cohesion and expressiveness as predictors and STEM motivation as the criteria. The overall model was not significant ( $R^2 = .01$ ,  $F(2,228) = .95$ ,  $ns$ ). Results indicated that familial cohesion ( $b = .40$ ,  $S.E. = .94$ ,  $t = .42$ ,  $ns$ ) and familial expressiveness ( $b = 1.05$ ,  $S.E. = .91$ ,  $t = 1.15$ ,  $ns$ ) did not have a significant, positive relation with STEM motivation. Thus, the hypothesis was not supported.

**Hypothesis Two.** Hypothesis two stated familial conflict will be negatively related to STEM motivation, such that higher scores of familial conflict will be associated with lower STEM motivation. A linear regression was run to examine hypothesis two with familial conflict as the predictor and STEM motivation as the criteria. The overall model was significant ( $R^2 = .04$ ,  $F(1,229) = 8.51$ ,  $p = .004$ ). Results indicated that familial conflict ( $b = 2.41$ ,  $S.E. = .83$ ,  $t = 2.92$ ,  $p = .004$ ) had a significant, positive relation with STEM motivation rather than a negative relation. Thus, the hypothesis was

not supported as stated. However, there was a significant relationship in the non-predicted direction.

**Hypothesis Three.** Hypothesis three stated dimensions of differentiation of self (i.e., I-position & Fusion to Others) will be positively related to STEM motivation, such that more differentiation of self (i.e., higher I-position and lower fusion to others) will be associated with higher STEM motivation. A multiple regression was run to examine hypothesis three with I-position and fusion to others as predictors and STEM motivation as the criteria. The overall model was significant ( $R^2 = .09$ ,  $F(2,228) = 10.95$ ,  $p < .001$ ). Results indicated that I-position ( $b = 4.89$ ,  $S.E. = 1.69$ ,  $t = 2.89$ ,  $p = .004$ ) had a significant, positive relation to STEM motivation. Whereas results indicated that fusion to others ( $b = -6.14$ ,  $S.E. = 1.87$ ,  $t = -3.29$ ,  $p < .001$ ) had a significant, negative relation with STEM motivation. Thus, the hypothesis was only partially supported due to lower fusion to others indicating higher differentiation of self.

**Hypothesis Four.** Hypothesis four stated anxious and avoidant attachments will be negatively related to STEM motivation, such that lower scores of anxious and avoidant attachments will be associated with higher STEM motivation. A multiple regression was run to examine hypothesis four with anxious attachment and avoidant attachment as predictors and STEM motivation as the criteria. The overall model was significant ( $R^2 = .07$ ,  $F(2,228) = 9.17$ ,  $p < .001$ ). Results indicated that anxious attachment ( $b = .53$ ,  $S.E. = 1.15$ ,  $t = .46$ ,  $ns$ ) did not have a significant, negative relation to STEM motivation. And avoidant attachment ( $b = -4.91$ ,  $S.E. = 1.17$ ,  $t = -4.19$ ,  $p < .001$ ) had a significant, negative relation with STEM motivation. Thus, the hypothesis was only partially supported.

**Hypothesis Five.** Hypothesis five stated that perceived parental care will be positively related to STEM motivation, such that higher scores of perceived parental care will be associated with higher STEM motivation. A linear regression was run to examine hypothesis five with perceived parental care as the predictor and STEM motivation as the criteria. The overall model was significant ( $R^2 = .04$ ,  $F(1,229) = 10.08$ ,  $p = .002$ ). Results indicated that perceived parental care ( $b = 6.37$ ,  $S.E. = 2.01$ ,  $t = 3.18$ ,  $p = .002$ ) had a significant, positive relation with STEM motivation. Thus, the hypothesis was supported.

**Hypothesis Six.** Hypothesis six stated perceived parental overcontrol will be negatively related with STEM motivation, such that higher scores of perceived parental control will be associated with lower STEM motivation. A linear regression was run to examine hypothesis five with perceived parental overprotection as the predictor and STEM motivation as the criteria. ( $R^2 = .04$ ,  $F(1,229) = 9.47$ ,  $p = .002$ ). Results indicated that perceived parental overprotection ( $b = -8.02$ ,  $S.E. = 2.61$ ,  $t = -3.08$ ,  $p = .002$ ) had a significant, negative relation with STEM motivation. Thus, the hypothesis was supported.

**Hypothesis Seven.** Hypothesis seven stated that experiential avoidance will moderate the relation between family environment (i.e., Familial Cohesion, Familial Expressiveness, & Familial Conflict) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which would be associated with lower STEM motivation. In reference to familial cohesion, the overall model ( $R^2 = .05$ ,  $F(5,225) = 2.40$ ,  $p = .04$ ) was significant, but the interaction effect between experiential avoidance and familial cohesion ( $b = .02$ ,  $S.E. = .03$ ,  $t = .78$ ,  $ns$ ) was not significant. In reference to familial expressiveness, the overall model ( $R^2 = .05$ ,  $F(5,225) = 2.28$ ,  $p = .05$ ) was significant, but the interaction

effect between experiential avoidance and familial expressiveness ( $b = -.01$ ,  $S.E. = .02$ ,  $t = -.28$ ,  $ns$ ) was not significant. In reference to familial conflict, the overall model was significant ( $R^2 = .05$ ,  $F(5,225) = 2.55$ ,  $p = .03$ ) but the interaction effect between experiential avoidance and familial conflict ( $b = -.03$ ,  $S.E. = .02$ ,  $t = -1.15$ ,  $ns$ ) was not significant. Thus, the hypothesis was not supported.

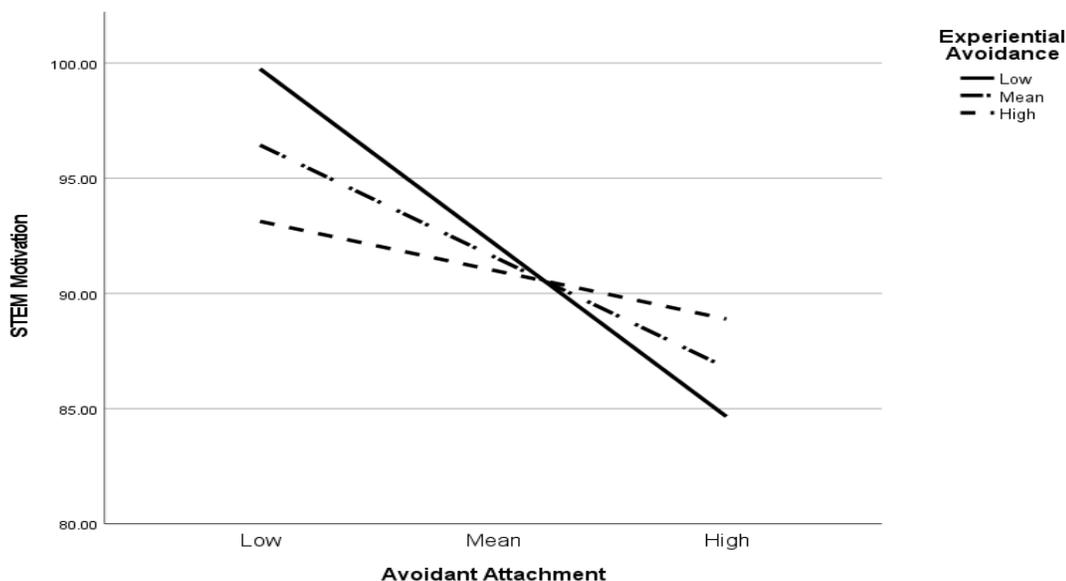
**Hypothesis Eight.** Hypothesis eight stated that experiential avoidance will moderate the relation between differentiation of self (i.e., I-position and Fusion to Others) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which would be associated with lower STEM motivation. In reference to I-Position, the overall model ( $R^2 = .10$ ,  $F(4,226) = 6.25$ ,  $p < .001$ ) was significant but the interaction effect between experiential avoidance and I-position ( $b = -.06$ ,  $S.E. = .04$ ,  $t = -1.35$ ,  $ns$ ) was not significant. In reference to fusion to others, the overall model ( $R^2 = .09$ ,  $F(4,226) = 5.81$ ,  $p < .002$ ) was significant but the interaction effect between experiential avoidance and fusion to others ( $b = .02$ ,  $S.E. = .05$ ,  $t = .45$ ,  $ns$ ) was not significant. Thus, the hypothesis was not supported.

**Hypothesis Nine.** Hypothesis nine stated that experiential avoidance will moderate the relation between attachment (I.e., anxiety and avoidant attachment) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which would be associated with lower STEM motivation. In reference to anxious attachment, the overall model ( $R^2 = .09$ ,  $F(4,226) = 5.33$ ,  $p < .001$ ) was significant but the interaction effect between experiential avoidance and anxious attachment ( $b = .03$ ,  $S.E. = .03$ ,  $t = 1.14$ ,  $ns$ ) was not

significant. In reference to avoidant attachment, both the overall model (Figure 1;  $R^2 = .10$ ,  $F(4,226) = 6.07$ ,  $p < .001$ ) and the interaction effect between avoidant attachment and experiential avoidance were significant ( $b = .06$ ,  $S.E. = .03$ ,  $t = 2.00$ ,  $p = .05$ ). Hayes (2013) Process Model was used to identify the Low, high, and mean interaction between experiential avoidance and avoidant attachment on STEM motivation. When experiential avoidance is low, there is a significant negative relation between avoidant attachment and STEM motivation ( $b = -6.36$ ,  $S.E. = 1.54$ ,  $t = -4.12$ ,  $p < .001$ ). At the mean of experiential avoidance, there is a significant negative relation between avoidant attachment and STEM motivation ( $b = -4.07$ ,  $S.E. = 1.17$ ,  $t = -3.47$ ,  $p < .001$ ). When experiential avoidance is high, there is a nonsignificant negative relation between avoidant attachment and STEM motivation, ( $b = -1.79$ ,  $S.E. = 1.74$ ,  $t = -1.02$ ,  $ns$ ). Thus, the hypothesis was partially supported.

Figure 1

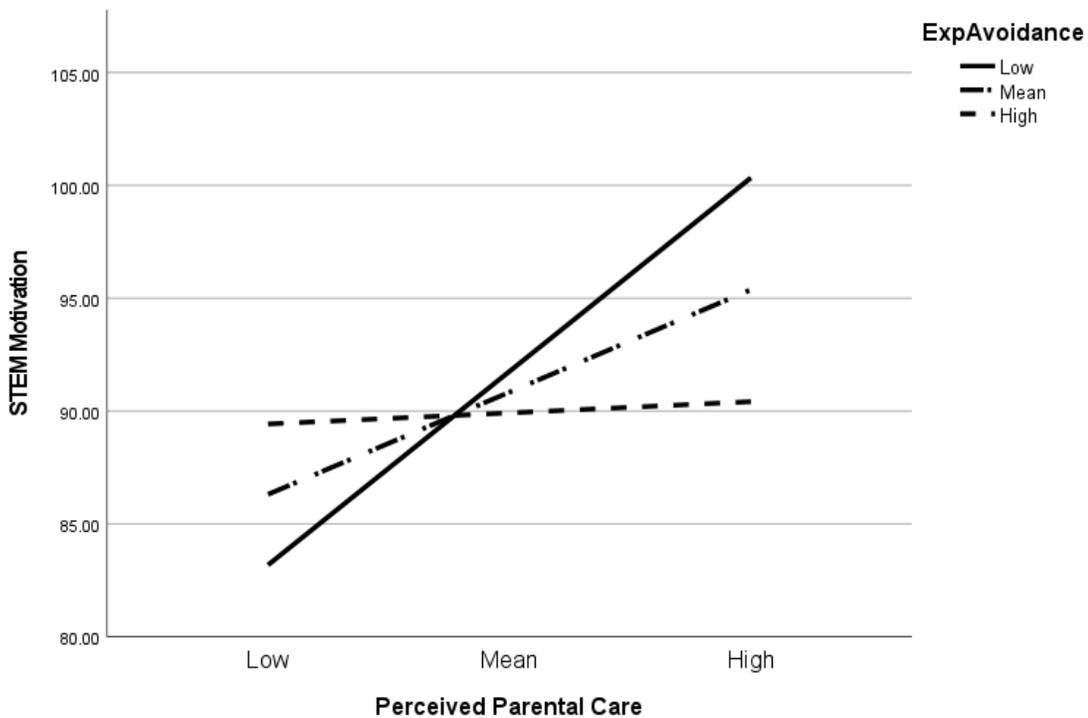
*Experiential Avoidance Moderating Avoidant Attachment and STEM Motivation*



**Hypothesis Ten.** Hypothesis ten stated that experiential avoidance will moderate the relation between perceived parenting behaviors (I.e., parental care and parental overprotection) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which would be associated with lower STEM motivation. In reference to perceived parental overprotection, the overall model ( $R^2 = .06$ ,  $F(4,226) = 3.81$ ,  $p = .005$ ) was significant but the interaction effect between experiential avoidance and perceived parental overprotection ( $b = .09$ ,  $S.E. = .07$ ,  $t = 1.25$ ,  $ns$ ) was not significant. In reference to perceived parental care, both the overall model (Figure 2;  $R^2 = .09$ ,  $F(4,226) = 5.45$ ,  $p < .001$ ) and the interaction effect between perceived parental care and experiential avoidance ( $b = -.15$ ,  $S.E. = .06$ ,  $t = -2.79$ ,  $p = .006$ ) was significant. Hayes (2013) Process Model was used to identify the Low, high, and mean interaction between experiential avoidance and perceived parental care on STEM motivation. When experiential avoidance is low, there is a significant positive relation between perceived parental care and STEM motivation ( $b = 12.85$ ,  $S.E. = 3.28$ ,  $t = 3.91$ ,  $p < .001$ ). At the mean of experiential avoidance, there is a significant positive relation between perceived parental care and STEM motivation ( $b = 6.79$ ,  $S.E. = 2.21$ ,  $t = 3.08$ ,  $p = .002$ ). When experiential avoidance is high, there is a nonsignificant positive relation between perceived parental care and STEM motivation, ( $b = .74$ ,  $S.E. = 2.66$ ,  $t = .28$ ,  $ns$ ). Thus, the hypothesis was partially supported.

Figure 2.

*Experiential Avoidance Moderating Perceived Parental Care and STEM Motivation*



## **Chapter Four:**

### **Discussion**

This section outlines the results found for each hypothesis along with a general discussion of the results implications, limitations, and future directions.

#### **Results Overview**

The main purpose of this study was to contribute to the growing literature that examines the role of early child-caregiver dynamics and STEM motivation. Further, this study aimed to explore the potential moderating effects of experiential avoidance on the relation between early child-caregiver dynamics and STEM motivation. Early child-caregiver dynamics examined in this study involved family environment, differentiation of self, attachment, and perceived parenting behaviors. When observing means and standard deviations, the subscales of the DSI (Skowron & Friedlander, 1998), ECCR-R (Fraley et al., 2000), PBI (Parker et al., 1979), & MEAQ (Gámez et al., 2011) in this sample had similar findings in means and standard deviations to previous research. However, there were several differences between this samples results and the original Moos & Moos (2009) findings. A one sample t-test was utilized to compare the means from Moos & Moos (2009) and the means found in this study. First, there was significantly lower reported familial cohesion ( $M = 2.92$ ) in this sample compared to the mean reported by Moos & Moos (2009;  $M = 6.69$ ). This sample also reported higher perceived familial conflict ( $M = 5.02$ ) compared to the mean reported by Moos & Moos

(2009;  $M = 3.57$ ). Logically, this may make sense since that our sample would report lower overall familial cohesion as familial conflict rises. This study's sample also reported lower overall familial expressiveness ( $M = 3.60$ ) compared to Moos & Moos (2009;  $M = 5.13$ ). A potential explanation involves that individual reporting both lower expressiveness and cohesion would also indicate more conflict in their family environments.

In terms of relationships between variables in the study showed the following. First, STEM motivation did not correlate with Familial Cohesion (Moos & Moos, 2009), Familial Expressiveness (Moos & Moos, 2009), and Anxious Attachment (Larson & Wilson, 1998) as predicted. Although these variables did not significantly relate to STEM motivation all the other child-caregiver dynamics did. This gives indication of some early child-caregiver roles playing a part in students perception of STEM motivation. Specifically, it might be beneficial to further exam the role some of these family dynamics play on STEM motivation. Experiential avoidance significantly related to Familial Expressiveness, Familial Conflict, I-Position, Anxious Attachment, Avoidant Attachment, Perceived Parental Care, and Perceived Overprotection. This gives evidence that early child-caregiver dynamics plays a role in individual's ability to tolerate or manage their difficult experiences. Specifically, this might indicate that healthier, adaptive family environments might improve children's abilities to confront difficult experiences. Meaning that researchers might find benefit in exploring the relation between early child-caregiver dynamics and experiential avoidance more directly. Experiential avoidance also significantly related to STEM Motivation. This provides evident that experiential avoidance does have some relation to career literature.

Considering the limiting information around experiential avoidance and career research, future researchers might benefit from exploring the relation between experiential avoidance and career more directly.

**Hypothesis One.** Hypothesis one stated familial cohesion and expressiveness will have a positive relation to STEM motivation, such that higher scores of cohesions and expressiveness will be associated with higher STEM motivation. Despite previous research (Hargrove et al., 2002; Hargrove et al., 2005; Penick & Jepsen, 1992) indicating that familial cohesion and familial expressiveness should predict STEM motivation, there was no evidence to suggest a relation exist. Results found that familial cohesion and Familial expressiveness does not relate to STEM motivation. Therefore, the hypothesis was not supported.

There are several reasons that potentially limited the results. One potential reason involves psychometrics that hindered a relation between these variables. Specifically, results found poor internal consistency for the Family Environment Scale for both familial cohesion and expressiveness using a Kuder-Richardson 20. Poor internal consistency might have influenced the accuracy between familial cohesion and expressiveness on STEM motivation. Specifically, poor internal consistency might indicate that a particular measure is not measuring the entire construct its attempting to measure. The Family Environment Scale having poor internal consistency with cohesion and expressiveness might indicate that it is not measuring the entirety of familial cohesion and expressiveness. Such that, the reason why familial cohesion and expressiveness might not be relating to STEM motivation is due to the FES not having an accurate depiction of familial cohesion and expressiveness. Another potential limitation

might involve that this sample reported significantly higher familial conflict and overall lower cohesion and expressiveness than Moos & Moos (2009) reported. Therefore, a different sample with more normative familial relationships might depict a clearer relation between familial cohesion and expressiveness with STEM motivation.

Participants also self-reported their family dynamics, Parker et al. (1979) discuss that individuals self-reporting family dynamics often are harsher than observing family dynamics directly.

**Hypothesis Two.** Hypothesis two stated that familial conflict will be negatively related to STEM motivation, such that higher scores of familial conflict will be associated with lower STEM motivation. Despite previous research (Hargrove et al., 2002; Hargrove et al., 2005; Penick & Jepsen, 1992), indicating that familial conflict would negatively relate to STEM motivation, results did not indicate such relationship. Specifically, results indicated that familial conflict had a positive relation with STEM motivation. This means in our sample individuals reporting higher family conflict also reported higher STEM motivation. One potential explanation for familial conflict positively relating to STEM motivation might involve participants believing that they need to fulfill familial expectations of being in STEM fields. Specifically, an individual might choose to remain in a STEM major even if they do not desire to enter into the STEM field in order to prevent familial conflict about career. Alternatively, due to the lucrative nature of STEM fields, participants might be more motivated to enter STEM fields to have enough financial independence to not continue being involved in a family filled with conflict. Confronting familial conflict might also lead an individual down different career paths, as such an individual might be more motivated to remain in their STEM field to avoid

family conflict that will lead them down a different career path. Future research might benefit from gaining more direct insight into the relation between familial conflict and STEM motivation. Thus, the hypothesis was not supported.

Familial cohesion, expressiveness, and conflict are being measured retrospectively and might have a different effect on STEM motivation if measuring early child-caregiver dynamics in the moment. Poor internal consistency might have influenced the accuracy between familial conflict on STEM motivation. Specifically, poor internal consistency might indicate that a particular measure is not measuring the entire construct its attempting to measure. The Family Environment Scale having poor internal consistency with conflict might indicate that it is not measuring the entirety of familial conflict. Many of the child-caregiver dynamics variables may overlap onto similar underlying factors which might have created some shared variance, thus diminishing their contribution to STEM motivation. Finally, the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are contemplating STEM fields or individuals who are in the early stages of choosing a career as opposed to individuals who have already chosen a career.

**Hypothesis Three.** Hypothesis three stated dimensions of differentiation of self (i.e., I-position & Fusion to Others) will be positively related to STEM motivation, such that more differentiation of self (i.e., higher I-position and lower fusion to others) will be associated with higher STEM motivation. Differentiation of self involves an individual's capabilities to make autonomous decision, express their own ideals, and be minimally affected by external, familial influences (Bowen, 1972, 1974). Components that

contribute to an individual's ability to be differentiated from their family involves I-position and fusion to others. I-position examines an individual's level of stability in their developing sense of "self". Specifically, I-position involves an individual being capable of describing who they are and advocating for their ideals. Individuals who report higher I-position are indicating having more differentiation from others due to having a more developed sense of self. Fusion to others involves the perception of being overly and emotionally involved with others. Individuals reporting lower fusion to others indicates higher differentiation of self-due to not needing to overly rely on others for basic needs to be met. Being more differentiated improves one's development of their vocational identity due to being able to identify their specific desires (i.e., I-position) and being able to be informed but still autonomous in their career decision making process (i.e., fusion to others; Bowen, 1972, 1974).

Aligned with previous research (Johnson et al., 2014; Kinnier et al., 1990; Zingaro, 1983) having more differentiation of self from ones' family did influence STEM motivation. I-position had a significant, positive relation with STEM motivation. Fusion to others had a significant, negative relation with STEM motivation. Since higher I-position and lower fusion to others indicates more differentiation of self the hypothesis was supported.

There are several implications around this finding. First, being more differentiated from one's family of origin allows for greater motivation to participate in STEM fields. Meaning that it is important for families to promote autonomy, open communication, and emotional expressiveness in their children to increase the likelihood of entering STEM fields. Disseminating interventions that target improving a family's capabilities to

differentiate from each other might improve the likelihood of their children to be more motivated to enter STEM fields. Specifically, by improving their children's differentiation, children can be more autonomous and assured in their career decision making process. Another implication involves professionals attempting to aid students in increasing their STEM motivation. Mental health professionals or career counselors might benefit from processing client's family of origin concerns around differentiation of self. These professionals might provide direct interventions that improve an individual's sense of self (i.e., I-position) or autonomy (i.e., fusion to others) involved in the career decision making process. Future research might also benefit in examining treatment protocols around improving differentiation of self to determine if improving differentiation of self does improve STEM motivation.

**Hypothesis Four.** Hypothesis four stated anxious and avoidant attachments will be negatively related to STEM motivation, such that lower scores of anxious and avoidant attachments will be associated with higher STEM motivation. Previous research (Blustein et al., 1995; Ketterson & Blustein, 1997) discussed that insecurely attached individuals are more likely to struggle with career indecision. Avoidant attachment involves an individual's cognitive representations of other's trustworthiness (Bowlby, 1969, 1973). Avoidant attachment had a significant, negative relation with STEM motivation. This finding aligns with Larson & Wilson's (1998) theory that individuals with more insecure attachment (i.e., avoidant attachment) are more likely to be inactive in their career exploration. This finding indicates that as an individual becomes more securely attached (i.e., low avoidant attachment) there is an increase in STEM motivation. Whereas anxious attachment did not have a significant relation to STEM

motivation. Anxious attachment involves an individual's cognitive representation of self-worthiness. This finding, in contrast to Larson & Wilson's (1998), indicates that as anxiously attached individuals become more secure there is no relation to STEM motivation. Thus, the hypothesis was only partially supported.

There are several implications for this finding. One implication is that mental health professionals might benefit to develop interventions that target avoidant attachment issues to improve overall STEM motivation. Specifically, by improving an individual's avoidant attachment style to a more secure one should increase their motivation to STEM fields. Another implication involves dissemination of programs that increase the responsiveness of families to approve the emotional bond between caregiver and child. By increasing overall family responsiveness and improving the emotional bond between child and caregiver an individual might improve their attachment style later in life.

There are several potential limitations that contributed to Anxious attachment not having a significant relation to STEM motivation despite previous research (Blustein et al., 1995; Ketterson & Blustein, 1997). One potential reason might involve that many of the child-caregiver dynamics variables tap into some of the same factors which might have created some shared variance in the data, diminishing their contribution to STEM motivation. Another potential reason might be that the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are contemplating STEM fields opposed to already being in one.

**Hypothesis Five.** Hypothesis five predicted that perceived parental support/care will be positively related to STEM motivation, such that higher scores of parental support

will be associated with higher STEM motivation. Perceived parental care involves the perception a child has of their primary caregiver's level of warmth and care. Aligned with previous research (Li & Kerpelman, 2007; Vignoli et al., 2005; Young, 1994), perceived parental care did influence STEM motivation. Perceived parental care had a significant, positive relation with STEM motivation. This indicates that as an individual perceives their early child-caregiver interactions in more warm and loving ways there is an increase in overall STEM motivation. Thus, the hypothesis was supported.

There are several implications for this finding. A main implication is for the importance of disseminating familial interventions that increase the overall abilities of parents to be responsive and caring to their children. There are many potential ways to increase a parent's ability to be responsiveness like active listening skills, psychoeducation about responsiveness, emotion regulation skills, and psychoeducation about different parenting styles. Another implication involves mental health professionals encouraging their clients to find supportive, responsive individuals in their life. Specifically, by increasing an individual's support system they might experience similar effects of having responsive, caring parents that will increase STEM motivation.

**Hypothesis Six.** Hypothesis six stated perceived parental overcontrol will be negatively related with STEM motivation, such that higher scores of parental control will be associated with lower STEM motivation. Perceived parental overcontrol involves the perception a child has of their parent's level of control and firmness. Parker et al. (1979) discussed that an individual's retrospective perception of their parent's firmness tends to be viewed in more overcontrolling ways. Aligned with previous research (Li & Kerpelman, 2007; Vignoli et al., 2005; Young, 1994), perceived parental overcontrol had

a significant relation with STEM motivation. Specifically, perceived parental overcontrol had a significant, negative relation with STEM motivation. Meaning as an individual perceives higher levels of overcontrol in their early child-caregiver experiences they are less motivated to pursue STEM fields. This provides evidence that children need space to develop their autonomy to make informative decisions about their career choices. Thus, the hypothesis was supported.

There are several implications for this finding. One implication involves the importance of primary caregivers to lower overprotective behaviors to increase autonomy to increase STEM motivation. One way to lower overprotectiveness is to provide psychoeducation to parents about the difference between appropriate responsiveness and inappropriate overprotectiveness. By decreasing overprotectiveness an individual might feel more empowered and autonomous to make their own STEM career decisions. Mental health professionals might also benefit from processing familial overprotectiveness with their clients to treat some of the underlying factors that might contribute to lower STEM motivation.

**Hypothesis Seven.** Hypothesis seven stated that experiential avoidance will moderate the relation between family environment (i.e., Familial Cohesion, Familial Expressiveness, & Familial Conflict) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which would be associated with lower STEM motivation. Despite previous research (Ross et al., 2016) indirectly suggesting that experiential avoidance plays a moderating role between family environment and STEM motivation, no relationship existed. Experiential avoidance did not significantly moderate the relation between

familial cohesion, familial expressiveness, or familial conflict with STEM motivation. Familial cohesion, one's perception of familial support, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on familial cohesion's relation with STEM motivation. Familial expressiveness, one's perception of their family's encouragement of expression, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on familial expressiveness's relation with STEM motivation. Familial conflict, one's perception of conflict in the family, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on familial conflict's relation with STEM motivation. Thus, the hypothesis was not supported.

There are several potential reasons that this hypothesis was not supported. A main limitation involved that familial cohesion, expressiveness, and conflict did not have significant relations to STEM motivation. Familial cohesion and expressiveness did not significantly correlate to STEM motivation, so a moderation analysis was not appropriate. Familial conflict did not have a significant main effect with STEM motivation, so a moderation analysis was not appropriate. Another limitation involved the poor psychometric properties found in this study of the FES. Poor internal consistency might have influenced the accuracy between familial environment and STEM motivation. Specifically, poor internal consistency might indicate that a particular measure is not measuring the entire construct its attempting to measure. The Family Environment Scale having poor internal consistency might indicate that it is not measuring the entirety of familial cohesion, expressiveness, and conflict. Familial cohesion, expressiveness, and conflict are being measured retrospectively and might have a different effect on STEM

motivation if measuring early child-caregiver dynamics in the moment. Many of the child-caregiver dynamics variable also tap into some of the same factors which might have created shared variance, diminishing their contribution to STEM motivation. Also, the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are in the growth or exploration stages of vocational development (Super, 1990, 1994). Finally, a limitation could be that experiential avoidance simply does not play a role in these relations.

**Hypothesis 8.** Hypothesis eight discussed that experiential avoidance will moderate the relation between differentiation of self (i.e., I-position & fusion to others) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation. Despite previous research (Ross et al., 2016) indirectly suggesting that experiential avoidance plays a moderating role between differentiation of self and STEM motivation, no relationship existed. Experiential avoidance did not significantly moderate the relation between I-position or fusion to others with STEM motivation. I-position, which is one's developed sense of self, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on I-position's relation with STEM motivation. Fusion to others, one's emotional involvement with others, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on its relation with fusion to others relation with STEM motivation. Thus, the hypothesis was not supported.

There are several potential reasons why this hypothesis was not supported. For starters, many of the child-caregiver dynamics variable also tap into some of the same factors which might have created shared variance, diminishing their contribution to STEM motivation. Also, the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are in the growth or exploration stages of vocational development (Super, 1990, 1994). Another limitation involves dynamics between parental career choice and a child's fusion to others. Fusion to others might have a positive impact on STEM motivation if a child is fused with their parents and enter a STEM field due to their parents being in STEM and not based on an autonomous decision. Future researchers might want to explore the role of parent career choice, fusion to others, and child's STEM career motivation further. Finally, a limitation could be that experiential avoidance simply does not play a role in these relations.

**Hypothesis 9.** Hypothesis nine discussed that experiential avoidance will moderate the relation between attachment (i.e, anxious attachment and avoidant attachment) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive family dynamics which is associated to lower STEM motivation. Previous research (Ross et al., 2016) indirectly suggesting that experiential avoidance plays a moderating role between attachment styles and STEM motivation, only a partial relationship existed. Experiential avoidance did not significantly moderate the relation between anxious attachment and STEM motivation. Anxious attachment, which is one's cognitive representation of self-worth, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance)

on anxious attachment's relation with STEM motivation. However, experiential avoidance did significantly moderate the relation between avoidant attachment and STEM motivation. Specifically, whenever avoidant attachment is low, an individual who also has low experiential avoidance reported higher STEM motivation than those who have low avoidant attachment and high experiential avoidance. Further, whenever avoidant attachment was high, an individual who reported higher experiential avoidance reported more STEM motivation than someone with low experiential avoidance.

Avoidant attachment, which is one's cognitive representation of other trustworthiness, was moderated by one's ability to avoid difficult experiences (i.e., Experiential Avoidance) on avoidant attachment's relation with STEM motivation. Specifically, individuals who actively avoid difficult experiences (low experiential avoidance) will have more STEM motivation if they believe that others cannot be trusted (high avoidant attachment). Whereas individuals who confront difficult experiences (high experiential avoidance) will have more STEM motivation if they believe that others can be trusted (low experiential avoidance). Thus, the hypothesis was only partially supported.

There are several implications for the moderating effects of experiential avoidance on the relation between avoidant attachment and STEM motivations. First, for individuals who report lower avoidant attachment might benefit from learning specific ways to improve their experiential avoidance to increase STEM motivation. Specifically, these individuals might benefit from workshops or therapy that improve their capabilities to confront some of their distressing issues head on. However, whenever individuals have high avoidant attachment mental health professionals will need to first address the underlying attachment issues before improving an individual's experiential avoidance.

This is primarily due to experiential avoidance serving as a buffer to the negative effects of avoidant attachment styles. Thus, if professionals want students with insecure attachment issues to improve their overall motivation to be in STEM fields, they will first need to address attachment before improving experiential avoidance.

Although experiential avoidance did moderate the relation between avoidant attachment and STEM motivation, no effect was found for the relation between anxious attachment and STEM motivation. There are several potential reasons that might have limited this effect. One limitation was that many of the child-caregiver dynamics variable also tap into some of the same factors which might have created shared variance, diminishing their contribution to STEM motivation. Also, the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are in the growth or exploration stages of vocational development (Super, 1990, 1994). Finally, a limitation could be that experiential avoidance simply does not play a role in these relations.

**Hypothesis 10.** Hypothesis ten discussed experiential avoidance moderating the relation between perceived parenting (i.e., perceived parental care and overcontrol) and STEM motivation, such that higher scores of experiential avoidance will amplify the negative effects of insecure, maladaptive parenting dynamics which is associated to lower STEM motivation. Previous research (Ross et al., 2016) indirectly suggesting that experiential avoidance plays a moderating role between perceived parental behaviors and STEM motivation, only a partial relationship existed. Experiential avoidance did not significantly moderate the relation between perceived parental overprotection and STEM

motivation. Perceived parental overprotection, which is one's reflection on their parent's level of firmness or control, was not moderated by one's abilities to avoid difficult experiences (i.e., Experiential Avoidance) on perceived parental overprotection's relation with STEM motivation. Experiential avoidance did significantly moderate the relation between perceived parental care and STEM motivation. Specifically, whenever perceived parental care is low, an individual who also has low experiential avoidance reported lower STEM motivation than those who have low parental care and high experiential avoidance. Further, whenever perceived parental care was high, an individual who reported lower experiential avoidance reported more STEM motivation than someone with high perceived parental care and high experiential avoidance. Perceived parental care, which is one's perception of their caregivers' love and warmth, was moderated by one's ability to avoid difficult experiences (i.e., Experiential Avoidance) on perceived parental care's relation with STEM motivation. Specifically, individuals who actively avoid difficult experiences (low experiential avoidance) will have more STEM motivation if they perceived their parents as unloving (low perceived parental care). Whereas individuals who confront difficult experiences (high experiential avoidance) will have more STEM motivation if they perceived their parents as loving (high perceived parental love). Thus, the hypothesis was only partially supported.

There are several implications for the moderating effects of experiential avoidance on the relation between perceived parental care and STEM motivation. One implication involves that experiential avoidance serves as a protective factor for STEM motivation if an individual perceives parental care as low. Further, this means that mental health professionals would want to process with their clients' issues related to poor

parental care before addressing experiential avoidance issues. Another implication is that whenever perceived parental care is high participants who also reported high experiential avoidance reported lower STEM motivation. This means that mental health professionals want to provide interventions targeting experiential avoidance to increase STEM motivation.

Although experiential avoidance did moderate the relation between perceived parental care and STEM motivation, no effect was found for the relation between perceived parental overprotection and STEM motivation. There are several potential reasons that might have limited this effect. One limitation was that many of the child-caregiver dynamics variable also tap into some of the same factors which might have created conflict in the variance, diminishing their contribution to STEM motivation. Also, the bulk of these participants were STEM majors and early family-dynamics might no longer be a key factor in their motivation to stay in STEM fields. As such, future research might want to examine individuals who are in the growth or exploration stages of vocational development (Super, 1990, 1994). Finally, a limitation could be that experiential avoidance simply does not play a role in these relations.

### **Implications**

There are several implications from this study. A primary implication is that early child-caregiver experiences (i.e., differentiation of self, secure attachment, and perceived parental behaviors) has a relation to STEM motivation. Therefore, it is important to develop interventions that directly improve early child-caregiver experiences. Specifically, developing interventions that enhance a families' differentiation of self, attachment styles, and perceived parenting behaviors will improve STEM

motivation. Generally, providing an environment that allows a child to be their own independent person while still having a healthy connection (i.e., differentiation of self), facilitate a strong emotional bond between caregiver-child (i.e., strong attachment), be responsive/caring (i.e., perceived parental care), and allow children to explore their autonomy (i.e., perceive parental overprotection) will be related to entering STEM fields. Therefore, developing interventions that improve a family's capabilities to be differentiated, securely attached, and authoritative parenting style could increase the motivation for children to enter STEM fields. Alternatively, mental health professionals might develop therapeutic interventions that treat some of the unresolved distress an individual feels about having maladaptive early child-caregiver dynamics to improve STEM motivation. Thus, by developing/disseminating interventions that target both early child-caregiver dynamics and therapeutic interventions that target processing maladaptive child-caregiver dynamics, there might be an improvement in individuals entering into STEM fields.

A second implication involves the moderating effects of experiential avoidance on individuals with avoidant attachment and low parental care. Generally, mental health providers would want to treat the issues related with poor avoidant attachment and poor parental care before targeting experiential avoidance. This provides evidence for the need to provide integrative care in therapy that addresses multiple concerns. Further, even individuals who have healthier child-caregiver dynamics (i.e., low avoidant attachment, high perceived parental care) can benefit from decreasing their experiential avoidance to improve their STEM motivation. Thus, treating unhealthy child-caregiver dynamics before treating experiential avoidance is key to improving overall STEM motivation.

## Limitations

There were several limitations to this study. One limitation involved that the sample was highly homogenized in demographics and results should be generalized with caution. Specifically, the sample primarily included individuals who were mostly white, cisgender, and straight so results might not be generalizable to other individuals. Results also might not be generalizable due to the sample being taken from a southern sample. Specifically, these results might not apply to other regions. Another limitation involved the poor internal consistency of the Family Environment Scale with subscales measuring family warmth: familial cohesion, familial expressiveness, and familial conflict. Potential future research might utilize a more cohesive measure of the family environment to determine more accurate results. This study also analyzed students who retrospectively discussed their early child-caregiver dynamics, as such results might be skewed more harshly than analyzing child-caregiver dynamics in the present moment (Parker et al., 1979).

Another limitation involves asking participants to answer these questions through self-report. Participants self-report can create validity issues. Specifically, asking individuals to self-report their perspectives are not always accurate. Another limitation involved mono-method bias. Specifically, only one measure was utilized to examine an entire construct (i.e., attachment) per which might limit understanding the full construct itself. Another limitation involves many participants already identified as STEM majors, as such it is possible that participants already held a solidified STEM motivation. To better understand the factors that go into someone's evolving decision-making process around entering STEM fields, researchers might examine students who are in the process

of making career decisions rather than individuals who were solidified in their major choice. A final limitation was that this research was conducted during the Covid-19 Pandemic, as such results might be influenced by the distress caused by the pandemic.

### **Future Directions**

In conclusion, future researchers might want to utilize a more robust and psychological sound measure of the real familial environment to get a better understanding of family environments role on STEM motivation. Future researchers might also want to attempt to examine participants who are currently undergoing career decision-making like high school students or students who are not as far along in their career decisions. By observing individuals who are in the career decision-making process might illuminate the ways these child-caregiver dynamics play in STEM motivation. Further, future researchers might want to improve in the diversity of sample collection to make the results more generalizable to the population.

Due to some of the discrepancies between cisgender men and women in respect to entering STEM fields, future researchers might examine these gender differences more explicitly. By examining gender differences, future research might be able to target specific needs to decrease gender wage gaps or improve women entering STEM fields. Looking at variables, it might be more beneficial to observe child-caregiver dynamics in vivo instead of retrospectively. Specifically, Parker et al. (1979) discussed that whenever individuals retrospectively examine parenting behaviors, they are harsher than reality. Finally, qualitative research might also enhance the understanding of experiential avoidance's role as a moderating variable in the relation between child-caregiver

dynamics and STEM motivation due to their not being a lot of direct evidence in the literature around these variables.

Another factor future researchers might take involves an alternative way to measure constructs. For instance, future researchers might take a non-dimensional approach to measuring these constructs. Specifically, rather than observing the dimensions of child-caregiver variables, future researchers might use more categorical constructs (i.e., parenting styles). By taking a more categorical approach family dynamics might be more generalizable in nature. Finally, future researchers might also examine factors that influence the ways in which parents behave. Specifically, by examining why parents behave in a way that is maladaptive might provide a more holistic perspective to these specific dynamics and relations.

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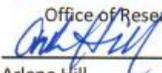
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## **Appendix A**

### **Human Use Committee Approval**

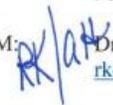
**OFFICIAL FILE COPY: HUC 21-053**

Office of Research &amp; Partnerships

  
 Arlene Hill  
 Executive Administrative Assistant


## EXEMPTION MEMORANDUM

TO: Mr. Dylan Harrell and Dr. Walt Buboltz

FROM:  Dr. Richard Kordal, Director of Intellectual Properties  
[rkordal@latech.edu](mailto:rkordal@latech.edu)

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: January 4, 2020

TITLE: "Moderating Effects of Experiential Avoidance on Child-Caregiver Dynamics and STEM Motivation"

NUMBER: HUC 21-053

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s): 46.104(d) (2) (i).

2. "Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

(ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or

(iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by § 46.111(a)(7)."

Thank you for submitting your Human Use Proposal to Louisiana Tech's Institutional Review Board.

## **Appendix B**

### **Consent Form**

### HUMAN SUBJECTS CONSENT FORM

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below. You must be of legal age or must be cosigned by parent or guardian to participate in this study.

**TITLE OF PROJECT:** Moderating effects of Experiential Avoidance on Child-Caregiver Dynamics and STEM Motivation

**PURPOSE OF STUDY/PROJECT:** The primary purpose of this study is to further the literature on the relation between child-caregiver dynamics (i.e., Family environment, Differentiation of Self, Attachment, and Perceived Parenting Behaviors) and STEM Motivation. Further, this study examines the role of Experiential Avoidance potentially moderates negative child-caregiver dynamics and STEM. By understanding these various relationships, future research can be developed to identify interventions to improve women's overall motivation to enter STEM fields.

**SUBJECTS:**

In order to participate in this study one must:

- 1) Be a student at Louisiana Tech University
- 2) Be over 18 years of age

**PROCEDURE:** Participation in this study is voluntary. You may skip any questions that make you feel uncomfortable answering, but are encouraged to answer as many questions as you can. Additionally, you can quit participating at any time without penalty. This survey should take approximately 30 minutes to complete.

**BENEFITS/COMPENSATION:** Instructors may offer extra class credit for participation in the survey. If extra credit is provided, the instructor must offer an alternative assignment for extra credit for those students who do not choose to participate in this study.

**RISKS/DISCOMFORTS/ALTERNATIVES:** If you encounter distress while taking this survey and are in need of help, you may visit the counseling center on campus for additional support. Their webpage can be found at: <http://www.latech.edu/students/counseling/> or you can call (318) 257-2488. The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

**CONSENT:**

The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research.

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

I attest by clicking "CONTINUE" that I have read and understood the following description of the study, "Moderating effects of Experiential Avoidance on Child-Caregiver Dynamics and STEM Motivation", and its purposes and methods. I understand that my (Or my Child's) participation in this research is strictly voluntary and my (or my child's) participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw (my child) at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of the material will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

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

<b>PRINCIPAL INVESTIGATOR:</b>	<b>CO-INVESTIGATOR:</b>
Dylan Harrell	Walt Buboltz, PhD
Louisiana Tech University	Louisiana Tech University
Dlh061@email.latech.edu	Buboltz@latech.edu
337-654-0894	318-257-4039

**Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:**

Dr. Richard Kordal, Director, Office of Intellectual Property & Commercialization

Ph: (318) 257-2484, Email: [rkordal@latech.edu](mailto:rkordal@latech.edu)

Continue ONLY when finished. You will be unable to return or change your answers.

## **Appendix C**

### **Demographics**

What is your current age in years

What is your gender identity

- Man
  Woman
  Trans
  Gender-Nonbinary
  Gender Fluid
  Other (please specify)

Other:

With which ethnic group do you most identify with?

- European American/White
  African American/Black
  Asian American
  Hispanic/Latino
  Native American
  Biracial
  Other (please specify)

Other:

How do you define your Sexual Orientation

- Heterosexual/Straight  
 Lesbian  
 Gay  
 Bisexual/Pansexual  
 Queer  
 Questioning  
 Asexual/Aromantic  
 Other (please specify)

Current relationship status?

- Single
  Casually Dating
  Committed
  Engaged
  Married
  Seperated
  Divorced
  Widowed
  Other (please specify)

Other:

Current year/status in school?

- Freshman
  Sophmore
  Junior
  Senior
  Graduate
  Other (please specify)

Other:

What is your current Major (if any) or undecided

Have you taken any of your core courses related to your major?

- Yes
  No
  Other (please specify)

Other:

To the best of your knowledge, what is your current GPA?

Reflecting on your childhood, what is the gender (Man, Woman, Trans.) of the individual who you would consider to be your primary caregiver? (or the person you believe took the most care of you)

What were the occupations of your primary caregivers (the people who raised you) during your childhood/adolescence?

If there has been a change, what is the occupation of your primary caregivers (the people who raised you) currently?

To the best of your knowledge, what was the average income of your household growing up?

- Less than \$20,000
- \$20,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- Over \$100,000

## **Appendix D**

### **Science Motivation Questionnaire II**

SMQ-II. In order to better understand what you think and how you feel about your science courses, please respond to each of the following statements from the perspective of "When I am in a science course..."

	Never	Rarely	Sometimes	Often	Always
The science I learn is relevant to my life.	<input type="radio"/>				
I like to do better than other students on science tests.	<input type="radio"/>				
Learning science is interesting.	<input type="radio"/>				
Getting a good science grade is important to me.	<input type="radio"/>				
I put enough effort into learning science.	<input type="radio"/>				
I use strategies to learn science well.	<input type="radio"/>				
Learning science will help me get a good job.	<input type="radio"/>				
It is important that I get an "A" in science.	<input type="radio"/>				
I am confident I will do well on science tests.	<input type="radio"/>				
Knowing science will give me a career advantage.	<input type="radio"/>				
I spend a lot of time learning science.	<input type="radio"/>				
Learning science makes my life more meaningful.	<input type="radio"/>				
Understanding science will benefit me in my career.	<input type="radio"/>				
I am confident I will do well on science labs and projects.	<input type="radio"/>				
I believe I can master science knowledge and skills.	<input type="radio"/>				
I prepare well for science tests and labs.	<input type="radio"/>				
I am curious about discoveries in science.	<input type="radio"/>				
I believe I can earn a grade of "A" in science.	<input type="radio"/>				
I enjoy learning science.	<input type="radio"/>				
I think about the grade I will get in science.	<input type="radio"/>				
I am sure I can understand science.	<input type="radio"/>				
I study hard to learn science.	<input type="radio"/>				
My career will involve science.	<input type="radio"/>				
Scoring high on science tests and labs matters to me.	<input type="radio"/>				
I will use science problem-solving skills in my career.	<input type="radio"/>				

## **Appendix E**

### **Approval to use Family Environment Questionnaire**

For use by Dylan Harrell only. Received from Mind Garden, Inc. on February 15, 2018



[www.mindgarden.com](http://www.mindgarden.com)

To Whom It May Concern,

The above-named person has made a license purchase from Mind Garden, Inc. and has permission to administer the following copyrighted instrument up to that quantity purchased:

**Family Environment Scale**

The five sample items only from this instrument as specified below may be included in your thesis or dissertation. Any other use must receive prior written permission from Mind Garden. The entire instrument may not be included or reproduced at any time in any other published material. Please understand that disclosing more than we have authorized will compromise the integrity and value of the test.

**Citation of the instrument must include the applicable copyright statement listed below.**

**Sample Items:**

Real Form

Family members really help and support one another.  
We fight a lot in our family.  
We don't do things on our own very often in our family.

Ideal Form

Family members will really help and support one another.

Expectations Form

Family members will often keep their feelings to themselves.

Copyright 1974, 2002 by Rudolf H. Moos. All rights reserved in all media. Published by Mind Garden, Inc., [www.mindgarden.com](http://www.mindgarden.com)

Sincerely,

Robert Most  
Mind Garden, Inc.  
[www.mindgarden.com](http://www.mindgarden.com)

Family Environment Scale Instrument (FES)  
Copyright 1974, 2002 by Rudolf H. Moos. All rights reserved in all media.  
Published by Mind Garden, Inc., [www.mindgarden.com](http://www.mindgarden.com)

## **Appendix F**

### **Differentiation of Self Questionnaire**





## **Appendix G**

### **Experiences in Close Relationships-Revised**



## **Appendix H**

### **Parental Bonding Instrument**

**PBI-** This questionnaire lists various attitudes and behaviors of parents. As you remember your primary caregiver in your first 16 years rate each question with the appropriate statement.

	Very Unlike	Moderately Unlike	Moderately Like	Very Like
Spoke to me in a warm and friendly voice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did not help me as much as I needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let me do those things I liked doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seemed emotionally cold to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appeared to understand my problems and worries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was affectionate to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Liked me to make my own decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did not want me to grow up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tried to control everything I did	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Invaded my privacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enjoyed talking things over with me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frequently smiled at me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tended to baby me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did not seem to understand what I needed or wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let me decide things for myself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Made me feel I wasn't wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Could make me feel better when I was upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did not talk with me very much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tried to make me feel dependent on them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt I could not look after myself unless they were around	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gave me as much freedom as I wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let me go out as often as I wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was overprotective of me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did not praise me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Let me dress in any way I pleased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## **Appendix I**

### **Multidimensional Experiential Avoidance Questionnaire**



