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The Role of Learning Experiences, Supports and Barriers in Career Development for the Doctoral Student

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VCU

The Role of Learning Experiences, Supports and Barriers in Career Development for the Doctoral Student

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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THE ROLE OF LEARNING EXPERIENCES, SUPPORTS AND BARRIERS FOR THE DOCTORAL STUDENT

By Madeline B. Goldman, DDS, MEd

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2018

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This study seeks to understand the role of career development classes offered by the graduate school at a large public research university as part of its Leadership and Entrepreneurs for Professional Development (LEAPD) program and the LEAPD program effects on doctoral students' career development and choices. The study also aims to understand the contextual influences on doctoral students, specifically the perceived supports and barriers that influence their career choices. The study's goal in understanding these issues is to discover how the LEAPD courses impact these students as well as identify perceived supports and barriers in career development for doctoral students. The Social Cognitive Career Theory (SCCT) serves as a theoretical foundation for the study. This qualitative interview study involved students from different STEM programs at the doctoral level. Results of this study showed that the LEAPD program raised the career development confidence and inferred self-efficacy of these students.

Furthermore, performance accomplishments were a significant factor in the persistence of these students to the doctoral level. Teachers and professors were most frequently reported as sources of support for these doctoral students, and the presence of supports seemed to minimize barrier perceptions.

Keywords: doctoral students, career development, learning experiences, SCCT, supports, barriers, performance accomplishments, vicarious learning, teacher support, STEM

CHAPTER 1 INTRODUCTION

The importance of obtaining a graduate degree is growing constantly, as more and more employers are requiring workers to have higher levels of educational attainment (Council of Economic Advisers, 2009). Students may enter graduate school with a specific career or profession in mind; yet not unlike undergraduates, doctoral students change their plans because of their graduate experiences (Haley, Jaeger & Levin, 2014). The educational process further refines the career goals of graduate students (Corcoran & Clark, 1984). Students' goals are often changed because of academic and experiential learning. Students who are not confident in their career goals are more likely to drop out of school (Newton & Gaither, 1980), have lower grades and experience more challenges adjusting to college (Plaud, Baker & Groccia, 1990).

Additionally, there exists a gap between research and practice on career development (Savickas & Walsh, 1996). Many practitioners do not base their interventions on the latest research and career theory. Halasz and Kempton (2000) surveyed 40 universities and found that most them could not identify a career development theory that was used in the development of the career course curriculum. Courses are generally designed to meet the needs of a larger number of students for career decision making than can be met by career counseling alone (Smith, Myers & Hensley, 2002). Lack of a theoretically informed career course is problematic (Byars-Winston, Gutierrez, Topp, & Carnes, 2011). It is important to know what specific factors influence career choice and how those factors are related (Byars-Winston, et al., 2011).

Interventions that rely on anecdotal evidence and unsubstantiated strategies lack the ability to maximize participants' career outcomes (Byars-Winston et al., 2011).

Research has shown that career interventions support college students by helping them define, set and create plans to reach academic and career goals (e.g., Baker & Popowicz, 1983; Diegelman & Subich, 2001; Fretz, 1981; Oliver & Spokane, 1988; Whiston, Brecheisen & Stephens, 2003; Whiston, Sexton, & Lasoff. 1998). Numerous publications exist on undergraduate students but comparatively fewer publications exist on career development for graduate students. (Byars-Winston, et al., 2011). Graduate students may become stymied by perceived career barriers that slow their progress toward degree completion (Betz, 2004). It is equally important to understand career supports that facilitate career progress.

However, few conclusions can be made concerning the types of interventions that are especially meaningful to college students. This primarily quantitative approach may show changes before and after an intervention, but it does not give insight into why or how those changes occurred. Studies should examine what happens in these career interventions as well as examine how students experience these career interventions.

Most of the research in Social Cognitive Career Theory (SCCT) has focused on individual variables like self-efficacy, career goals and interests rather than environmental supports and barriers (Fouad, Hackett, Smith, Kantamneni, Kitzpatrick, Haag & Spencer, 2010). Few studies have comprehensively examined the variety of barriers and supports that influence career choice (Fouad et al, 2010).

There have been few studies on barriers and supports in career development for graduate students. Barriers and supports may vary by educational level. Financial barriers may be far more significant for the graduate student, whereas parental support or lack of parental support may be

more important in earlier stages of development (Fouad et Al., 2010). Very little research has focused on barriers in the achievement environment where important career attitudes are formed or reactivated (Deemer, Thoman, Chase & Smith, 2014).

Learning experiences in career development have not been studied extensively. Under SCCT, learning experiences are believed to influence self-efficacy and outcome expectations (Lent et al., 1994). Not as much is known about the specific components that contribute to career-related learning experiences (Tokar, Thompson, Plaufcan & Williams, 2007) and very little is known regarding how learning experiences contribute to experiential sources of self-efficacy and outcome expectations (Tokar et al, 2007).

Most of the research has focused on how career factors such as learning experiences, self-efficacy, supports and barriers influence early career choices by high school or younger students. Only recently has research focused on choices in college and the workplace (Fouad & Santana, 2016). Researchers who studied undergraduate and graduate students have mainly focused on the influence of self-efficacy in STEM-related fields. Chemers, Zurbriggen, Syed, Goza & Bearman (2011) surveyed graduate students to understand their science support experiences specifically research experience, mentoring and community involvement. They found that research experience and mentoring are associated with self-efficacy, whereas community involvement had less of an impact (Syed, Goza & Bearman, 2011). This research has not been replicated for STEM doctoral students.

Recent studies were also completed on perceived supports and barriers for college students using Social Cognitive Career Theory (SCCT) as a framework. Pena-Calvo, IndaCaro, Rodriguez, Menendez and Fernandez-Garcia (2016) studied engineering college students in Spain and found that peers and family were the most important perceived supports, whereas

teaching staff and financial difficulties were the greatest perceived barriers. It is unclear whether doctoral students in the United States have the same supports and barriers. It would also be important to understand how these supports and barriers act. It would be useful to know the process behind the influence of the support or barrier in career development.

Theoretical Rationale

There are three theories that are predominant in career development: Holland's Theory of Vocational Personalities, Theory of Career Construction, and Social Cognitive Career Theory (SCCT). The Social Cognitive Career Theory is the best match for this study. SCCT (Lent, Brown & Hackett, 1994) was developed to merge and link existing career development theories. The framework emphasizes the dynamic processes that influence and form academic and career interest, choice and performance. Derived largely from Bandura's (1986) general social cognitive theory, SCCT takes into consideration the relationship between interest, abilities and goals that are addressed in other career theories (Lent & Brown, 1996). It also addresses the learning experiences, both cognitive and experiential, and their influence on the development of vocational interests in Holland's (1985) theory. Like the Career Construction theory, it takes a constructivist approach to career choice (Lent & Brown, 1996).

Figure 1 illustrates the relationship among these constructs in SCCT (Lent, Brown & Hackett, 1994).

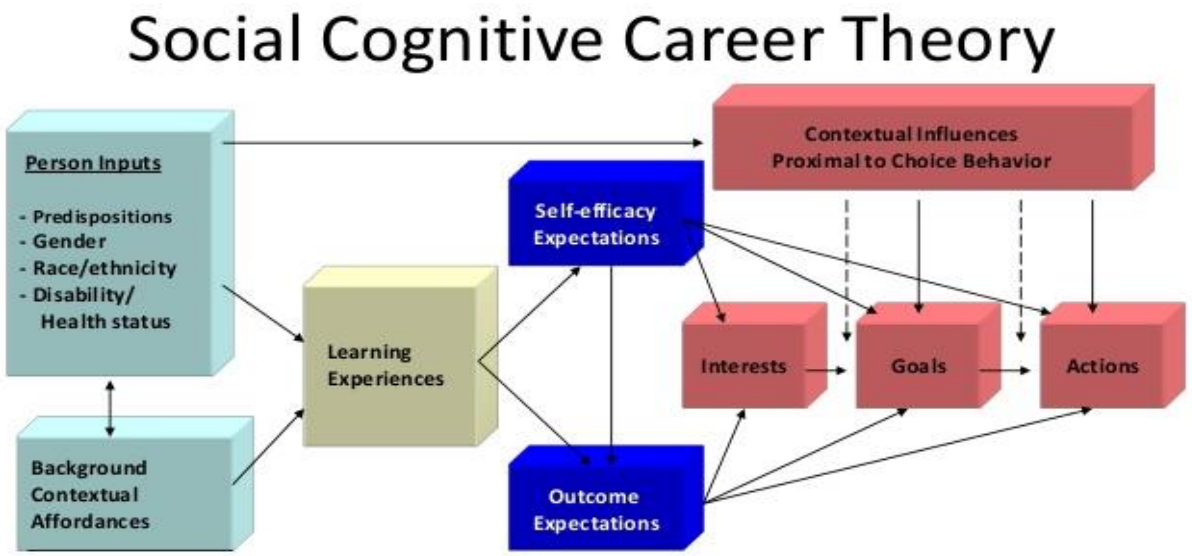


Figure 1 Social Cognitive Career Theory Lent et al., 1994

In studying these person attributes, SCCT emphasizes three variables: self-efficacy beliefs, outcome expectations and personal goals (Lent & Brown, 1996). Learning experiences are experiential sources of self-efficacy, and outcome expectations are influenced by contextual supports and barriers both proximal and distal. Thus, learning experiences can figure prominently in interest formation career choice and career performance (Schaub & Tokar, 2004).

In addition to the study of learning experiences, SCCT can also be used as a framework for studying and modifying career barrier effects (Albert & Luzzo, 1999; Swanson, Daniels & Tokar, 1996; Swanson & Woitke, 1997) as well as the study of contextual supports. Individuals can be affected adversely or beneficially by events that are beyond their control or awareness. Perceived barriers or supports (contextual influences) are subject to individual interpretation.

(Lent, Brown & Hackett, 2000). Such environmental variables can be distal background contextual factors that affect learning experiences or proximal contextual influences important during the active phase of education or career decision making (Lent, Brown & Hackett, 2000), According to SCCT, self-efficacy, outcome expectations, learning experiences and contextual influences affect individual career interest. Career interest can then influence career choice, action and performance. The degree to which individuals succeed or fail in these performance experiences forms a feedback loop that influences learning experiences (Lent, Brown & Hackett, 1994).

SCCT was chosen as a theoretical foundation for the study because it has been identified as a promising approach for examining the processes by which career choices are made (Conklin, Dahling & Garcia, 2013; Garriott, Flores & Martens 2013; Olle & Fouad, 2015). This study examines how a learning experience, specifically a career development class, can influence career choice. It also examines what other types of learning experiences doctoral students report as influencing career choice. Additionally, this study examines the contextual supports and barriers--both distal and proximal--that doctoral students perceive as influencing career choice.

Statement of Purpose

The purpose of the study is twofold: 1) add to the literature base on Social Cognitive Career Theory and 2) inform career advising in practice by connecting theory to practice. The study hopes to add to the literature based on career development classes offered at universities in terms of how they contribute to doctoral student career development as well as on the contextual supports and barriers that doctoral students face. It can also add to the literature on Social Cognitive Career Theory as well as to the design and implementation of career development

classes at universities. When examining the Social Cognitive Career Theory, most studies have been conducted on STEM undergraduate students. This study aims to illustrate specific contextual supports and barriers that are influential for doctoral students in STEM fields. This study further aspires to understand how the learning experience or career services intervention influences the doctoral student.

Very few studies address STEM doctoral-level career development classes and doctoral students' contextual supports and barriers. There are also very few qualitative studies on SCCT in the literature. This study will extend previous work on contextual supports and barriers moving beyond the categorization of influences (Fouad et al., 2010) toward an understanding of experiences of student who are participating in a career intervention. This study is intended to develop a deep understanding of the process by which students engage in career choice and navigate contextual supports and barriers. This study will also extend the empirical research base on SCCT by examining the different components of the career development learning experience and its subsequent role on career choice.

The study seeks to understand the role of the career development class experiences for the doctoral student. The theoretical framework for the study suggests that learning experiences, such as those taught in career development classes, impact their career choice and interest. By also understanding the contextual supports barriers that these doctoral students face in their doctoral careers, the interviews may help the students understand and become aware of the barriers themselves. Findings may also empower the students to take more control over their career development as they become cognizant of their influences.

Another goal of this study is to inform career advising of doctoral students from different programs as well as inform instruction of a career development class. Educators will be able to

make use of the information gained in this study when designing future career development classes or interventions. This study can help higher education administrators understand the contextual barriers that doctoral students face and be able to help them navigate those barriers. It may also help administrators be a source of support for doctoral students in their career development journey.

This study is significant because it will contribute to the existing literature base on SCCT. It will allow for the understanding of how the SCCT works to influence career development. It will also allow for a greater understanding of the relationships between the variables of SCCT, such as the relationship between learning experiences and self-efficacy or perceived supports, and barriers and career interests. New relationships within the model may also be identified. This study will also be significant because it will inform career development practice in higher education. By understanding the significant supports and barriers for the doctoral students, practitioners can better understand how to advise these students. Professors and administrators alike can help doctoral students navigate common barriers and recommend sources of support for them. Professors and administrators will also have a better understanding of the learning experiences that influence the doctoral student. They will be able to improve learning experiences in career development as well as other learning experiences that are important to the doctoral student.

Background

Career development in higher education has mainly been studied in undergraduate students; researchers often want to know the impact or effectiveness of a career development course offered to undergraduate students (Fouad, Cotter & Kantamneni, 2009). Some studies

have shown that career decision-making difficulties decrease after the completion of a college career course designed to increase career decision making confidence and ease career exploration. However, these courses have not always changed perceptions of barriers (Fouad et al., 2009).

Social-contextual variables also have an influence on college students' career decision making; research for college students has indicated that they perceive a considerable number of influences on their career goals (Luzzo, 1993; Luzzo & McWhirter, 2001; Swanson & Tokar, 1991). Financial concerns, role conflicts and family influences are some examples of contextual variables that can be perceived barriers to career choices and subsequent career decisions. It may be beneficial for career interventions to be designed to help students cope with perceived barriers.

Career courses are a common way to provide career interventions to college students. Folson and Reardom (2003) found that students who took a career course were satisfied and they increased college persistence (Fouad et al., 2009) indicating that career courses increased students' career self-efficacy and decreased career decision making difficulties. Many colleges offer career courses to help students through self-assessment, career exploration and decision making as well as to provide students with tools needed for the job search. These self-assessments include such instruments as the Myers-Briggs (Myers & Briggs, 1976) and the Strong Interest Inventory (Donnay, Morris, Schaubhut & Thompson, 2005). Job search strategies and career research are also frequently found in career classes (Johnson, Nichols, Buboltz & Riedesel, 2002) as well as lectures from professionals who offer career advice (Macera & Cohen, 2006). This study examines the role of a career course focusing on career exploration and how it affects individual career choice and perception of educational and occupational supports and

barriers. Using an SCCT framework allows us to understand the components of an intervention and its influence on a career trajectory. SCCT can also be helpful to practitioners because it can point to specific areas where the intervention can assist in the career decision making process (Fouad & Santana, 2016).

The career course in this study is part of the Leaders and Entrepreneurs for Professional Development (LEAPD) program offered by the graduate school at a large public research university. The graduate school strives to create an engaging environment for teaching, learning, research, creativity and public service. It strives to be aware of the changing needs of students and society, remaining flexible in meeting those needs. Students often have difficulty making career decisions; if such difficulties are not addressed, graduate students might not make optimum career and academic choices. One of the courses offered by LEAPD is a Biomedical Sciences Careers Seminar. The course is designed to broaden the students' knowledge about the spectrum of non-academic careers available to people with degrees in biomedical sciences. In addition, the course is designed to complement the educational experience of the student with career development activities that help clarify career goals and prepare students for future professional endeavors.

It is important to study STEM doctoral students because there is an increased demand for jobs requiring an advanced degree. By 2018, the U.S. Commission on the Future of Graduate Education predicts an additional 2.5 million jobs requiring an advanced degree, with the number of jobs requiring a master's degree growing by 18 percent and those requiring a doctoral degree by rising by 17 percent (Wendler, Bridgeman, Cline, Millet, Rock et al., 2010). With the increased importance of master's degrees for many entry-level positions in Science, Technology, Engineering and Mathematics (STEM) fields, new career courses have emerged to enhance the

competitiveness and readiness of the workforce (Snyder, Dillow & Hoffman, 2009). Job placements for PhDs suggest that the U.S. academic market is no longer the primary placement for many new PhD students. According to an NSF study (2006), more than 50 percent of doctoral students took nonacademic positions in private and public-sector organizations. There is a need for doctoral students to understand alternative career pathways.

It is also important to study doctoral students to verify the importance of high-impact educational practices. High-impact educational practices have been widely tested and shown to be essential for college students from a wide variety of backgrounds (Kuh, 2008). These practices can include first-year seminars, learning communities, undergraduate research and internships. Research has shown increased rates of student retention and student engagement when student participate in high-impact educational practices. Undergraduate research has been most prominently used in the science disciplines. Undergraduate institutions are creating opportunities to connect students to systematic investigation and research. The goal is to involve students with active questions, cutting-edge technologies and an excitement that comes from answering research questions. Internships are another common form of experiential learning. The goal of internships is to provide students with experience in a work setting. They also benefit from being coached and supervised by professionals in the field (Kuh, 2008).

Research Questions

This study explored three research questions:

1. How does the LEAPD program inform doctoral students' career development?
2. What other past learning experiences have the doctoral students had that have influenced their career development?

3. What contextual factors (perceived supports and barriers) have influenced career development?

These questions address the different components of the SCCT to gain a deeper understanding of the theory and test its effectiveness and applicability for the study. The first question asks what the role of the career development class is for these doctoral students. This question is designed to help understand how this class helps the students. The second research question offers additional insight into other learning experiences that are important for career development and is also a part of the SCCT framework. The final research question investigates the supports and barriers that these doctoral students have faced during their studies. Once we understand the supports and barriers that these students face, educators can better advise them as career counselors.

Definition of Terms

Several terms used in this study have varying definitions across relevant literature. This section provides operational definitions for this study.

Career barriers. *Career barriers* are defined as "events or conditions either within the person or in his or her environment that make career progress difficult" (Swanson & Woitke, 1997, p. 434). These barriers include both intrapersonal and environmental factors that inhibit career development (Lent et al., 2000).

Career choice. In this study, *career choice* is defined as an expressed intention or goal for pursuing an academic or occupational option. It is the result of a complex interaction of factors such as learning experiences and contextual influences that form an individual's decision to choose one career path over another (Lent et al., 2002).

Career development *Career development* is defined as the "total constellations of economic, sociological, psychological, educational, physical and chance factors that combine to shape one's career" (Sears, 1982, p.139)

Career development class A *career development class* is an intervention designed to assist students to develop career plans. This class may include helping students explore career options, make decisions, create plans to implement those decisions and manage growth and development within a chosen field.

Contextual influences on the career choice process *Contextual influences* are factors that a person perceives as having a significant role in his or her process of making academic and career choices. These influences may provide supports or block (barriers) consideration of options, making of decisions and implementation of plans (Lent et al., 1994). Several additional terms provide further clarification of environmental influences:

- **Distal background influences** *Distal background influences* precede and help shape learning experiences that fuel personal interests and choices. Examples include exposure to role models, gender and cultural role socialization, and emotional and financial support for engaging in an activity (Lent et al., 1994).
- **Proximal influences** *Proximal influences* come into play at critical choice junctures along the SCCT Pathway. They can moderate and directly affect the processes by which individuals make and implement career choices. Examples include personal career network contacts and structural barriers (Lent et al., 1994; Lent et al., 2000).

- **Perceived contextual influences** *Perceived contextual influences* are factors that are perceived by the individual and articulated as potentially influencing their progress towards educational and career goals (Lent et al., 2000)
- **Objective contextual influences** *Objective contextual influences* are factors that influence career choice that are objective—i.e., they exist regardless of whether they are perceived by the individual or not. Examples of objective factors include the quality of the educational experience an individual has been exposed to or the financial support available to one to pursue training (Lent et al, 2000).

Learning Experiences *Learning experiences* are experiential sources of self-efficacy and outcomes expectations that are shaped by person inputs and distal contextual influences, according to SCCT. There are four types of learning experiences or sources of self-efficacy formation, which include personal performance accomplishments, vicarious learning, social persuasion and emotional arousal (Thompson & Dahling, 2012).

- **Social persuasion** *Social persuasion* is a learning experience that is the result of direct encouragement or discouragement (Bandura, 1986).
- **Vicarious learning** *Vicarious learning* or modeling is learned from seeing someone else succeed or fail. It is most helpful for success when the individuals themselves to be like the model (Bandura, 1986). Vicarious learning could be a type of experiential learning that occurs in shadowing or internships.
- **Emotional arousal or physiological factors** *Emotional arousal* is triggered by physiological factors such as changes in heart rate, muscular tension or vasomotor reactions. In this form of emotional learning, “persons, places and events become

endowed with anxiety-arousing value associated with a painful experience" for example (Bandura, 1986, p.42).

- **Performance accomplishments** *Performance accomplishments* or the achievement of mastery is one important type of learning experience that raises self-efficacy (Bandura, 1986). These accomplishments may be the result of doing well in a class, for example, but can also occur in the workplace.

Summary

Previous research on career development has focused primarily on undergraduate students. Additionally, the focus of the research on SCCT has been primarily on self-efficacy and outcome expectations. This study intends to complement current research by examining STEM doctoral student career development and the influence of learning experiences, contextual supports and barriers. In contrast to much of the quantitative research on SCCT, this will be a qualitative study to provide more insight into how these processes that influence career development occurs. Understanding these learning experiences and contextual supports and barriers for doctoral students will enhance the body of existing literature. It may also improve the ability of institutions of higher education to assist these doctoral students in career development and enhance their doctoral experience.

Chapter 2 will explore the relevant research conducted in the Social Cognitive Career Theory as it specifically relates to the role of learning experiences and perceived supports and barriers. Additionally, Chapter 2 will illustrate how the framework of SCCT can be found in the LEAPD program.

CHAPTER 2. REVIEW OF LITERATURE

Method of the Review

Research for this literature review began with a general search in the VCU Libraries for "career development" in peer-reviewed journals, which yielded over 100,000 results. The search was narrowed by adding the term "SCCT" for Social Cognitive Career Theory, which brought the total number of peer-reviewed articles down to more manageable 238 articles. Databases utilized included ERIC and Psych Info. After reading the abstracts of these articles, 50 potentially relevant articles were yielded. Most of these articles were suitable based on their topics of focus and the scholarly quality of the articles.

In addition to reading the findings described in these articles, the literature review sections and bibliographies of these articles were examined. This examination produced foundational articles that were not located in the original search, including books, which added five books and 25 articles. Finally, the ERIC and Psych Info databases, repeating the original search, located 10 additional articles.

The next part of the literature search focused on specific aspects of the SCCT theoretical framework. Additional searches were conducted in the VCU Libraries search on "SCCT" and "Learning Experiences," which yielded 19 peer-reviewed articles; "SCCT" and "Supports," which yielded 88 peer-reviewed articles; and "SCCT" and "Barriers," which yielded 117 peer-reviewed articles. The abstracts were scanned, and the most suitable articles for the topic were read, which yielded an additional 20 new articles. After determining that there were not enough

recent studies about SCCT, the search was performed again with each of the parameters described above, limiting the articles to those appearing after the year 2010, and adding the search term "college students," which yielded an additional 19 relevant articles.

Theories of Career Development

As mentioned earlier, the primary inspiration for this study comes from personal professional experiences working primarily with undergraduate students at two different institutions of higher education. Through personal observations, the lack of attention to doctoral students was surprising and influenced the topic of this study. This study is also grounded in theories of career development that influence career choice in doctoral students. However, it is also important to consider the context of the STEM doctoral student in terms of the career course environment. The sources of the conceptual framework are the Social Cognitive Career Theory (SCCT) and the Leaders and Entrepreneurs for Professional Development (LEAPD) program. The LEAPD program is based on the SCCT framework. The study of career development has been influenced by three major theories: Holland's Theory of Vocational Personalities, Social Cognitive Career Theory (SCCT) and Theory of Career Construction. Well-analyzed career theories can be vital in helping college students with their career growth needs. These theories have permitted the development of crucial evaluation and educational interventions; many career assessment tools used today that help students ascertain their desired fields are derived from the application and testing of these theories.

Holland's Theory of Vocational Personalities

One of the early theories of career development was Holland's Theory, introduced in 1959 during the post-World War II boom (Brown & Lent, 2012). He wanted a straightforward theory that students and counselors could utilize; it is noted as one of the most powerful theories for use in career counseling (Brown & Lent, 2012). Holland's theory describes how students communicate with their surroundings and how individual and environmental features determine career selection and alteration (Brown & Lent, 2012). Holland suggests that by late adolescence, individuals demonstrate features from six vocational personality types: Realistic (R) Investigative (I), Artistic (A), Social (S), Enterprising (E) or Conventional (C)--in six parallel work environments. These six types (RIASEC) are identified from replicated empirical studies. The theory asserts that most people have features of more than one if not all types to some extent (Brown & Lent, 2012).

Typically, however, the highest three letters of that type code are used in evaluations and interventions. People with comparable codes generally show comparable markings of career inclination and thrive in similar work surroundings. Congruence is a distinguishing term used to suggest the amount of fit between an individual's personality and the kind of work environment in which they were employed or desired to enter. Consistency measures the scores from the three-letter code. If the first two letters are similar, then there is more cohesive interest between the codes. Differentiation is the extent to which the score parallels some types but not others. Low differentiation leads to less clearness and more challenges in shaping career choices. The final construct is identity, which is related to consistency and differentiation (Brown & Lent, 2012). It follows that individuals with highly consistent and differentiated personalities also have more

defined identities and make career decisions with greater ease. Holland's theory was used to develop the Strong Interest Inventory (SII), which is the second-most studied theory in career development (Sampson, Hou, Kronholz, Dozier, McClain, Buzzetta, et al, 2014).

Theory of Career Construction

A more recent theory in Career Development is the theory of career construction; it incorporates differential, developmental and dynamic views of career (Savickas, 2001). Career development is the product of the adjustment of the individual to the environment rather than maturation (Brown & Lent, 2012). People create their career by deriving significance from the occupational behavior and occurrences. Career is a subjective construction that derives understanding from previous recollections, current knowledge and prospective goals and hopes and blends career into a professional growth design. There is a progressive development of meaning making; counselors take note for accounts of occupational temperament, career flexibility and development motif (Brown & Lent, 2012). They assist individuals in constructing occupational narratives to describe their identity and make meaning of any changes or difficulties. Storytelling supports the formation of a workplace identity. Career Construction Theory is not cited as frequently in the literature for traditional college students. However, it is used to study the complicated background of full-time employed adults attempting to complete their college degree. Savickas (2001) gave guidance to strengthen these individuals in the workplace with constructivist techniques.

Social Cognitive Career Theory

A convergence of these two above theories can be seen in the development of the Social Cognitive Career Theory (SCCT). SCCT is the most commonly examined career theory in research and practice because it creates an inclusive and thorough framework for examining the various components affecting career development (Sampson et al., 2013). SCCT was developed by Lent, Brown, and Hackett (1994). Their model, derived from Bandura's (1986) general social cognitive theory, contends that private characteristics, extrinsic circumstantial determinants and unconcealed actions combine to reciprocally stimulate one another. SCCT advanced because of the need to blend various career theories and support for a unifying framework (Borgen, 1991; Hackett et al., 1991). Theory construction works are utilized to combine connected constructs, such as self-image and self-confidence, to more thoroughly describe consequences that are familiar to a lot of career theories and explain the connections between different constructs such as self-confidence, interests, capabilities and desires (Hackett & Lent, 1992). Like Holland's theory, SCCT considers the important roles that interests, abilities and values play in the career development process (Hackett & Lent, 1992). However, unlike Holland's theory, SCCT recognizes the dynamic nature and domain-specific behavior of people acting in their environments. People and environments do not always stay the same, as Holland would suggest. Significant changes, brought about by technology and globalization, have created a need for workers to modernize their skills and cultivate new interests (Brown & Lent, 2012). SCCT was developed as a model for studying first-generation college persistence (Wright, Jenkins and Murdock, 2013).

SCCT is constructivist in nature in that it enables students to create their own self-efficacy and outcome expectations (Mahoney & Patterson, 1992). Students can change their interests and

outcome expectations as well; it is not a maturation theory or the result of some innate ability, like Holland's theory. SCCT depends on constructivist assumptions about how people play an active role in their own career development (Mahoney & Patterson, 1992). Constructivism depends on a relativist ideology that infers numerous realities and a subjectivist epistemology in which knowledge is created rather than the search for an absolute truth (Denzin & Lincoln, 2000). Constructivists usually regard data and analysis as developed from a shared experience of the researcher and the participants; they are creating knowledge together. The investigator's connection with the participants is also vital in constructivism (Charmaz, 2000).

Social Cognitive Career Theory (SCCT) has been used to characterize career development in college students. It has been utilized to explain "processes through which (a) academic and career interests develop, (b) interests, in concert with other variables, promote career-relevant choices, and (c) people attain varying levels of performance and persistence in their educational and career pursuits" (Lent & Brown, 1996, p. 311). SCCT is comprised of three constructs that all influence career decisions and actions: self-efficacy, outcome expectations and goals. SCCT suggests that gender and ethnicity as well as other background contextual factors influence learning experiences that then affect these three constructs. A keen sense of self-efficacy helps to sustain performance in a field (Lent et al., 1994). Supports and barriers (contextual influences) also affect individual goals throughout the career development process (Lent, Brown, & Hackett, 2000) and allow for a second level of analysis. The theory is outlined in Figure 2.

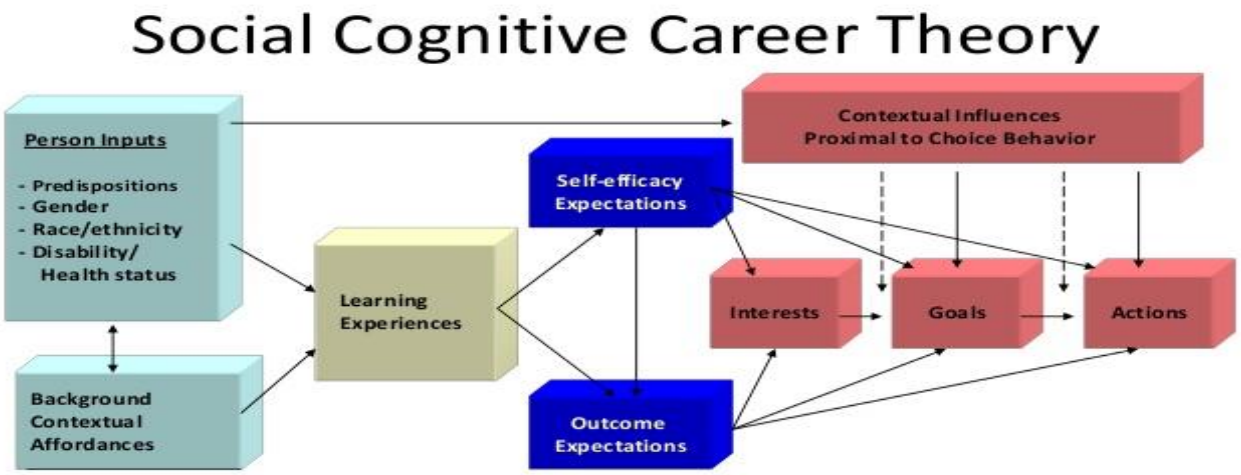


Figure 2 Social Cognitive Career Theory. Reprinted from Lent, Brown and Hackett, 1994.

Most of the research on SCCT has focused on the influence of self-efficacy and/or outcome expectations on interests (Bishop & Bieschke, 1998; Fouad & Smith, 1996; Lapan, Shaughnessy, & Boggs, 1996; Lent, Brown, Nota, & Soresi, 2003; Nauta & Epperson, 2003). Bandura's social cognitive theory serves as the foundation for SCCT (Luse, Rursch & Jacobson, 2014). Social cognitive theory explains psychosocial functioning in terms of the interaction between behavior, cognitive, and personal factors as well as environmental events (Zikic & Saks, 2008). These factors interact with each other in a reciprocal manner (Bandura, 1986). Additionally, the social cognitive theory encompasses many self-regulatory and self-reflective processes such as self-efficacy and goals. Social cognitive theory views individuals as active

shapers of their environment and of their own behavior, thought and emotions; not as bystanders to internal or external forces. This active shaping occurs through self-regulation and self-reflection. Self-efficacy plays a key role in social cognitive theory; it is believed to be a key mechanism by which individuals steer their own courses (Lent & Maddux, 1997). The activities and environments that individuals choose to affect the path or direction of their lives (Bandura, 1997).

Self-efficacy (Bandura, 1986, 1997) refers to a people's beliefs about their ability to perform behaviors or actions across different domains. It is important to understand self-efficacy when looking at career-related outcomes in both men and women (Hackett & Lent, 1992; Lent, Brown, & Hackett, 2002; Swanson & Gore, 2000). General social cognitive theory also suggests that other personal variables, like outcome expectations and personal goals, play a critical role in guiding behavior (Bandura, 1986, 1997). Individuals believe in their efficacy influence whether they think pessimistically or optimistically in self-enabling or self-debilitating ways (Bandura, 2012). Self-efficacy beliefs influence how well individuals can motivate themselves and persevere in the face of challenges through goals they set for themselves and their outcome expectations. Self-efficacy beliefs also affect the options individuals consider and the choices that they make at pivotal decisional points. It is these choices of activities and environments that influence the course of a life path and what people become (Bandura, 2012).

Conklin, Dahling and Garcia (2013) found that Career Decision Self Efficacy (CDSE) was an important mediator between perceptions of an academic major and career outcome expectations. They also found that major fit perceptions and high affective commitment to major had the highest CDSE scores (Conklin et al, 2013). Chen (2013) indicated that self-efficacy is a key determinant for behavior intention in an academic major as well as with career development;

self-efficacy positively influenced outcome expectations. Garriott, Flores and Martens (2013) also found that there was a strong relationship between self-efficacy and goals as suggested by the SCCT framework. Biere, Prayson and Dannefer (2015) found a relationship between self-efficacy and medical students' career interests. Less research has focused on SCCT's hypothesis regarding learning experiences and contextual influences in interest formation (Schaub & Tokar, 2005). Conklin, Dahling and Garcia (2013) suggest that more research is needed to identify if students gain more learning experiences with high affective commitment and fit perceptions in a field and if their learning experiences mediate the links between commitment, self-efficacy and outcome expectations.

More recent studies have also incorporated satisfaction as an important construct of SCCT. Lent, Miller, Watford, Lim, Morrison et al. (2013) studied the relationship between interest, satisfaction and choice variables as well as to determine the range of the theory's cross-cultural and cross-gender validity. They studied interests and satisfaction relative to persistence in engineering. They found that interests were predictive of satisfaction, which then leads to persistence (Lent et al., 2013). SCCT is also a useful framework for studying first-generation college students. First-generation college students may eliminate career and education options based on an inaccurate assessment of their ability to succeed in college (Olson, 2014).

Table 1 summarizes the different theories of career development and the associated scholars with each one.

Table 1 *Theories of Career Development*

Study Focus	*Scholars*
Holland's Theory of Vocational Personalities	Brown and Lent (2012) Sampson et al. (2014)
Theory of Career Construction	Savickas (2001) Brown and Lent (2012) Gagnon and Packard (2012)
Social Cognitive Career Theory (SCCT)	Lent et al. (1994) Sampson et al. (2013) Borgen (1991) Hackett and Lent (1992) Lent and Brown (1996) Lent et al. (2000) Wright et al. (2013)
Social Cognitive Theory	Bandura (1986) Bandura (1997) Lent and Maddux (1997) Zikic and Saks (2008) Bandura (2012)
SCCT Constructivist	Mahoney and Patterson (1992) Denzin and Lincoln (2000) Charmaz (2000)
SCCT Self-Efficacy	Bishop and Bieschke (1998) Swanson and Gore (2000) Lent et al., (2002) Conklin et. al. (2013) Chen (2013) Garriott et al. (2013) Biere et al. (2015)
SCCT Satisfaction	Lent et al. (2013) Olson (2014)

The Role of Learning Experiences in SCCT

According to SCCT, learning experiences are experiential sources of self-efficacy and outcome expectations that are influenced by person inputs and background contextual affordances. That is, enhanced learning experiences are believed to predict higher levels of self-efficacy and outcome expectations (Garriott, Flores, & Martens, 2013). Garriott et al. (2013) found a significant relationship among most of the variables as described in SCCT, which included self-efficacy, learning experiences, interests, supports, barriers and goals in prospective low-income first-generation college students. There was a relationship between social class, learning experiences and subsequent effect on goals or outcome expectations. These indirect effects were significant (Garriott et al., 2013).

Thompson and Dahling (2012) found that perceived social status predicted learning experiences, which in turn predicted self-efficacy and outcome expectations. They also found that perceived social status related positively to learning experiences across Holland's (1997) RIASEC domains. Gender and perceived social status explained four to eleven percent of the variability in learning experiences. It is assumed that there are more opportunities for career-related learning with higher levels of perceived social status. Men reported more career-related learning in the R, I and E domains, while women reported more experiences in the S and C domains (Thompson & Dahling, 2012). Through structural equation modeling, Thompson and Dahling (2012) found a direct pathway from learning experiences to both self-efficacy and outcome expectations, but the relationship from learning experiences to self-efficacy is stronger than the relationship between learning experiences and outcome expectations.

Self-efficacy expectations, according to social learning theory (Olle & Fouad, 2015), are *learned* from four sources of information: (1) performance accomplishments, (2) vicarious experience, (3) verbal persuasion and (4) emotional arousal. These sources of information have an immediate influence on self-efficacy and outcome expectations (Lent et al., 1994) and are called learning experiences. Olle and Fouad (2015) studied diverse inner-city high school students. They found that parental support did predict outcome expectations. It was a stronger contributor to outcome expectations than self-efficacy. They also found that critical consciousness could be a proximal support—i.e., if students are more aware of societal barriers, they are better equipped to navigate and overcome them.

Despite this key role, few studies have examined the role of learning experiences in SCCT (Schaub & Tokar, 2005) for graduate students. Schaub and Tokar (2005) studied college students and wanted to understand the indirect effects of personality on interests through learning experiences and sociocognitive mechanisms. Results of path analyses indicated that personality's relation to interests was mediated via learning experiences and sociocognitive mechanisms. Their findings also supported a relationship between learning experiences to self-efficacy and outcome expectations (Schaub & Tokar, 2005). Most studies that have been conducted on the role of learning experiences focus on the mathematics-related efficacy, outcome expectations and the learning sources of the beliefs. It is important, as Smith and Fouad (1999) have indicated, to study areas other than math and science so that the theory may be applied in a more general manner to other occupational domains. Additionally, studies that have been conducted on learning experiences were often carried out in a quantitative manner using instruments such as the learning experiences questionnaire (LEQ). However, these studies found that learning experiences were a strong positive predictor of self-efficacy (Schaub & Tokar, 2005). More

research still needs to be conducted on how these learning experiences influence self-efficacy and interest formation and what makes them good learning experiences.

Kolb (2005) developed an experiential learning theory that suggests--similarly to SCCT--that learning is created by the individual learner and is not merely "transmitted" knowledge from teacher to student. Learning style is the preferred method for perceiving and transforming the learning experiences. It is the internal goals that influence how an individual approaches learning, which then results in formation of the dominant learning style. College students decide a major based on how well the norms of the major fit with their individual learning styles (Kolb, 2005). Instruction in many disciplines is more student-centered and focused on hands-on learning experiences (Kulturel-Konak, D'Allegro, & Dickinson, 2011). Kolb's learning style could give insight into which types of learning experiences these doctoral students may prefer and have the greatest impact on career development.

Differences in learning experiences have also been suggested as a point of origin for differences in career-related self-efficacy, outcome expectations and interests (Williams & Subich, 2006). Williams and Subich (2006) examined career-related learning experiences in undergraduate students. They used the learning experiences questionnaire (LEQ) to study learning experiences as they relate to SCCT across Holland's (1997) RIASEC domains. Gender as well as other social-constructed influences can limit career interests and impact career opportunities and goals (Lent, 2005). College women have reported fewer learning experiences feminine domains (Williams & Subich, 2006). This distinction also suggests that learning experiences are the source of differences in self-efficacy, outcome expectations and interests. Results also indicated that more reported learning experiences in a given domain related to higher self-efficacy and outcome expectations in that domain (Williams & Subich, 2006). Bierer,

Prayson and Dannefer (2015) studied medical students using SCCT to evaluate their research curriculum designed to train physician-investigators. They found that medical students' research self-efficacy perceptions increased with exposure to research concepts and experiences (Bierer, Prayson & Dannefer, 2015). That is, the learning experiences--experiential or academic--influenced the students' self-efficacy. Studies like these need to be replicated in doctoral students to determine whether similar outcomes will be found. Table 2 outlines the studies in learning experiences.

Table 2 *Studies of Learning Experiences*

Scholar	*Theoretical Framework*	*Methodology*	*Population*	*Findings*
Garriott et al. (2013)	SCCT	Quantitative	First-generation college students	Relationship between social class and learning experiences
Thompson & Duhling (2012)	SCCT	Quantitative (Structural Equation Modeling)	Adult men and women	Perceived social status predicted learning experiences which then predicted self-efficacy and outcome expectations
	SCCT			Difference in learning experiences by gender were also reported
Olle and Fouad (2015)	SCCT	Quantitative	Diverse inner-city high school students	Parent support predicted outcome expectations

Table 2 Continued

Scholar	*Theoretical Framework*	*Methodology*	*Population*	*Findings*
Kolb (2005)	Experiential learning theory		College students	College students decide a major based on how it fits their learning style
Kulturel-Konak et al. (2011)	Kolb's Experiential Learning theory		College students	Instruction in many disciplines is student centered and hands-on oriented
Williams and Subich (2006)	SCCT	Quantitative	Undergraduate students	Women reported fewer learning experiences in traditionally masculine domains

Table 2 Continued

Scholar	*Theoretical Framework*	*Methodology*	*Population*	*Findings*
				More reported learning experiences in a given domain resulted in higher self-efficacy and outcome expectations in that domain.
Bierer et al. (2015)	SCCT	Quantitative	Medical students	Research self-efficacy perceptions increased with exposure to research concepts and experiences.

SCCT and the LEAPD Program

The LEAPD program is based on the SCCT framework; many of the course goals and activities are representative of the SCCT framework. Careers in Biomedical Sciences Seminar in the LEAPD program is examined in this study. One main goal of the course in the LEAPD program includes explaining how personal skills, values and interests correspond with a specific field or industry. This goal is consistent with the SCCT model, which indicates that career interests influence career goals subsequently influence career performance (Lent et al., 1994). The development of career decision-making skills leads to the development of career goals. Another important goal of the course is to identify persons of interest within a desired field for an informational interview and source of support. This goal is also a vital component of the SCCT theory, which indicates career supports are important in career choice, career goals and career success. Other sub-goals include developing a self-awareness of how personal characteristics connect with academic and career development, writing resumes and cover letters and developing strategies for a job search. The overall goal of the class is to help students make meaningful career choices, and gain confidence in their career development. The development of self-efficacy is another vital component of SCCT (Lent et al., 1994). Students complete reflection papers, resumes and informational interviews. They also complete an interest, values and strengths assessment. By completing these assessments, students can clarify their career interests, values and strengths which are also believed to enhance career performance, according to the SCCT model.

The Role of Supports in SCCT

SCCT considers the influence of background and context on an individual's career development (Olson, 2014). Contextual supports and barriers can be classified as distal or proximal to choice behavior. Background or distal contextual variables (social, economic, cultural, political) influence the amount and nature of the learning experience (Lent, Brown, & Hackett, 2000). Proximal contextual variables influence closer to choice behavior, they moderate behavior related to interests and goals. Contextual supports facilitate career progress (Lent, Brown, & Hackett, 2000). These distal supports are a precursor to self-efficacy and outcome expectations (Lent, Miller, Smith, Watford, Hui, et al., 2015). Lent et al. (2015), found that social supports were linked to interests indirectly through their relation to self-efficacy and outcome expectations in engineering undergraduate students. The pathway from interest to persistence was mediated by satisfaction (Lent et al., 2015). They suggest that receiving supports from others in the environment can lead to satisfaction (Lent et al., 2015). They also found that environmental supports and resources had a significant relationship with self-efficacy expectations and outcome expectations (Lent et al., 2015).

These supports may include familial influences, parental involvement and cultural socialization (Byars-Winston & Fouad, 2008). Byars-Winston and Fouad (2008) studied the influence of parental involvement and perceived career barriers on math/science goals in college students. They found that parental support both directly and indirectly predicted goals through its relationship with outcome expectations. Coping efficacy was also found to be a mediator between perceived career barriers and goals (Byars-Winston & Fouad, 2008). Research suggests that parental support for college students may motivate students to develop goals. Distal supports, such as the opportunity for skill development or range of available role models, can

influence career relevant learning experiences in the SCCT model. Gushue and Wilson (2006) studied the role of parental and teacher support and their connection to career self-efficacy and outcome expectations among African-American high school students. They found that parent and teacher support were positively related to self-efficacy, and teacher support was also positively related to outcome expectations. Inda et al, (2013) found that teacher support influences women's outcome expectations for engineering students, and in the case of men, predicts their interests and goals. Due to the difficulty of the engineering program, teacher supports/barriers were more important than parental support/barriers (Inda et al., 2013). Garriott et al. (2013) found that supports had an indirect effect on self-efficacy and goals in prospective low-income first-generation college students. Similar studies need to be conducted with doctoral students. Background contextual influences may predict meaningful academic learning experiences (Garriott, Flores, &Martens, 2013).

The second category of contextual factors in SCCT influence a person's career development at the point of choice and are therefore considered more proximal influences (Byars-Winston & Fouad, 2008; Lent & Brown, 1996; Lent et al., 2000). These influences include factors such as perceived social support systems and other social barriers. Lent et al. (2015) found social support to be a significant predictor of self-efficacy. Sheu et al. (2010) had similar findings. They used meta-analytic path analysis to suggest that contextual supports and barriers produce direct paths to choice goals as well as indirect paths through both self-efficacy and outcome expectations. Research has suggested that supports and barriers may influence goals, outcome expectations and self-efficacy. (Sheu et al., 2010). It seems likely that environmental factors have the strongest effect at earlier stages of development when for example, suboptimal educational conditions might block off certain career options (Sheu et al.,

2010). College student samples might be less likely to report choice limiting barriers than those who did not make it to college due to inadequate finances, lack of role models or lack of support with college application (Sheu et al., 2010).

Peer support is another proximal contextual influence that correlates with self-efficacy (Choi, Park, Yang, Lee, Lee et al., 2012). Lent et al. (1994, 2000) also found that a person's informal career network maybe a contextual support. SCCT provides a framework to helping understand how context can influence career, acting as a support or barrier and influences goals and interests as well (Olson, 2014). Garriott, Flores and Martens (2013) found that supports may be of relatively greater importance than perceptions of barriers in the SCCT model.

A summary of the literature around the different types of support can be found in Table 3.

Table 3 *Summary of Supports*

Scholar	*Theoretical Framework*	*Methodology*	*Population*	*Findings*
Lent et al. (2015)	SCCT	Quantitative	Engineering undergraduates	**social supports** were linked to interests indirectly through their relation to self-efficacy and outcome expectations **environmental supports** and resources had a significant relationship with self-efficacy expectations and outcome expectations
Byars-Winston and Fouad (2008)	SCCT	Quantitative	College students	**parental support** directly and indirectly predicted goals through its relationship with outcome expectations
Gushue and Wilson (2006)	SCCT	Quantitative	African American High School students	**parent and teacher support** were positively related to self-efficacy
Inda et al. (2013)	SCCT	Quantitative	Engineering students	**teacher support** influences women's outcome expectations and in the case of men predicts their interests and goals **teacher** was more important that **parental support/barriers**

Table 3 Continued

Scholar	*Theoretical Framework*	*Methodology*	*Population*	*Findings*
Garriott et al. (2013)	SCCT	Quantitative	Prospective low income first generation college students.	supports had an indirect effect on self-efficacy and goals supports may be of relatively greater importance that perceptions of barriers in the SCCT model
Sheu et al. (2010)	SCCT	Quantitative		contextual supports and barriers produce direct paths to choice goals as well as indirect paths through both self-efficacy and outcome expectations **environmental factors** have the strongest effect at earlier stages of development when for example
Choi et al. (2012)	SCCT	Quantitative		**Peer support is** another proximal contextual influence that correlates with self-efficacy

The Role of Barriers in SCCT

Contextual barriers can be defined as those that inhibit career progress (Lent, Brown & Hackett, 2000). In SCCT, perceived barriers to career development play a key role in occupational choice. Even if self-efficacy is high for a certain career, one may still avoid that career if one perceives large barriers to that career path (Brown & Lent, 1996). A substantial amount of research has shown that individuals do perceive barriers to career development that influence their career decision making processes (Luzzo, 1995, 1996; Swanson & Tokar, 1991; Swanson & Woitke, 1997). Lindley (2005) found that college women's perceptions of barriers were positively related to their outcome expectations. Women perceived male-dominated careers as implausible for them due to gender-related barriers (Lindley, 2005). No relationship was found between outcome expectations and perceived barriers for men. Women report more financial barriers than men in pursuing their career goals (Inda, Rodriguez, &Pena, 2013). For engineering students, women felt they had less contextual support and faced more contextual barriers than men (Inda, Rodriguez, & Pena, 2013). Further research should be conducted on the different types of barriers, such as internal versus external, barriers in specific career fields and barriers at different developmental stages of career choice.

The degree to which perceived barriers affect choice outcomes is dependent upon how the individual judges and interprets these factors (Vondracek, Lerner, & Schulenber, 1986). Some barriers may be obstacles for some individuals, while acting as facilitators for others (Lent et al., 2000). Studies have shown that contextual barriers are more prevalent among persons who have wrestled against the backdrop of achievement, including women (Fouad et al., 2010; Luzzo

& McWhirter, 2001) and persons of color (Kenny, Blustein, Chaves, Grossman, & Gallagher, 2003). Lent (2003) studied contextual barriers and their effects on engineering goals and math interest. Lent (2005) also studied contextual barriers and their negative effects on undergraduate major choice goals. Most of the research has focused on distal contextual barriers such as pressure from parents (Lent et al., 2003) and institutional sexism (McWhirter, 1997). These act in the lower left-hand corner of the model seen in Figure 3.

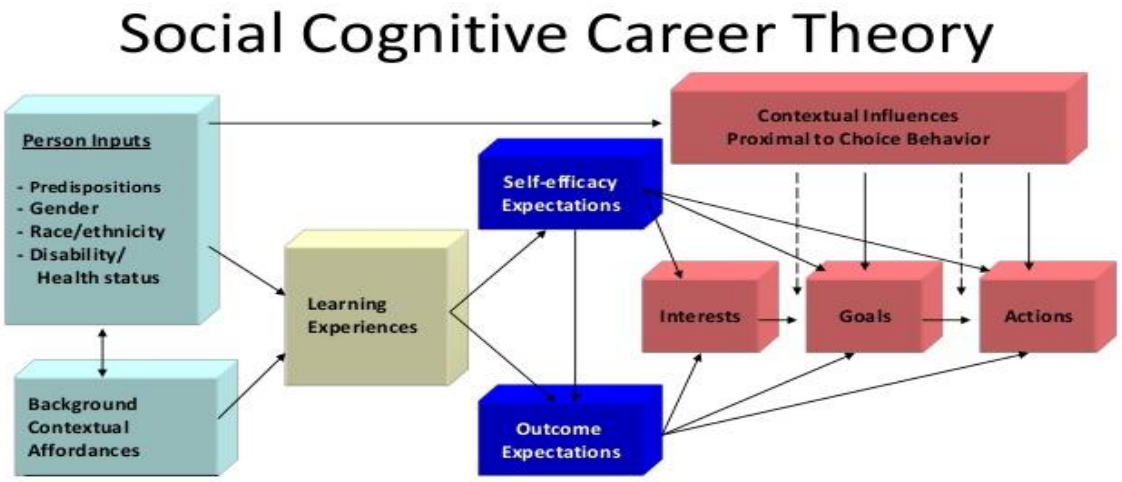


Figure 3 Distal Barriers in SCCT

Fouad (2010) classified barriers and supports into five broad domains: (1) parental and familial influence, (2) institutional influences, (3) financial and environmental influences, (4) social influences and (5) internal influences. Fouad et al. (2010) found that students are finding influential supports for continuing their education in math and science, although barriers still exist. Further studies should look at the patterns of influence on educational and career choice, if a threshold effect is needed for a barrier and the possibility of implicit influences (Fouad et al., 2010). Students may be unable to report the actual influence of barriers like lack of role models, so these barriers act implicitly (Fouad et al., 2010). Fouad et al. (2010) also found that barriers and supports vary by educational level. This finding has been noted mainly in middle school and high school students. Additional studies should be conducted in undergraduate and graduate students to see if the same patterns prevail.

The proximal category of influences is important during the active phases of education and career decision making, seen in the upper right-hand corner of Figure 1. Stereotype threat is a proximal barrier, since it is within the achievement environment that can have a negative effect on women's career choices (Deemer, Thoman, Chase, & Smith, 2014). When a gender stereotype is "in the air," it is meant to result in stereotype threat. Deemer et al. (2014) suggest that women who have repeated exposure to gender-based microaggressions can have long-term negative consequences. Stereotype threat had a negative indirect effect on the intent to engage in learning experiences like undergraduate research for chemistry undergraduate students. (Deemer et al., 2014). Yet this undergraduate research experience is often needed for a student to pursue a career in the sciences (Deemer et al., 2014). Gushue and Whitson (2006) suggested that a factor may be proximal or distal depending on the circumstances. Early supports, such as the culture of origin, may also act as a support for education but become a proximal cultural barrier if the

individual decides to move out of state for a career. This cultural support or barrier has been seen with first-generation college students; there may be a tension between the old and new cultures in first-generation college graduates. Being a first-generation college student may also be viewed as a barrier since these students are less likely to persist in college (Wright, 2013).

The summary of barriers can be seen in Table 4.

Table 4 *Summary of Barriers*

Scholar	*Support/ Barrier*	*Methodology*	*Population*	*Findings*
Lindley (2005)	Barriers	Quantitative	College students	Women's perception of barriers was related to their outcome expectations Women experienced gender-related barriers
Inda (2013)	Barriers	Quantitative	Engineering students	Women report more financial barriers than men. Women perceived less support and more barriers than men
Fouad et Al. (2010)	Barriers	Quantitative		Barriers more prevalent in women Student find influential supports for continuing their education in math and science
Luzzo et al. (2001)	Barriers	Quantitative		Barriers more prevalent in women
Kenny et al., (2003)	Barriers	Quantitative		Barriers more prevalent in persons of color
Deemer et al., (2014)	Barriers	Quantitative	Chemistry undergraduate students	Stereotype threat is a proximal barrier Undergraduate research experience is needed to pursue a career in the sciences

Table 4 Continued

Scholar	*Support/ Barrier*	*Methodology*	*Population*	*Findings*
Gushue and Whitson	Barriers	Quantitative		Factor may be proximal or distal depending on the circumstances
Wright (2013)	Barrier	Quantitative	College students	Being a first-generation college student may be a barrier

Summary

The existing literature serves to inform the research proposal design. Data collection will be focused on collecting more information on the learning experiences of the students participating in the LEAPD program since there is a lack of literature in this area. Most of the existing research focuses on the role of self-efficacy and outcome expectations in SCCT. Additionally, the categories of perceived supports and barriers as identified by Fouad (2010) will serve as a framework for the data collection as well. The research serves to fill the gap by qualitatively investigating doctoral students' perceptions of learning experiences in the LEAPD program, past learning experiences and perceived supports and barriers. The next chapter will explore the methodology for the study.

CHAPTER 3. METHODOLOGY

Introduction

There is a lack of literature on doctoral student career development. Additionally, literature that addresses the SCCT framework on learning experiences, contextual supports and barriers is scarce. This research study is designed to fill that literature gap by understanding more about the process of career development in doctoral students.

The exploratory research questions are:

1. How do the LEAPD classes inform doctoral student career development?
2. What is the role of past learning experiences on career development?
3. What are the perceived contextual supports and barriers to career development for a doctoral student?

Design

This research study utilizes an interpretive and constructivist qualitative study design. According to Merriam (2014), “Interpretive research...assumes that reality is socially constructed that is there is no single observable reality” (p. 65). Merriam (2014) further elaborates that “individuals seek understanding of the world in which they live and work. They develop a subjective meaning of their experiences and [these meanings] are formed through interactions with others” (p. 25). A qualitative design was chosen because it is important to understand how doctoral students ae interpret their experiences in the LEAPD program as well as other learning

experiences in an effort to better understand the process of career development. By understanding what meaning students attribute to their experiences and how they construct their career development, it can be easier to advise them on their career development and decision-making process.

This study employs the phenomenological qualitative research method. A phenomenological study seeks "understanding about the essence and the underlying structure of the phenomenon" (Merriam, 2014, p. 75). Phenomenology is interested in the "lived experience" of the participants (Merriam, 2014, p. 80). Phenomenological research is based on "the assumption that there is an essence to shared experience. These essences are the core meanings mutually understood through a phenomenon commonly experienced" (Merriam, 2014, p. 9). The phenomenon of study in this research is experiences of the students in the LEAPD program.

Phenomenology is appropriate for this study as it is important to understand the essence of the LEAPD career development class for these doctoral students. Phenomenology is the collection of data from participants who have experienced the LEAPD program to develop a description of the essence of the experience for these individuals. (van Manen, 1990; Vauterin, Linnanen, & Michelsen, 2013) The goal is to understand what they experienced and how they experienced it (Creswell, Hanson, Clark, & Morales, 2007). By using this design, students' perceptions of the LEAPD career development class were assessed as well as their perceptions of other important learning experiences in their career development. Additionally, participant perceptions of contextual supports and barriers in career development were also explored.

This study included seven students participating in the LEAPD program at a large, public, urban, research-based institution who were interviewed in the middle of the semester to

determine context surrounding the program and their learning experiences, as well as at the end of the semester to record student perceptions about their career development and direction. Additionally, the data-gathering methods of classroom observations and document analysis of student perceptions of career development were used to triangulate the data.

Participants

All the students participating in this study were doctoral students at a large, public, urban, research institution taking a graduate career development class in the LEAPD program. This program is open to all graduate students. The LEAPD program career development classes were chosen because they allowed for participation of doctoral students. This study was conducted with seven students. The participants consisted of one male and six females; six of the participants were White and one was Asian American. The doctoral programs of the students included two from pharmacology and toxicology, one from pharmacy/pharmaceutics, one human and molecular genetics and two from biomedical engineering.

The original purpose had been to use purposive sampling. Purposive sampling is used to ensure that the sample includes gender, race and ethnic diversity. Because phenomenology relies on the lived experiences of the participants and the meaning of those experiences, samples for these studies should be selected using a purposeful sample of participants who have experienced the LEAPD phenomenon, rather than relying on probability methods (Cresswell, 2009; Smith, Flowers & Larkin, 2009; Smith & Osborn, 2003). However, due to a smaller than expected number of students interested in participating in the study, all willing doctoral students were included in the study. Despite their similarities, these students brought with them a variety of perspectives; thus, the cases turned out to be information-rich.

The participants were recruited for the study by the researcher speaking in their classes and asking for participants. Students were then asked to sign up to indicate interest in the study. A questionnaire was emailed to all the interested students, which included an electronic informed consent. The questionnaire asked the student if they were a master's, doctoral or first professional student. The questionnaire asked their program. Additionally, students were asked their name, gender and race. Once participants were selected for the study, a pseudonym was used to identify each one. Finally, the students were asked if they were willing to be interviewed. The questionnaire can be found in Appendix A

This setting is intentional so that the role of these learning experiences for doctoral students can be examined. The LEAPD program is a professional development program designed to enhance the professional development skills of graduate students not interested in academia. The LEAPD class for this study was focused on careers in biomedical sciences. The class was designed to teach student effective job search strategies and build confidence in the student's ability to conduct a job search. Doctoral students are also an important population to study since the literature on them is sparse and their career development needs have largely not been addressed. By understanding the relationship between learning experiences and career development, it can be better understood how these learning experiences influence self-efficacy and outcome expectations of doctoral—as opposed to BA or MA--students.

Institutional Review Board

The required application and paperwork were submitted to Virginia Commonwealth University's Institutional Review Board in February 2017. Final IRB approval **(**HM20009174) was received on April 4, 2017. IRB protocol was followed throughout the study.

Instrumentation and Procedures

The study's instruments involved individual interviews, observations and content analysis. Recruitment of participants commenced after receipt of university IRB approval. Potential participants were informed of the voluntary nature of the study and informed participant consent was obtained prior to the beginning of the study.

All interviews were conducted in a study room in a library on campus. The interviews were audio-recorded and transcribed. The first interviews were transcribed by the researcher. The second interviews were transcribed by a third party. Participants were given the opportunity to review the interview transcripts and to request changes if they perceived inaccuracies. After transcription and member checking, the transcribed interviews were uploaded to ATLASti. Classroom observations were conducted four times, and the data were uploaded into ATLASti. Content analysis from three classroom assignments were also uploaded into ATLASti. The audio recordings were kept in a password-protected file in Google drive on a password-protected computer. The audio recordings will be destroyed at the end of calendar year 2018.

Interviews

The goal of the study is to understand the role of the learning experiences, supports and barriers in career development for the doctoral student. Interviews provided insight into how these learning experiences have influenced the career development of these students as well as to understand what contextual supports and barriers influence their career development.

Interviews are an effective data-gathering method because they allow for "an interactional exchange of dialogue ...where the researcher has topics they wish to cover in a fluid and flexible structure" (Edwards & Holland, 2013, p. 55). The interviews were semi-structured

to allow for "flexibility in how and when the questions are put and how the interviewee can respond. The interviewer can probe answers, pursuing a line of discussion opened up by the interviewee and a dialogue can ensue" (Edwards & Holland, 2013, p. 29). Interviews also allow the researcher to explore the understandings and experiences of research participants as well as the significance of the meanings they generate (Edwards & Holland, 2013).

Seven doctoral students were interested in participating in the study. The participants included six females and one male. The demographic composition was six White students and one Asian American student. The doctoral programs of the students included two from pharmacology and toxicology, one from pharmacy/pharmaceutics, one human and molecular genetics and two from biomedical engineering. All the volunteers were selected for the study. Students were emailed to invite them for an interview. These interviews were scheduled in October 2017 and then again in November 2017. The interviews lasted 30-45 minutes. Follow-up from the initial email was conducted for those students who did not respond to the initial email. Students were compensated with a $5 Starbucks gift card at the end of each interview. Questions for the interviews can be found in Appendix A.

Prior Interviews

Students were interviewed in 2016 from the LEAPD classes. These students were interviewed as part of a class research assignment for a qualitative methodology class. These previous interviews gave the researcher the opportunity to explore questions and confirm that they were clear and elicited the kind of information that was desired. Because of the pilot, some of the interview questions were revised, the question order was changed, and multiple prompts were added to each question. For example, instead of just asking "what goals do you have for

yourself?" additional prompts were added to that questions such as "what do you want to be when you graduate?" and "why would you like to be that?" The pilot also gave a better understanding of the length needed for the interview. Additionally, a second interview was added to obtain more information about the student as well as to better understand the influence of the LEAPD class.

Observations

After obtaining informed consent to observe in a classroom environment for these LEAPD classes, observations were conducted twice a month during October and November 2017. Since the class only ran from the end of September to the end of November, the classroom observations were conducted within that time frame. During the observations of each class, field notes were created. Field notes helped guide the observations within the framework of the research questions and SCCT. From the field notes, full observations notes were created. The observations were designed to generate data on activities and behaviors in the career development class. The observations provided valuable background information that informed other aspects of the research. It allowed for the observation of situations described in the interviews as well to understand how much participants communicate with each other and spend time on various activities. Observations also gave a better understanding of the context of the career development class. Classroom observation provided an additional opportunity to get to know the participants, thus enhancing subsequent interviews.

Document Analysis

Document analysis of written student reflections about career development in their LEAPD class provided an additional source of data. Document analysis was a systematic procedure for evaluating documents to gain meaning or understanding (Bowen, 2009). Document analysis of student work from the career development classes produced data that can be organized in themes and categories, like the coding of data from an interview. These documents included approximately three assignments from each of the seven students chosen, for a total of 21 assignments. Document analysis of student assignments was used in combination with the other data collection methods as a means of triangulation. By triangulating the interviews, classroom observations and document analysis, the researcher was looking for consistency in student perceptions of career development (Schwandt et al., 2007; Denzin & Lincoln, 2000). The document analysis provided information on context and background information. It was also used to supplement interview and observation data and corroborate findings from other sources.

Document analysis was from student assignments in the class. Students reflected on a range of career development topics in the LEAPD classes. These reflections will provide a "snapshot into what the author thinks are important" (Merriam, 2014; Denzin & Lincoln, 2000). Document analysis reflected the participants' perspectives on career development and provided vital information to the study; these documents were reflective of what the students experienced. These documents were also a reliable source of information because they were primary sources that were recorded close to the time of the phenomenon being studied. These documents also offered stability, unlike interviewing and observation. The presence of a researcher does not alter what was being studied (Merriam, 2014). Table 5 illustrated a data collection matrix.

Table 5 *Data Collection Matrix*

Research Questions	*Methodology*	*Area of Interest/ Interview Question*
How does the LEAPD program inform doctoral student career development?	Interview, Direct Observation, Documents	The career development class as a learning experience *What do you think of the LEAPD class you are taking? What role has this class had on your graduate study? How has the class helped you? What aspects of the class did you find helpful?* *What do you like about the class you are taking? What are the strengths of the class? What do you dislike about the class you are taking? What are the weaknesses of the class?* *How has it changed the way you view your career or graduate study? How has it impacted your career choice?*
What is the role of past learning experiences on career development?	Interviews, Documents	Other significant learning experiences *What learning experiences outside of this class have influences your career choice? From High School? College? Graduate School? How have they influenced your career choice?* *What did you take away from these experiences? What benefits did you experience from these learning experiences? What have been weaknesses of learning experiences outside of this class?*

Table 5 Continued

Research Questions	*Methodology*	*Area of Interest/ Interview Question*
		What did you like about other learning experiences that influenced your career development? What did you not like about other learning experiences that influenced your career development?
What contextual factors (perceived supports and barriers) have influenced career development?	Interviews, Direct Observation, Documents	Identification of perceived supports and barriers *What influenced you to aspire to this career? Were there particular people who were influential in shaping your career choice? What specific experiences influenced your career choice negatively or positively* *What are struggles or challenges that you have faced in terms of your graduate study or career? Have you come across anything that might get in the way of your career? If so what?* *Have you come across anything new that might support your career choice?* *What have been institutional influences on your career choice, negative or positive?* *Thinking back to the best professors in your program, what made them the best? How did they support your career path? Why did you like their classes?* *How were other professors less effective or helpful?*

Table 5 Continued

Research Questions	*Methodology*	*Area of Interest/ Interview Question*
		How has your department supported or hindered you?
		What is the parental or family influence on your career choice negative or positive? *How have peers in your programs supported or inhibited your career development? How have role models influenced you career choice?*

Data Analysis

Maxwell (2014) suggests following a multi-step process for qualitative data analysis that begins with reading all the documents associated with the research project. For this study, the initial reading included seven interview transcripts. A code book was created based on the conceptual framework of the study, the research questions and the interview guides used in the study (Lent et al., 1994; Monroe, 2007). Procedures outlined by Miles and Huberman (1994) guided the study's coding and analysis. In the first stage outlined by Miles and Huberman (1994), data collection and initial analyses were conducted as interviews, observations and document analysis and preliminary interpretations were made. In the second stage, data reduction, data were coded and organized into themes; material from the three data sources was analyzed and assigned a code based on the question or concept addressed (Gaudreault & Woods, 2012).

After this initial analysis, additional analysis included writing research memos during data analysis, categorizing and/or coding the data and making connections from the data and categories through narrative analysis. In addition to using codes from the codebook, open coding was also used. In Miles and Huberman's (1994) third stage, data display, themes emerged, and the data were organized into categories. Through this thematic analysis (Boyatzis, 1998), the essence of the LEAPD experience began to emerge.

Finally, the data were analyzed with an interpretive phenomenology lens (Gaudreault & Woods, 2012). Following this initial code-generating process, transcripts were reread, and codes were amended to create a final list of codes. The code book was examined to merge codes that

were similar and subdivide codes that had more than one construct in them. For example, the category of institutional barriers was subdivided into department and professor categories. Other codes, such as learning experience teamwork and learning experience peers, were merged based on the quantity and theme of individual codes.

Interpretive Phenomenology

After an initial reading of the transcripts, an interpretive phenomenological analysis (IPA) was conducted from the data (Cooper, Fleischer, & Cotton, 2012). IPA was not a single step of data analysis, but included the following characteristics: (a) movement from what is unique to a participant to what was shared among participants, (b) movement from a description of the experience to an interpretation of the experience, (c) commitment to understanding the participant's point of view and (d) psychological focus on meaning-making within the career development context (Cooper et al., 2012)). After the IPA process was complete, descriptive, linguistic and conceptual comments were made (Cooper et al., 2012).

The first stage of analysis in IPA was the creation of descriptive comments on the interview transcript. In creating these descriptive phrases or codes using ATLASti, identification of key phrases, explanations, descriptions and emotional responses was possible. In the next phase of analysis, the transcripts were reread to create linguistic comments or codes. These codes focused on the content and meaning of the transcripts and tried to understand the "how" and "what" from the transcripts to understand the meaning behind the words. During the third level of analysis, conceptual codes were made to move into a more interpretive stage of analysis. (Cooper et al., 2014). At this point, key themes emerged. The development of themes was supported by descriptive, linguistic and conceptual codes.

After the grouping and coding processes were completed, a network map was created based on the codes to help develop a narrative analysis of the data. Writing research memos during data analysis, came at the end of the initial data analysis phase. Document analysis of student work in the career development class was also used and organized into themes, categories and case examples through content analysis. The same code book was used to supplement the other research methods used in the study. The interviews, observations and document analysis were used to triangulate the data to study the same phenomenon. The phenomenon being studied was the student experience in the career development classes. The triangulation of student perception of career development led to an understanding of the student experience in the LEAPD class.

Reflexivity

In qualitative research, one strategy for promoting validity and reliability is to understand the researcher's position or reflexivity. This process allows for "critical self-reflection by the researcher regarding assumptions, worldviews, biases, theoretical orientation and relationship to the study that may affect the investigation" (Merriam, 2014, p. 60). In this way, researchers become more transparent about why they have chosen the project, what they expect to find, how data collection is done, how they interpret data and what values and underlying assumptions have influenced the study.

Throughout the study, a research journal was kept in which expectations and assumptions were recorded along with observations about the researcher and the environment. Recording this information revealed researcher biases in the study. The research journal was kept also to record changes in methods that occurred because of the changes in the career development class moving

from Spring 2017 to Fall 2017. The journal also recorded initial findings and themes from data analysis. For example, key areas of support were noted in the journal.

As a career counselor at a large public research university who works with professional and career development programs, the researcher cares deeply about the success of students and their programs. The researcher is also committed to the mission of the department to create an intellectual and humanistic environment for teaching and learning. One way to support these students is by creating professional development programs for them. As a facilitator of some of these professional development programs as well as an advisor, the researcher is constantly looking for ways to increase the career development self-efficacy of students.

The concern about career development made the researcher more aware of the need to actively detach themselves during the interviews to make sure that the researcher was listening rather than offering advice or encouragement. The researcher's position as a career counselor removed some of the distance between the researcher and the participants. However, the familiarity with graduate school and doctoral programs was also beneficial. Students were more comfortable with the researcher in the study.

Trustworthiness

Quantitative research addresses the quality of the research in terms of validity and reliability. In qualitative research, the standard for research is trustworthiness (Merriam, 2014; Morrow, 2005; Schwandt, Lincoln, & Guba, 2007). Qualitative research has strategies for establishing trustworthiness. Credibility, transferability, and dependability are all important components of trustworthiness (Merriam, 2014; Schwandt, Lincoln, & Guba, 2007). Credibility

is analogous to internal validity; transferability is an analog to external validity, and dependability is an analog to reliability (Schwandt, Lincoln, & Guba, 2007).

Credibility means that the findings are credible given the data presented. Credibility is analogous to the quantitative concept of internal validity (Schwandt, Lincoln, & Guba, 2007). Triangulation is one way to increase the credibility of a study. Multiple methods and sources of data will be used to confirm findings. This study will examine interview data, observation data and content analysis. A second common strategy to increase credibility is member checks. Participants were given the opportunity to review the interview transcripts and make corrections to any inaccuracies they found in the data. Member checking is one of the most important ways to rule out misinterpretation of what participants say as well as identify researcher bias (Maxwell, 2014; Merriam, 2014; Schwandt, Lincoln, & Guba, 2007). Active engagement in data collection is a third strategy that was utilized to enhance credibility. Adequate time was spent collecting data. The researcher had lengthy and intensive contact with the participants in the field as well as through the participant interviews. Persistent observation allowed for in-depth analysis of elements salient to the participants' experience (Schwandt, Lincoln, & Guba, 2007). Another strategy to enhance credibility is reflexivity. The researcher reflected critically on themselves as a researcher to explain biases, dispositions and assumptions. Doing so helped bring understanding about how the researcher's values and expectations influenced process and outcome of the study (Merriam, 2014).

Transferability is the degree to which the study is transferable or generalizable to other situations; this can be enhanced using rich, "thick description" (Merriam, 2014, Schwandt, Lincoln & Guba, 2007; Maxwell, 2014). The researcher utilized highly descriptive and detailed

presentation of the data to enhance transferability. Another strategy to enhance transferability is maximizing variation in the sample (Merriam, 2014).

Dependability is another aspect of trustworthiness. Dependability is enhanced when outsiders agree that given the data collected, the results make sense. Dependability also means that the results are consistent and dependable (Maxwell, 2014; Merriam, 2014; Schwandt, Lincoln, & Guba, 2007). Triangulation and reflexivity also enhance dependability as they do credibility. Another way to enhance dependability is to create an audit trail (Lincoln & Guba, 2007; Merriam, 2014). An audit trail describes in detail how the data were collected, how categories were created and how decisions were made throughout the study. A research journal on the research process is a way to create an audit trail. The researcher used a research journal to create an audit trail in this study.

Delimitations

The results of this study are delimited to participants in graduate career development courses at a large, public, research urban university. Though these classes are open to all graduate students, not all graduate students are aware of the LEAPD program. Additionally, these same career development classes are also offered as part another professional development program at the university, Broadening Experiences for Scientific Training (BEST). BEST is a career and professional development program for doctoral and postdoctoral scientists in the biomedical sciences. This career development course is also open to first professional students. Because of these factors, biomedical students may be overrepresented in the sample. BEST is a separate program from LEAPD.

It is also important to note that because participation in these career development courses is voluntary, the students may not be representative of the university's doctoral students. Students who enroll in these classes may have more apprehension about their career development than students who have high decision making self-efficacy. The study is also limited by time since there is little way to determine how careers developed or changed because of the career development class. The changes will continue to occur after the career development class is complete. Another limitation is the trustworthiness and memory of the participants.

Summary

This study examines the perceptions of career development of individual doctoral students. The results are delimited to the specific sample of doctoral students studied and the data are representative of doctoral students at this public urban research institution. However, the findings may still be meaningful to other professionals interested in student career development of doctoral students. The study is designed to fill a literature gap by understanding the process of career development in doctoral students. This study used a phenomenological research design to understand the essence of the doctoral career development experience. It included seven doctoral students at a large public urban research institution. Data collection included interviews, direct observation and document analysis, allowing for triangulation of the data. Data analysis was comprised of coding and organizing data into themes as well as narrative analysis. This narrative analysis included an interpretive phenomenological analysis. Reflexivity is important to allow for more transparency in the study as well as to identify underlying assumptions of the researcher. Trustworthiness was important to establish in this study. The credibility, transferability and dependability have all been addressed.

Chapter Four will discuss the findings from the student interviews, classroom observations and document analysis. All three areas of findings were examined concurrently to look for themes that would answer the research question. Discussion of each of the major findings also occurs in Chapter Four.

CHAPTER 4. FINDINGS

Introduction

This chapter presents the findings from a qualitative phenomenological research study to inform the following research questions:

1. How do the LEAPD classes inform doctoral student career development?
2. What is the role of past learning experiences on career development?
3. What are the perceived contextual supports and barriers to career development for a doctoral student?

The participants were seven doctoral students at a large, research, urban, public university. They were selected for the study because they were participants in a career development class in the Fall 2017 LEAPD program. All volunteer doctoral students were included in this study. The sample included six females and one male. Data collection included interviews, document analysis and direct observation. Interviews were semi-structured to allow for more of a dialogue. Classroom observations were designed to understand the context of the career development class and occurred at four separate times during the class period from September to October 2017. Since the class only ran from September to November 2017, classroom observations were condensed to be collected during that time frame. Document analysis of student work about career development in their LEAPD class was an additional source of data. Student assignments that were analyzed included two professional development philosophy papers, one at the

beginning of class and one at the end of the class, as well as one informational interview. By triangulating the interviews, classroom observations and document analysis, consistency in student perceptions of career development could be established.

This chapter presents the findings from the student interviews, classroom observations and document analysis of the participant writings. Findings from all three data collection methods were examined concurrently to look for underlying themes that would answer the research questions. Illustrations of the underlying framework of the Social Cognitive Career Theory help outline the discussion of the data. The initial findings discuss the role of the LEAPD class on the career development of the participants. Many of the participants indicated the course served to confirm or expand their career options. They sought careers beyond academia and were considering careers in industry and government. They also felt that they had been given a "toolbox" to help them with future career development activities, which included such useful tools as LinkedIn, informational interviews and a curriculum vitae. The participants also indicated that the class had encouraged them to reflect and understand themselves. They often reflected on what they valued, and many of the students were found to value a work-life balance as well as job security.

Secondly, this study examined the role of other learning experiences on the students' career development. As mentioned earlier, the learning experiences were broken down into four categories: performance accomplishments, vicarious learning, verbal persuasion and emotional arousal. Performance accomplishments that most influenced the career development of the participants were often achieved in academic or experiential settings. Examples of experiential learning included research, internships, and employment.

Finally, this study explored perceived supports and barriers in career development for the doctoral students. The greatest source of support for the doctoral students was their teacher or professor, to include teachers from high school, undergraduate or graduate school. Institutional supports were also found to be important, including departmental support. Employers were another source of support for the students, to include financial support. Other strong sources of support were family and peers. Barriers were not as frequently reported by these doctoral students as supports. Many participants identified institutional barriers that impeded their career development, and the largest institutional barrier for students was academia-related. Students did not like grant writing or the politics of academia. Students also identified barriers at the department level, such as not understanding research or a lack of available career counseling. Internal barriers were another source of difficulty for the doctoral students. Lastly, a few students indicated that the professor was a barrier as well. Table 6 describes a summary of the findings as they relate to each research question.

Table 6 *Summary of Findings*

Research Question	*Findings*
How does the LEAPD class inform doctoral student career development?	**Confirmed or expand career options** 1. Confirmed that they had made a good career choice 2. Beyond academia to consider industry or government **Provided a toolbox for career development** 1. Create LinkedIn profile 2. Conduct informational interviews 3. Critique own resume/CV **Encouraged reflection and self-discovery** 1. Values were commonly reflected upon. Many students valued work/life balance and job security.
What is the role of past learning experiences on career development?	**Performance accomplishments** 1. Academic accomplishments were important to continue in field 2. Experiential learning included research and internships, and employment was also vital. Experiential learning served to further interest in the field. **Vicarious Experiences** 1. Participants learned frequently from their peers 2. Peer experiences could also inhibit career development 3. Participants also learned from their family
What are the contextual influences (perceived supports and barriers) that influence doctoral student career development?	
A. Supports	The **teacher or professor** was a major source of support. This included high school, college or graduate school professors **Peer** support is another significant category of support. **Family** support was also important to the student
B. Barriers	**Academia** significant barrier for the doctoral student. **Internal barriers** (lack of confidence) was reported **Professors** were also reported to be a barrier

LEAPD Class as a Learning Experience

RQ 1: How do the LEAPD classes inform doctoral student career development?

Themes: *Exposure to different career options led to career choice confidence*

Career development resources are essential for effective job searching

Understanding oneself leads to optimal career choice decisions

Exposure to Different Career Options Led to Career Choice Confidence

One significant theme that emerged from the first research question (How do the LEAPD classes inform doctoral student career development?) is that exposure to different career options led to increased career choice confidence. Several of the students indicated in both their personal statements and interviews that exposure to different career options had helped them immensely. For example, Liz in her second personal statement indicated that "overall, I still feel that I want to pursue X career…." After she had learned about all the different career options available to her from the career development class, she still wanted to pursue her desired career. She was not persuaded to consider another career, but rather remained firm in her decision and seemed more confident in doing so. Carrie, another student, also in her second personal statement, indicated that she

> "confirmed that I wanted to pursue a career in industry as a Y Career. While most of the careers we've heard about were very interesting options I have never considered, I don't think they would be a great fit for me…Learning more about these different career

> options have confirmed that I would most likely be happiest in a position where I am still active in research."

She later stated in her second personal statement that she "learned that I am actually confident that I would truly enjoy a career in industry research." Not only did Carrie confirm her career but she has also built self-confidence to her decision. Like Liz, she wants to still pursue her original career choice in research. Exposure to the different career options helped to build the confidence of both participants. Another student, Karen, expresses similar views. Karen states in her second personal statement that her "career goals haven't really changed much since my first draft. I am still extremely interested in a career as Z." They all learned from the speakers but were true to their original goals and career objectives. Multiple students found that the class served to confirm and reinforce their original career interests. By exposing them to other careers in the classroom, guest speakers came to visit and discussed their careers; these students increased their confidence in their career decisions.

Students Felt Confident in Their Expanded Career Options

Other students found that the career development class served to expand their career options, thus building their confidence in their career choice as well. One student indicated in her interview that she had built confidence from being exposed to several different career options. The presentation gave her different ideas for different careers, thus building her career development self-efficacy and reducing her anxiety about different career choices. Anne indicated in her second interview that the class is a

> "great survey of diverse types of careers. Several of those careers I had never heard of, so I think I will be able to find something that fits me...It helped me identify my general

> interests as well as taught me about diverse types of things that exist...It's given me different ideas about career choices."

Another student indicated that the exposure to different career options had been helpful for her as well. Learning about the different jobs and how to get them helped to build her self-confidence as well. Carrie also indicated in her second interview that the career class "has been really helpful in clarifying how to get jobs, what jobs are out there and everything. It's been really useful information." Like Anne, learning about the different career options helped this participant to see what was out there, which built her self-confidence.

Another student, Karen, had a similar experience. Karen also stated in her second interview that "it really introduced me to careers that I didn't know existed and or didn't really know the names of. I know people do that, but I didn't know what it was." She said that "not only are there jobs out there but they're interesting and they're actual jobs that I would want to pursue." Reducing the uncertainty about different careers built clarity and confidence that served to alleviate her stress about job searching. Vishwa had a similar experience, as she indicated in her second interview

> "exposure to different people, to the guest speakers, their perspectives and their career paths are definitely interesting...We don't get that normally in our department… Some of the speakers come and talked to us, I see certain aspects of their career and I'm like, 'hmm, I don't really want to do that.' And that's fine. And then other parts of that I'm like 'oh my gosh, that sounds exciting. Let me consider that a little bit more.' And so, it's just that I want to take away that knowing more about myself, being more willing to explore different options."

She learned about different perspectives from the guest speakers and wanted to consider them more. She further confirms that in her second personal statement when she states,

> "I've definitely had my eyes opened to other career paths that I'd never heard of or considered before. I still don't know exactly what I want to do but from this class the idea of keeping my options open is a lesson that has been reinforced for me."

Both her personal statement and her interview reinforced that she had learned about different career options from the course. She is not totally sure what she wants to do, but she is comfortable keeping her options open. She has confidence that there are career options now that she has been exposed to through the course.

Pete confirms a similar sentiment in his second personal statement when he states, "this experience has merely showed me that there are many more opportunities for me than I previously thought and that my requirements and desires for a successful and rewarding career aren't as rigidly defined as I had once thought." He also has been exposed to the different career options and he almost sounds thankful that there are so many options available. He appears confident that he will be able to find a suitable career option from his choices.

These students were exposed to different careers during the class from the different guest speakers as well as their own informational interviews. They expressed excitement about learning about the different career paths and relief that there were other options available. They have confidence in their ability to choose from among their choices or more solidified in the career they already know what they want to do.

Students Expressed Confidence in Career Choices Beyond Academia

Several students indicated that this LEAPD career development class showed them that there were other options for careers besides academia. Students often choose to take the class to learn about other options beyond academia in the biomedical sciences. Kate stated in her second interview that she,

> "feels like I have more options than academia now. I still felt like I was being [pushed] towards academia before. And then I also feel I have more information. So, it's just I met with the instructor and I think before the class started too. And she gave me the names of certain people that I could reach out to. And so, I think that just having that open conversation of being able to have ideas of how to find more information. Because before then I felt that the internet was almost my only source. Or if I had a friend who someone I would email them. But now I feel like I have more ways to find out things."

Kate felt like her options were expanded beyond academia. Students reported feeling like academia was their only option from their principal investigator (PI) or advisor, so it was a relief to hear that other options were available beyond academia. Many of the students were not interested in pursuing a career in academia. By Kate indicating that she had found other ways to find out about jobs she expresses her confidence in job searching as well. She sounds more confident in her options.

Carrie expressed a similar sentiment in her second interview when she stated that the class "helped give me ideas for what careers are encompassed within academia and what else besides academia is out there, which is what I was leaning towards anyways." She also now knows where to look for positions. She is no longer solely relying on her advisor to help with job searching. Karen agreed and indicated that she had also found out about a lot more jobs outside

of academia. She stated in her second interview that one of the most important takeaways of the class was that "there are definitely more jobs out there besides academia for Ph.Ds. And that's quite a relief." She further indicates in her interview that

> "being a professor is not the worst thing... But now I know there's so many more opportunities that I would so much prefer to do that I didn't know about before… But this has given me so many more career paths. I have the opposite problem from when I came in. When I came in I didn't know what I wanted to do [and did not know the options]. And now I don't know what I want to do because there's so many options."

Students again expressed relief that other options were available beyond academia. Like some of the other students, Karen was relieved to find out there were other options outside of academia. She has the opposite problem from before--too many choices to know for sure what she wants to do--but she seems comfortable with her options. She was not panicked about her career decision ability. She also expressed confidence in her job searching ability.

Students Expressed Confidence in Industry and Government Career Choices

Not only were students confident in their career choices beyond academia, but several students became more focused and indicated that they had come to specifically consider careers in industry and government. Liz indicated that she was considering a career in industry and government in her second interview. She had learned that "government and industries like small companies will just hire consultants for X career. And you can just go and do short-term, part-time work and travel a lot. So that was through my informational interview." She had learned about other options in industry from her informational interview that she conducted as part of her class assignment. She was now able to confidently consider other options. She had learned

vicariously from other professionals in the field because of her assignment in the class. She was now more committed to her field. This confidence in industry and government is further supported in Liz's second personal statement.

> "[my] ideas have expanded from just working in a government research lab to looking more broadly at the job market and how my skills could be applied. For example, when Dr. X came and spoke about X company and X career that went into their design, I realized that X companies would be able to utilize X career to improve their designs for labels, instructions, drug delivery systems, and advertising. And that pretty much any advertising company could use human factors engineer to improve the quality of their ads in an objective manner."

Like her informational interviews, she was also learning vicariously from the guest speakers that came to the classroom. Both the informational interview and the guest speakers served as valuable resources for the students. By discussing their career interests with other professionals, they were becoming more confident in their career decisions. Table 7 summarizes the first theme and the various data collection methods associated with each theme.

Table 7 *Exposure to different career options led to career choice confidence*

Theme	*Data Collection Method*		
	Semi-Structured Interviews	*Document Review*	*Direct Observations*
Expanded career options	X	X	
Beyond academia	X		
Industry and government	X	X	

Career Development Resources are Essential for Effective Job Searching

A second major theme to determining how the LEAPD class informs doctoral student career development is that career development resources are essential for effective job searching. Students benefitted and expressed gratitude in their acquisition of tools that would help them with their job searches. They indicated that many of the topics and activities in the classroom helped them feel more prepared to navigate their own career development. Such activities included conducting an informational interview, setting up a LinkedIn account and revising their curriculum vitae.

Informational Interviews Were an Important Learning Tool

One of the assignments analyzed for this study was an informational interview that the students conducted with a professional in a field of their choice. Many of the students felt the informational interview and LinkedIn were important tools that they had learned about to help them in the future. They were now equipped to handle their own job searches. Liz indicated in here second interview how excited she was to discover these tools for job searching. She felt these tools were essential to her job search. Liz states in her second interview her excitement about conducting:

> "LinkedIn and the informational interviews. [I am impressed with] how you can reach out to people and they'll talk to you. I didn't know that was a thing. Now I'm excited that I know it's a thing because I can just email people and they might respond to me…. But that's enough to still get in the door and talk to people and make connections."

Knowing that informational interviews were possible and a practical way for her to network was enlightening for her. She was also impressed with LinkedIn and the capacity for networking

there. Both served to equip her with her own job search resources which were essential for job searching. The experience built her self-confidence in her ability to job search. In her second interview, Vishwa also exclaimed enthusiasm for the informational interview. Like Liz, she did not realize that she could reach out to professionals to network and set up informational interviews through LinkedIn. She was also amazed at the results:

> "The informational interview that was due last week. I never would have reached out. The whole idea of cold emailing people, it's scary to me. But the fact that I've done it once and it worked out well. I want to take some time over winter break to do it again."

She was encouraged by her success and wants to try again. She was working on building her network, another essential component of job searching.

Students also learned how to conduct their own informational interviews when guest speakers who were professionals in the biomedical sciences came to their classroom. The visits from professionals served a similar purpose as the informational interview assignment in that they taught them how to learn vicariously from other professionals. This is another essential tool for career development resources that teaches students how to conduct their own informational interviews and ultimately their own job searches. Carrie discussed her view on the different speakers in her second interview when she stated:

> "I think the speakers definitely give their personal input on how they got there, what their job entails and what their future aspirations are. That really has helped clarify what exactly I need to be doing to plan. And how to get there."

She learned from the speakers and was able to develop a plan. And she was confident in her ability to create a plan. Like the other students, her experience helped to illustrate that speaking

to other professionals was an essential component of job searching. She was able to develop a plan based on vicarious learning. She goes on to further elaborate in the interview:

> "the fact that the speakers have that first-hand experience of what they went through. Whereas, the professors are teaching from a broader aspect of 'here's in general what you need x, y, z to get there.' So, it has been helpful to have both sides."

She valued the specific information from these professionals, which is different than the information that she received from her professors. The two sources of information provide a balance of information. Karen also valued the guest speaker visits to the classroom, as she stated in her second interview: "I love that they bring people in to talk to get their point of view. That was probably the most helpful." For Karen, one of the most essential parts of career development resources was the guest speakers. That is where she learned the most from the class and was the most helpful. The guest speaker visits to the classroom were like the informational interviews that the students were able to conduct this semester in that the students learned immensely from both, which indicates that they were also essential career development resources needed for job searching.

Utilizing LinkedIn was an Important Learning Tool

One of the class sessions focused on networking. The instructor encouraged the students to think of networking like data collection. The more information the student can gather, the better decisions can be made about how best to proceed. Students can rule out options, determine which options they need more information about or confirm that it is the path they want to take, just like in their labs. She suggested a very analytical approach to networking. Each student had to create a LinkedIn profile listing education, work experience, at least 10 skills, a photo, at least

10 connections, and then follow at least one organization and join one group. After explaining the assignment, the instructor then explained that networking was like asking effective questions. Networking builds relational capital.

In addition to the classroom observations, students felt that they could use LinkedIn. They had learned how to network and set up informational interviews using LinkedIn. Kate indicated in her second interview that the LinkedIn assignment was one of the strengths of the class. She enjoyed the presentations on LinkedIn and networking, particularly

> "the ones that break down exactly the formula that you need to [network]. It's nice to have someone tell you [exactly] what to do when it comes to [LinkedIn and networking] and how to reach out to people.... I don't know the protocol, the normal way to go about asking someone for an informational interview and be respectful of their time."

Liz agreed in her second interview. She really liked "all of the information. I think it's helped me network and branch out more." Karen, in her second interview, liked the "feedback that I got to fix up some things was pretty helpful [for her LinkedIn account]." Vishwa, in her second personal statement, indicated that she has been:

> "reminded of how important networking is since almost all of the speakers ended up where they are now because of connections they'd made previously. Going forward, networking is something I want to focus on. My goal is to make at least two new contacts/connections a month, whether it be in-person, at a networking event or conference or online in LinkedIn."

They each felt more confident in their ability to network through LinkedIn. They had been given a process to use for LinkedIn and networking that made them more comfortable with their job searching abilities.

Ability to Revise Own Curriculum Vitae

Another valuable job resource for the students is the curriculum vitae (CV). They valued the feedback that they received on their CVs and said they could start to critique their own CVs as they added other experiences. The importance of a CV was stressed during one classroom observation that focused on the hiring process and put the CV in the context of the overall hiring process. The instructor encouraged students to think of themselves as service providers rather than service recipients. They should think in terms of what skills they can offer a future employer. She then reviewed the overall hiring process, from completing the application to the job offer, and suggested that students be aware of the timeline for the hiring process. She indicated that the average recruiter spends six to seven seconds on a resume. One can learn from that observation that the CV is critical to job success. It helped give students an understanding of what employers are looking for so that they can create the best CV possible. They also prefer bullet points to paragraph and most of their time is spent on the top third of the resume.

In addition to the classroom observation and emphasis on CVs, students also appreciated and valued the work that was done on their own individual CV. Carrie indicated in her second interview that in one class they talked about:

> "resume and CV building and I thought that was really helpful because you see all these things online on how to do it. But to have someone who reads resumes and helps to write them was really helpful to cover and get real insight instead of just Google insight."

Carrie liked having someone review her CV and provide solid feedback as well as knowing in the future there was a resource that she could use. She felt the in-person reviewer was much better than the Internet advice that she had been relying on previously. She really liked having an

expert in CVs look at her and provide feedback. Like Carrie, Pete expressed a similar sentiment in his second interview:

> "it's been helpful. The things that they mentioned about CVs, I had never really thought about. Like how they are saying that most people take seven seconds to look at a CV. So, you need to organize your CV so in those seven seconds they can see what you're doing. And not write a paragraph worth of things. Put the important things on the front page. Things like that that I hadn't really thought of."

Pete appreciated the classroom presentation in which the instructor showed the students how much time is spent on a CV. He also learned where to place the most important parts of his resume as well as how to format his resume. He now knows how to develop a strong CV. Vishwa, like the other two students, also found the CV class session valuable. She suggested in her second interview that the CV session was valuable:

> "I've had a CV and a resume for a while. And I could just submit what I already have as my assignment. But the fact that it is due again is encouraging me to review my CV. You know, I've got post-it notes with things that I want to add on and I just haven't gotten around to adding them yet. But the fact that it's like due again is encouraging me to review my CV. So, the fact that there is a due date is forcing me to spend time to look at those kinds of things."

Vishwa appreciated the time that was taken to review the CVs, time that as a busy doctoral student she would not otherwise have. While Carrie and Pete really appreciated what they learned about the CV itself, Vishwa valued the deadline and structure of the class that forced her to get things done. A summary of the career development resources that are essential for effective job searching can be seen in Table 8.

Table 8 *Essential Career Development Resources*

Findings	*Data Collection Method*		
	Semi-Structured Interviews	*Document Review*	*Direct Observation*
Informational Interview	X		
LinkedIn	X		X
CV	X		X

Understanding Oneself Leads to Optimal Career Choice Decisions

Another theme from the study is that understanding oneself leads to optimal career choice decisions. Students spent time reflecting about themselves in their personal statements and understanding themselves in terms of their strengths, weaknesses and other related factors. One important concept for the students was the emphasis on reflecting on values. In Vishwa's personal statement she indicated that:

> "I haven't started seeking positions but just trying to build the foundation of trying to figure out who I am, who I want, what kind of lifestyle I want to lead. Asking those self-evaluating questions and then knowing that so when opportunities for careers do come up, I am willing to get to know people, pass my cards out and listen to feedback to what people must say."

She was searching to understand herself and her values. She was asking herself tough questions so that she understands what is important to her in terms of a career and lifestyle. This process will help her choose the best career when the opportunity arises.

Students Reflected on Their Values

Not only did students discuss values in their personal statements but values were also discussed as observed during the classroom observations. The instructor started one class by discussing values. She asked for definition of values from the class. She then compared values vs. interests and defined the difference between the two. Values are basic beliefs that guide our decision making, motivation and behavior and serve as standards that influence our perceptions of self and others. Values are standards. Interests are mere preferences. As part of the class, the instructor recommended that the students participate in a Life Values Inventory. She then reviewed the results of the inventory and grouped the students' values into one of four categories: High priority, over-attention, under-attention, medium-low priority. These values can change over time and help the student realize what is important to them. Understanding your values can help you make career decisions.

Like Vishwa, Anne also indicated that she had reflected on her values in her first personal statement. In her Individual Development Plan that she developed online at my IDP.com, she determined that her three most essential values were work on the frontier of knowledge, creativity and work / life balance:

> "As I have mentioned, I set the bar pretty low for success (not living with parents). I suppose that could be interpreted as the value of independence. I don't particularly care if I make a lot of money--just enough to live by is ok. I like to learn cool facts and share them. I like making things. I like to go home at the end of the day and rest, separating work from home. While I am working, I try to give it my all, stay focused and complete my daily goals. I think these values would be successful in most careers. I would not be as successful in a field that requires me to work 80 hours a week or under the

management of a boss who regularly calls me to talk about work at night or weekends. I would not be successful in a very competitive field. I want to be someone with a full life who has a career rather than someone whose whole life is their career."

Like Vishwa, Anne is also reflecting on what is important to her in a work environment and seeking to understand herself. Independence is important to her as well as work-life balance. Money is not something that has a high value for her. She also knows that she does not want to work all the time. She wants a work/life balance. Understanding what you value will help the student make better career decisions. Anne also indicated that she valued work/life balance in her first personal statement:

> "Something that is very important to me is rationing my energy. I am most productive and feel healthiest if I can spend a few hours a day on intellectual tasks like experiment planning or thinking about concepts, a few hours working with my hands to perform the experiments and plenty of time to take care of myself."

Anne mentioned twice in her personal statement that she valued a work/life balance. This was confirmed in two different places in her personal statement, therefore it must be an important value to her.

Students Valued Work/Life Balance

Many students, like Anne, also valued a work/life balance. Karen also reflected on her values in her first personal statement. She states that in

> "addition to work-life balance, I value a positive work environment. I believe that you don't necessarily have to be friends with your coworkers, but it is important to have a good rapport. A positive environment breeds positive work. For me to do my best, I need

to be able to feel comfortable in my environment. I am an extravert, so this requires me to have great day-to-day interactions with the people I am surrounded by."

She valued work/life balance, but then goes on to state that a positive work environment for her is a work/life balance. The two go together and are both important values for her. Part of work-life balance for Carrie is being in a positive environment so that she will feel comfortable to perform:

> "I value a solid work-life balance…. I know I need 'me-time' to decompress and take care of myself. A job that requires 60 hours' week, including weekends, wouldn't work for me. I know that many people thrive under pressure and (to an extent) I do as well but I know that I could never last long in that environment. I think a job that has high expectations but allows you to make your own hours would be the best fit for me."

She understands that she does thrive under pressure but will not be able to continue to do well in a high pressure setting over time. She is also concerned about burnout. Classroom observation of Karen revealed an interest in work-life balance when she asked a guest speaker who was an expert in the biomedical profession, "How is your work-life balance?"

Like Vishwa, Anne and Karen, Pete indicated in his first personal statement that he also valued a work-life balance. A "healthy work-life balance is paramount to me because one's life should not be entirely dictated and defined by their career, but it should be a relatively stable and not overbearing part of their life." Pete reinforced these ideas in his second personal statement, "As I stated in my original [personal statement], the values that are most important to me are helping society with my work, holding an expert status, receiving recognition for my work, job security and a healthy work-life balance." His values did not change from his first personal statement to his second personal statement. He continued to value a work-life balance.

Carrie reflected on her values in her first personal statement as well:

> "The values that are essential to me mostly relate to having a healthy work-life balance, including working for a family-friendly company, flexible schedule and benefits. While I enjoy a busy schedule during the work day, I would like to be able to enjoy other pursuits outside of my career. Knowing myself, without a balance, I would burn out quickly and thus, become discouraged from furthering my career...I would appreciate a career where I can somewhat leave work at work and enjoy solely being [at] home."

She further elaborates in her first personal statement that "I would like to find a job at a small-to-medium company that values health and family with some flexibility that allows for a reasonable work-life balance." Like the others, Carrie very clearly wants a career that has a work-life balance and is concerned about burnout that would prevent her from further advancing in her career. She indicates that part of work-life balance was working for a family-friendly company. Having time for family is an important part of work-life balance for Carrie.

Vishwa also reflected on her values and what work-life balance would mean to her. Like Carrie, she also wants to work for a family-friendly company:

> "involvement in service and the community is important to be along with a family-oriented family-friendly company. These will be the biggest values for me to consider when finding an organization that fits, and I think if I am able to find this, I can be successful because I will be passionate about serving the organization that is looking out for my family and my community."

For Vishwa, work-life balance is achieved not only with a family friendly company but also a company that values community service. She also connected a work/life balance to a family friendly company, like Carrie.

Students Reflected on Job Security

Several students also indicated that they reflected on and valued job security. Vishwa indicated in her first personal statement that "my passions for service and helping others as well as my commitment to my future family has encouraged me to pursue an occupation that is relatively secure and family-friendly in an organization that has a mission to protect patient health." It is evident that her values are interconnected. She valued work-life balance, which leads her to value a company that is family-friendly and service-oriented. However, because she also values her future family, she wants job security. Job security was another common value for these students, to include Karen:

> "I am not a risk-taker. I think through everything and make sure I take the most beneficial choice. Because of this, I want a job with great security. I could not function in a healthy way if I was worried if I had a job every day. I need to feel safe to work my best and I couldn't perform to my full potential if my job wasn't secure."

For Karen, job security is connected to her overall health. She wants to work in a healthy environment that values job security. Work-life balance could be implied to be part of a healthy work environment. The summary of understanding oneself is essential for optimal career choices. The data collection methods associated with it are outlined in Table 9.

Table 9 *Understanding oneself is important for making career decisions.*

Findings	***Data Collection Method***		
	Semi-Structured Interviews	*Document Review*	*Direct Observation*
Reflection on Values		X	X
Work/Life Balance		X	
Job Security		X	

Other Learning Experiences

RQ 2: What Other Past Learning Experiences Have Influenced Doctoral Student Career Development?

Themes: *Academic learning experiences were significant to initiate career interest*

Experiential learning is important to sustain career interest and development

Peers' career experiences are significant influences on career development

This study also examined what other learning experiences were significant to the doctoral students. Learning experiences were classified into four broad categories based on the literature: performance accomplishments, verbal persuasion, vicarious experience and emotional arousal. The two largest categories in this study for these participants were performance accomplishments and vicarious experiences.

Academic Learning Experiences Initiated Career Interest

One of the largest categories for these students in terms of their type of learning experiences was performance accomplishments. These performance accomplishments can be achieved in academics or through experiential learning. Many students described that their initial interest in their career derived from the simple fact that they had long-term academic success in courses related to this subject/field/career. Academic success allowed them to advance to the next stage of education that was necessary for their career. Anne described in her first interview that one of the benefits that she experienced from her studies was "admissions to the next level of education I suppose. I went to college and then graduate school." Her continual success propelled her to achieve more and continue to graduate school. Pete described more specifically

in his first interview some of his academic experiences both in college and graduate school. In college, he was taking an undergraduate psychology class when he indicated:

> "I just took my first Y class and one of the things that they mentioned was psychopharmacology and just how drugs bind to receptors and create biological changes in the brain that produce an effect on behavior. I realized that if I wanted to do something like that and get into graduate school I needed to get good grades."

This field sparked an interest in him and influenced his choice of graduate study in pharmacology. It also inspired him to excel in school, so he would be able to get into graduate school and pursue that career. His continued success served to motivate him further. Pete also described in his first interview how in graduate school how he came to consider other career options:

> "the … class that I had to take last semester; we had a Y section that was my first actual foray into that. The professor that lectured that is in our department was saying that it's a career choice that he doesn't think a lot of people in our department consider because there aren't really that many Y [researchers] in the department, but we are trained in both X and Y. It is what our degree is in, so it opens the door to those opportunities [and careers]"

The class exposed him to additional opportunities in Y subject that he had not previously considered, and his ability to do well in Y and X moved him to consider Y as a career. The class initiated his interest in Y, a career that he had not previously considered. Liz, in her first interview, described a similar successful high school academic experience in her first personal statement:

> "I think in high school from the technical, the main benefit was just showing me that I wasn't bad at school. I thought I was not very smart, like not a good student coming from elementary and middle because I didn't get good grades. But it wasn't that. I think it was how I was being taught and how I wasn't super interested. So that pushed me to be able to pursue the X as a field."

Liz further described her learning experiences from high school that influenced her career development in her first interview: "So I did a technical center in high school. So, half a day for two years I was going to a different campus and doing engineering course and dual enrollment courses with X university so that brought me to Y subject specifically." She did well in sciences and other technical fields in high school, which showed her that she could achieve in the Y field. Not only did the academic experience serve to spark her interest in the field but has also showed her that she could be successful in that field as well. If she could achieve academically, then she would have a successful career. That success continued in her undergraduate and graduate study:

> "Throughout my undergraduate career, I cultivated a love of mathematics, physics, organic chemistry and biology. I minored in mathematics and chemistry and took elective biology course to better understand special topics. In my graduate studies, my coursework has focused on X subject, statistics and Y field."

She continued to find success in academics, which had led her to the career path that she has today. She describes more specifically a scholarship that allowed her to study engineering under a famous professor:

> "during the summer of 2014, I took a pilot of a research writing class that a professor recommended to me. It was completely online and there was a chance to win a scholarship to continue the life and work of [Professor X, the inventor of the computer

mouse], by becoming an X Scholar. I received the scholarship and then had the opportunity to visit the SRI Archives and the Computer Museum in [Y Location] that holds all of Professor X's. work."

This learning experience had a considerable influence on the direction of her career and work. She had the opportunity to study X subject during college, which then led to her continued interest to study X subject in graduate school. This summer experience had a considerable influence on her.

Experiential Learning is Important to Sustain Career Interest and Development

Other students described experiential performance accomplishments that influenced their career development, whether it was research, an internship or employment. These experiential learning experiences served to help sustain career interest and development and confirmed their interest in a career. Anne indicated that an experiential learning experience in high school was influential in her career development:

"When I was in high school, I spent the summer working at X federal institute working at scientific outreach. I tried to design science experiments to help inner-city children. So, I tried communicating very difficult concepts into simple terms…. I enjoy simplifying difficult concepts to lay audiences to give them confidence."

The experience sparked her interest in scientific outreach. Later, after college, in her first interview, Anne described her performance accomplishment at a Y federal institute:

"after college graduation, I was then employed by the same employer who won a research training award and I worked there. Then we had budget cuts a few years back. And he was not able to renew my contract. So, I stayed as a volunteer because

> I loved the research. Because I stayed as a volunteer, I discovered a way to show how medicine worked. I identified a project myself and got first author publication out of it as well as a few other publications."

It was her ability to publish and perform well in the workplace that inspired her to pursue her Ph.D. She was further motivated to pursue a Ph.D. after her workplace experience. Her interest had only grown stronger.

Carrie also described in her first interview her research experience as influencing her desire to obtain a Ph.D.: "I think that so far, I have had a pleasant experience. I have gotten to do a lot of research, which is what I enjoy doing. I have been able to see a lot of different techniques." She further describes other research projects in college, where:

> "I could do several research projects outside of class that my professors that weren't required but optional things to try, so I was able to experience a wide variety of different sciences and did some chemistry, microbiology and biochemistry research projects that opened my eyes to how much fun research can be and how interesting it can be to tackle a problem and try to find a solution."

Her research experiences in college served to influence her to pursue a Ph.D. She was excited by how much fun research could be and enjoyed the problem-solving aspect.

Pete described his experience as a technician: "I did a lot of research as a technician in a couple of labs. I enjoyed the work more. It solidified that it [research] was, yes, something that I could do for four or five years at least." He also enjoyed research in the workplace. It served to confirm his interest in the field since he was doing experiments. It was a valuable learning experience for him. Liz described in her first personal statement her experience fixing old

medical equipment. She wrote about traveling to X country to fix old medical equipment using Y techniques. She learned how practical and useful Y could be:

> "We worked in local, state-run hospitals performing preventive maintenance … and repairing medical equipment. This furthered my love for the problem-solving aspect of X. We fixed old medical equipment. This equipment had been predominantly donated from the Y country because it was too old to be used in hospitals and there were no longer spare parts made specifically for the equipment."

She learned how to repurpose old medical equipment and found it very rewarding. It influenced her greatly and furthered her desire to be an X. Liz in her personal statement then goes on to describe more specifically her experience in the developing country when she stated:

> "We helped to set up a recently donated ECG machine. First, we had to change the language settings because we were the only people who could read the English manual. After that we brought it to the ICU ward where it was to be used and they began to attach the leads to the arms and legs, but I noticed that they were attaching them to the wrong limbs. Each lead was labeled using English acronyms, so when something said RA for right arm, they just guessed at which limb to attach. These simple design flaws could have been fixed with thought put into designing over language barriers."

She elaborated on this moving experience, which influenced her to want to improve the design of medical equipment. She further described this experience in her first interview: "They kept putting the leads in the wrong places, so we kept relabeling them all with tape. But why--when designing leads like that--would you put it in English? Why wouldn't you just put little stick figures with wherever it goes highlighted?" Liz confirmed the value of this experience in her first

interview, where she indicates travelling to a developing country to fix medical equipment influenced her career choice:

> "I pursued a program … where they send you to a developing country for two months and you fix medical equipment…. I was very inspired by the track and all the designs and basically all the hospitals have donated old equipment from the X and Y country and from a few other places. But all the equipment is such that they don't use it anymore and all of it is X or Y language…. I helped them set up a lot of equipment that they just got because it was too confusing, and no one could read the manuals that they just got…. So, it pushed me to pursue Z as a field. I thought it was something that I wasn't smart enough [for my intended major] here and now I am doing ok. [The experiences] pushed me to go to graduate school."

Both in her interview and personal statement, Liz described this experience fixing medical equipment in a developing country as a significant contributing factor to her reason for pursuing graduate school. It was here that she first learned about human factors engineering and universal design.

The experiential learning continued to be valuable for Liz in graduate school. She took a group of undergraduate students to a developing country. In her first interview, she indicated that she was a teaching assistant in charge of:

> "interdisciplinary teams and had them [the teams] design basically a piece of furniture for someone's house of bamboo. The point of course was to use bamboo, because it is very sustainable material and it is something that Country Y has a great climate for growing but no one really uses it…That was something that influenced me…The same developing country has made me think more about how I can design things better.

She further confirmed her desire to pursue X career through this experiential learning experience in graduate school. She had influential experiential learning in undergraduate and graduate school, which suggests both undergraduate and graduate experiential learning are important to the pursuit of doctoral study.

Peers' Career Experiences are Significant Influences on Career Development

Vicarious experiences are another large category of learning experiences that was significant for participants. Vicarious experiences are learning experiences in which the participant learns from others' experiences. The largest category of vicarious experiences for these participants are peer experiences. Participants learned most frequently through their peers.

Peer Vicarious Experiences

Many of the students learned from their peers. Kate indicated in her first interview that she had explored careers by speaking with her friends:

> "I have asked some of my friends and friends in X career and I used to be a tech in another lab before coming here so I keep in touch with everyone in the lab I know if they are in their post doc now. I talk with them about their experiences after they moved on from their Ph.Ds."

She states later in her interview that she has a "What App group with all of the women that I used to work with. It is easy to check on them." She also indicated she is interested in jobs in science policy:

> "I contacted my friend who has a friend that does X career. He got his job because he volunteered with politics before. He was the Y position on some …campaign. Now I feel

like I must, so something like that. It leads you down a path of rounding yourself out. You can't just do one thing. But it does end up being a lot more work."

She continued learning from her peers through vicarious learning experiences. Peers were an important influence on her. The peers' experiences influenced her career choice and development. She had an interest in a career in X and was influenced to get involved in Y based on the experience of a peer.

Carrie also learned from her peers in her labs: "I have been able to see a lot of different techniques." When it comes to career explorations, she notes, "I have a couple of friends who are out in the job force. I am reaching out to them and trying to understand what they do and if that is something that would interest me." She is learning from her peers about different career options. She is using the peers' careers and jobs to understand if they would interest her or not. She is making career decisions based on peer information. She also learned from her peers at conferences that she attended: "I have tried to talk to them [the conference attendees] and learn about what other options are available and what those companies do to see if that is something I might be interested in down the line." Carrie indicated that she learns from her peers in a variety of different settings, from the lab to conferences, as well as the workplace. She looks to them for advice in her career development decisions. She also looks to them for career options.

Karen's vicarious learning from her peers started at an even earlier age. When she was in high school, she states in her first interview,

"I first learned about my major when I was a junior in high school. X disease has always been big in my family. Everybody's family has some history of X disease, so I knew I wanted to work with the X. And then I was a junior and my friend was a senior and she

was telling me about Y [career] and … she was explaining it to me. That is what I have been looking for this entire time."

She described her relationship with the senior later in the interview:

"I was in AP Bio and she was talking about it and I was like, 'what even is this?' And she said it is the systems of the body, but you are learning about the mechanics…. that's it. To me I was always biology and then you can do Y career. I had no idea that was even a thing."

This high school friend had a considerable influence on Karen and her choice of careers. Karen also discussed her experience in high school in her first personal statement in describing the same experience from her interview:

"My junior year of high school I learned about the field of X. I had a friend in my AP Biology class that asked for my advice on where she should go to study X major. I couldn't help her with that, but she helped open my eyes to an area I never knew about."

Thus, she indicated that she learned from this high school friend in her personal statement as well as her interview. She decided to pursue X career because of the conversations with her friend. The friend had a considerable influence on her career path.

Pete also had learned vicariously through his peers. When asked during his first interview about the LEAPD career development class, he stated,

"I decided to take it. A friend said it was helpful to listen to the speakers. They broaden your perspective. We don't get outside perspectives in graduate school. Most everyone that you interact with has been in academia their entire careers and don't really know anything outside of it."

He decided to take the career development class based on the experience of his peers. He wanted to learn about different career options in the biomedical sciences beyond academia based on his friends' advice.

Vishwa indicated in her first interview that she felt finding a career that is a good fit to her would be helped by speaking to her peers:

> "I think the biggest thing is going to be talking to people and seeing what hearing about their experiences and learning about. I totally understand that everyone is different. I love that. So, knowing that I can take their experiences good and bad and reshape the way I am thinking about it. And saying well you might not have been a good fit for that but I think that is something that I can do. Or love to do. Or somebody's positive experience of being I want to do that too and seeing what opportunities there are for me. So, for me it will be talking to people and learning about what they had to say."

She emphasized the importance of networking with her peers to find out other options that can be considered for a career. She also realized that some peer advice will be helpful or positive, whereas other advice may be negative for a certain career, but it does not mean that she should not consider the career. She also indicated that she learned from her peers in her second interview:

> "talking to people and hearing positive things. Positive outcomes from their experiences. Hearing about their struggles. Just to encourage me to know that I'm going to have struggles too. Knowing that I'm going to have good times and tough times and things are going to get hard and sometimes things are going to easier than other times and that's ok. You just keep pushing through and you'll get where you need to go at the end. But Just hearing other people [helps].

In addition to learning from her peers about different career choices, she used them as a resource to help her get through tough times like graduate school. They were part of her coping mechanism. Vishwa focuses on the relationships that are built in graduate school and uses them to help her succeed.

Peer Experiences as Barriers

Most of the vicarious learning experiences described thus far have encouraged the participants toward a career path or served as a source of support. Sometimes the experiences of others, however, can discourage students from pursuing career paths as Kate indicated:

> "My lab I used to work in before made me not want to be a post-doc. They were really burnt out. They were wanting to quit science afterwards. I know plenty of people that have had good experiences with postdocs but seeing that first hand made me wary about it. You are in a position where someone else can control your life even more so than you are in your Ph.D. program."

Kate did not want to pursue a post doc experience based on the experience of her co-workers. She goes on later in the interview to say that she is:

> "more realistic. It is good to be realistic and grounded. I feel like I should always have a second plan. I know people whose first goal is academia and their second plan is industry. They are ok with two different careers, and they prepare for two different careers. If the first one is so competitive that people don't get in very often, which I think is a clever idea after knowing how competitive it is, how I might not like it. I want another option, so I am not stuck like some of the postdocs."

She did not want to pursue a post-doc career based on the experience of her classmates. It prevented her from considering the career in the future. These peer experiences were influencing her career choice and development. Karen's experience with her peers also acted as a barrier for certain career choices after college:

> "Honestly, the realization [is] that most people with my major don't get jobs or the jobs they want. That was big for me. My best friend, she just has a bachelor's and she was in X [career] my year. She works at a job that she hates but she makes great money, but she is not really doing X [major]. She is doing more consulting work and it's not really engineering. She is in a weird managerial bubble…. It's a X company but she doesn't do any actual X [major]. She is much more of a hands-on person. She is … job searching again, and the problem is that she gets paid great, but she is not doing what she wants to do. I felt like that trend popped up a lot when I was in undergrad. Pay is important, but I would rather be doing what I want to do. So that is why I decided to continue on to graduate school."

Her friend's experience with a career after college discouraged her from pursuing a similar path. She did not want to go into the workplace right away after college. The experience acted as a barrier to pursuing a career in that direction. She learned from the friend's experience in the workplace and did not want to end up in a similar place. That same friend is now "struggling working on her master's but not doing what she wanted to do. Knowing that solidified my choice." She did not want to end up in an analogous situation and therefore chose to pursue graduate studies.

Family as a Career Development Influence

Family was another source of vicarious learning experiences for the participants. Liz, for example, was influenced by family to study X major:

> "My grandmother suffers from essential tremors, which add complications to day-to-day living, which are already complicated in the process of aging. I hope that research in X [major] can lead me to design solutions which are able to help her, and everyone else who struggles with activities of daily living."

She learned from her grandmother's difficulties about the issue, and it sparked an interest in her to want to help others who struggle with daily living. Karen had a similar experience in her career development: "The summer between my junior and senior year, my grandfather had a X [health problem]. This occurrence solidified my desire to work with the X, but I still wasn't sure what I wanted to do." She was also influenced by her family's health experiences to pursue an X career and to study the Y. She is fascinated by the Y. Table 10 summarizes various data collection for past learning experiences

Table 10 *Past Learning Experiences in Career Development*

Findings	***Data Collection Method***		
	Semi-Structured Interviews	*Document Review*	*Direct Observations*
Academic Learning	X	X	
Experiential Learning	X	X	
Peer Learning	X	X	

Supports in Career Development

RQ3: What are the perceived contextual supports and barriers for a doctoral student on career development?

Themes:

Professors are the largest source of support for doctoral students

Peer support facilitated doctoral student success

Family support connected students with their values

Institutional barriers were not overcome by these students

Departmental barriers were easier to navigate and negotiate

Internal barriers deterred students from pursuing some careers

Professors were barriers that the students were able to negotiate

Professors are the Largest Source of Support for Doctoral Students

The participants had various sources of support that they depended on for their career development. Their largest source of support was their teacher or professor. These supporters included teachers from high school, college and graduate school. They also included larger departmental and institutional supports within the schools and universities. Employers could also be a source of support for the participant as well as a financial support. Other strong sources of supports were family and peers. Many students found their network to be a source of support as well.

High School Teacher

Many students identified their professor or teacher as be a strong source of support for them. Often this support began as early as high school. Carrie was influenced and supported to study the sciences from her AP Biology teacher in high school. She said in her first interview, “I think the teacher encouraged us to enjoy and made it seem interesting and the material stuck, and I understood the concepts as well.” She adds, “He made the material fun and interesting.”

Karen described a similar experience in her first interview, “My senior year, I had an amazing AP Physics teacher. He was fresh out of grad school and was so passionate about the subject. His passion was passed down to me and I knew I would love being an X. Karen added in her second interview, “I had some high school science teachers that really made a difference just to get me into STEM in general.” Both Carrie and Anne’s teachers were enthusiastic about the subject, which was passed on to them. Anne also had a “science teacher in ninth grade who noticed my various skills. And he told me that I would grow up to be a researcher.” They all had encouraging and supportive teachers in the sciences during high school who helped convince them to pursue careers in the sciences. It was the initial support that got them started along their career path.

Undergraduate Professor

Many of the participants indicated that a college professor was a source of support for them in their career development. The professor could have been as advisor or a research professor. Carrie states, “I got to know my professors a lot more, which is good. It helped me get into grad school and internships in college. It helped me with understanding how things work.” She also describes the support she received in her second interview: “So, in my undergrad, they

were very supportive of me going to graduate school and wrote me great recommendation letters. [They] helped me with every step of the process of applying and getting in." Carrie really received a lot of support in her application to graduate school. It was different than the type of support reported for high school, but important nonetheless. Karen also had a similar experience: "I had phenomenal professors …. I think the great professors I have had it helps that I am still here." Karen also describes the positive relationships that she had with professors in her first personal statement: "Going in to undergrad, I didn't know what to expect. I thought I would just be learning about the body and devices that can be applied to it. I didn't expect to make long-lasting connects with professors." For Karen the long-term connections that she was making with professors helped her the most. She thought college would be more about just learning technical information. Kate also described the support she received in her second interview:

> "I think that I probably had like a lot of positive professors because I—that just kept me interested in things. Not one that I felt I was taking —they helped guide me in any way in my career. But, I just felt that some of them made the biology interesting …And I felt prepared mentally when I graduated undergrad to do things in the science field."

Kate described support that made the subject interesting, but also prepared her for the next level. Adequate preparation for Kate is a source of support. Support for all these students from their college professors encouraged them to persist further in the science field. They could consider graduate school and beyond because of the continued support. The support expanded from high school from making the subject interesting and relaying enthusiasm to building stronger relationships with these professors. The support in college came in the form of helping to establish a foundation in the sciences and letters of recommendation.

Undergraduate Professor: Advisor Support

In many of the cases, the student's professor was also their advisor and served as a source of support. Carrie described that her support came from:

> "a couple of different professors. I went to a liberal arts school that was small, but research-focused. Several of my professors--most of them were my advisors--but they had projects that they wanted help with and I showed interest."

They encouraged her to do research. They supported her research interest and helped her find research opportunities. She describes such an experience in her first personal statement:

> "My undergraduate chemistry advisor was a wonderful professor who made learning enjoyable and was supportive of independent research. If I were to become a professor, I would prefer to work at a small liberal arts school like the one I attended."

Again, her undergraduate advisor supported her chemistry research. Undergraduate research is source of support for students who want to pursue doctoral studies in the sciences. He also influenced her career choice. She would like to be a professor at a small liberal arts college. Pete also had a college advisor who was influential in shaping his career choice:

> "One of the women on my advisory committee that I worked with as an undergraduate…she does X research…and that was my first exposure into that field outside of the classroom and actually working with animals in that type of experimental paradigm."

The advisor exposed him to research that would later influence his course of study. Having exposure to that type of undergraduate research probably also helped him get into graduate school.

Undergraduate Professor: Research Support

Research support is imperative for those who want to pursue doctoral studies. Most of these students who participated in this study had support to conduct research in their undergraduate career. Carrie indicates in her first interview that she had professors who encouraged and supported her interest in research:

> "They encouraged me to try … and helped me to be independent, which is what I really liked. I got to do not just what we learned in lab, which is already set out and the answer is already known. I had to go and do something on my own which wasn't known before."

Carrie indicated that she received support to conduct research on her own, which is critical to achieving graduate school success. She was able to have a successful undergraduate research experience. This led her to pursue her doctoral studies:

> Karen also had a professor support her by helping her obtain experience in research: "I did have one professor who helped me get my undergraduate research job, so that helps…Someone contacted him--'do you have any students to recommend'? He recommended me, and I submitted my resume and got hired that way. I worked in the biochemistry lab, but that got me more wet lab experience and actual real-life experience with experiments. 'Cause up to that point the only experiments that I had done were experiments in bio labs. So, what was crucial was that professor getting me that job to see what real research looks like."

She was able to get much-needed undergraduate research experience because of a professor supporting her in her research endeavors. This information is confirmed in her first personal statement: "The professor that taught this [class] has helped me get into undergraduate research in Biochemistry." And Karen also mentions it again in her second interview: "But I have one

professor who helped me get my undergraduate research going. And then, helped me, get into grad school." This research support was vital to her getting into graduate school:

Graduate School Advisor

Most of the students in the study indicated that they had been supported by their graduate school advisor. Anne indicated in her second interview that her graduate school advisor was a source of support for her:

> "I work with this person sometimes. And I enjoy how when I ask this person a question, he deeply thinks about it, and gives me an answer and discusses it with me, and he respects my ideas and opinions. And I feel as if I learn things from him because he can share additional information, as well as give me references for the information so that I can pursue the topic more myself."

This professor supported her learning and discovering things for herself. He encouraged her to work independently. Carrie also had a graduate school advisor that was a source of support:

> "I think I have a good mentor. He is great and really understanding and wants to work with students and take the time to talk with us and answer questions. He is really open to student participation and encourages us to present every week at lab meetings, so I think he has been a big part of my wonderful experience in lab."

Carrie's advisor offers support by spending time with her and encouraging her to present at lab meetings. He shows her that she is important and valued in the lab as well as developing skills that she will need in the future. Karen also has been supported by her graduate school advisor as she indicates in her first interview: "My PI has also really cared, and he is phenomenal in making

sure that I am doing things that will benefit me later." She indicated to her advisor that she wanted to have X career, and:

> "then after I expressed this to my PI he was like, 'we are going to send you to a bunch of conferences. I am going to connect you to an X [career person] that I know. You can talk.' And he has been really beneficial and given me as many outreaches as possible."

She describes her lab where she works with her PI:

> "Now there are two other graduate students and four undergraduates. We have weekly meetings; my PI is always there to answer questions. It is night and day [from my old lab]. It really is. Two months ago, I was considering dropping out because I was so miserable. Even though my parents and boyfriend were telling me not to overreact, you want to do this, and I was like I am miserable being dramatic, but it [being in this new lab] really did almost drastically change my life.

In her second interview, Karen also talks about support from her graduate advisor: "my current advisor is, you know, really phenomenal in helping me kind of find the best path for me. And, pushing me and…. giving me resources. He's really good at pushing me to be what I want to be." She later states in the second interview:

> "I've only been in his lab since August, but I've already got, you know, so many more things like colleagues. And, you know, he's already pushing me to go into conferences and get undergrads and mentor that kind of way. So, I think that he has really helped me, you know, become more of a graduate student and take on more responsibilities and prepare me for the real world."

Karen has received tremendous support from her graduate school advisor, which has been critical in her success as a doctoral student. She further elaborates as to what makes a good advisor by

describing his interest in lab meetings and her future career. He pushed her to go to conferences and gave her additional resources.

Pete also felt supported by his PI: “My advisor is good. He challenges me and has helped mold my critical thinking more positively but [it is] stressful with it being a graduate program.” Being challenged is another way an advisor can provide support. Pete noted that it is not always easy being challenged, but that he knew it was good for him. In her second interview, Liz also is supported by her graduate advisor:

> “my advisor did a good amount of X [career field] when he first graduated. He worked in industry for a few years. So, he teaches the human factors courses. There’s two at X University. So, taking those and talking to him have given me more of an idea of what I wanted to do.”

She also more explicitly states that he has supported her career path or development later in the second interview:

> “One of them is my advisor, so I think he’s supportive of me going into this. And he’s gotten me a couple contacts in the field. That’s through one—that was one of my informational interviews was through him. So, I think he’s supportive of me doing that X [major].”

Liz has also received support from her advisor. He has helped her through networking in her field and helped her build contacts that way. She also received support by taking some of his courses and discussing the class with him. It furthered her knowledge and career development.

Carrie also indicated in her second interview that her PI has been a source of support for her: “I think my PI is great about being there and being willing to listen to our ideas and

supportive of us trying new things. And just general—and overall support." She later tells how he is supportive by saying:

> "Then currently my PI has been encouraging of me going to visit. I went back to visit Company X recently. He was very encouraging--let me take a few hours off work to go do that. He's just been, you know, helpful in every way, towards whatever I want to do."

Carrie's advisor was a good listener and encouraged her to try new things. He also supported her taking time off from lab to visit a company, which could be a potential employer to her. Like Liz, Carrie's advisor has been supportive of her career development and helping her find careers that might be suitable for her. Most of these professors have supported students finding careers in non-academic environments.

Graduate School Classes

In addition to being supported by their graduate school advisors, many of the students also felt supported by the professors who taught them in their graduate school classes. In her second interview, Liz indicated that some of:

> "the best professors … were generally the ones that everybody hated, because they were always super-tough. But I always thought they were very fair, with their—and they had—their expectations were clear. So, I always thought it was the teachers that I learned the most from and I felt the most accomplished after I took their course."

Liz felt most supported by the professors who challenged her the most. She was not looking for the easy A. In her second interview, Karen felt supported by her professors if she could tell:

> "how much they cared about the students. That puts it above and beyond for me is how much they really cared about the students and really care that they were learning. You

know, not just like checking off boxes and be like oh, I need to teach this, I need to teach this. But that the students got it, and understood it, and could apply it to the real world."

For Karen professorial support was in the form of caring about their students. They wanted their students to truly understand the material. She also felt supported by the ones who were collaborative with her when she was a teaching assistant (TA) for them:

> "a lot of research professors are like, 'I'm here for the research, classes are secondary, I don't care about that or anything. You know, just let the TAs do everything.' But my favorite professors are the ones who are 'okay, you know, I have the TAs, and they're going to grade some stuff, but I want to help you, and I want to make sure you get it, and we're working together.'"

She felt supported by the professors where she was a TA for the class as well. Support for her was working collaboratively with the students, not just expecting them to do all the work by themselves.

Pete, as he indicated in his second interview, felt supported by the professors who excelled in teaching itself:

> "But then when you have a professor at this level that does know how to teach and impart their knowledge—[it] is really refreshing rather than just, 'Okay, I must go through these slides and understand it for myself.'"

It was refreshing for him to have a professor who was interested in teaching and not just research. The professors supported him by helping him learn the material. They were excited by teaching. This is like Karen's experience. Vishwa felt supported by professors when they taught, talked about their successes and failures:

> "I think it takes a certain amount of vulnerability to kind of put yourself out there and

> Say' I did this, this, and this.' I think what differentiates them is they talk about their failures just as much as they talk about their successes."

She felt by hearing about their successes and failures, they became more human and more relatable. They were not on a pedestal but someone you could really connect with.

> "So, you don't—you talk—they're telling you stuff and they're telling you good things and bad things, and things that work and things that don't work. And you're seeing them as people, and not —you know, I still have a lot of them on like pedestals. That I'm 'Oh my gosh, they're just amazing professors.' But then you like talk to them and you're like they're just people. They really help you relate to them."

For Vishwa, the support came in the form of being able to connect with the professors. She liked it when she could find something in common with them or hear about their failures. It made them seem more real to her.

Peer Support Facilitated Doctoral Student Success

Peer support was another significant category of support for the participants. Many of the students' felts supported by their fellow doctoral student peers. From classroom observations, the instructor of the career development class promoted peer support by encouraging students in the class to post their informational interviews in the discussion section of Blackboard. She stated that she wanted them to learn from other student's informational interviews and required the students to comment on each other's informational interviews. This encouraged the students to learn from as well as support each other. Kate in her second interview described the experience of reading different informational interviews:

> "So, um, so I feel like her informational interview is the one that I like commented on as far as the assignment. And, that was good for me to read. Because it was—it must do some with X [career]. It was kind of this thing I've never heard of, this group I never heard of, and it kind of integrated research and X [career]. So, I'd never even like thought that this was a job, integrating the two of them. And I'm just kind of, what would you do to prepare yourself for that job 'cause it's not like one or the other. Would you do a post-doc or a fellowship or whatever? And so, it's something that I will look more into."

She learned about other career options from speaking to her peers. She was learning from their experiences. Kate later described in her second interview how she learned how to switch labs from an X lab into more Y lab by talking to graduate students in her new lab:

> "I just talked to this girl in my lab now. So, I guess she probably influenced me. She's an older student. … And she's in the X program as well. So, finding out how I could make the move over. … Like I felt like I didn't have anyone to talk to because most of the people don't do that. When I got into the school, I had written all about my other experiences and the type of labs I wanted to be in. So, then my advisor didn't really—she thought I was being like spastic and stuff. So, she didn't really know what to tell me. So, I sought out the two older students that were in that program and talked to them about it because it was hard to navigate. I would I—yeah, it was difficult. So, if I had not talked to them, it would've maybe not worked out."

She relied on the experience of the older graduate students to help her switch labs. They were able to help her when her advisor was not able to.

Karen indicated in her second interview that she had found support from graduate students when studying for classes or big exams:

> "I think I have a—I mean I have a good relationship with most of the other graduate students in my class or who I take courses with. We always will study together. We studied together for … the qualification exams, the comprehensive exams over the summer. Those were terrible. I'm still recovering. I think everyone's very supportive. Like if I have a research problem and I need coding in the lab done, I could easily go to someone and ask them to help me write the code because I'm good at that. But I would do other things for them too."

It was a mutual relationship for Karen. Her peers helped her out in difficult situations, and she was also able to return the favor when needed.

Not only did Karen find her doctoral classmates supportive when they studied together, she also used them as a sounding board for ideas:

> "So, my friends in the program have been really helpful. …We bounce ideas off each other. We practice presentations together. We studied together when we were taking courses and just been the sounding board for ideas and support for difficult times."

Karen also has doctoral student classmates that supported her with classes as well as editing papers: "We all just support each other in classes, helping each other learn things, or editing papers and looking at review processes. So, I think that we are little club of just constant support for each other."

Pete describes his support in an analogous manner. In his second interview he discusses how helpful his peers were during lab meetings: "My peers are helpful in asking questions and making me think about my data in ways that I hadn't previously or different interpretations for it, things like that, helping to see a wider picture of what I'm actually studying."

Vishwa also describes similar support in her lab and reflects on her ability to be personable and connect with them. She seemed to highly value the relationship itself. She could ask them:

> "Well what do you want to do when you graduate?" And we'll have these conversations of like, 'Okay, I like this, I like this. But I don't like this, and I was looking at this company.' And the fact that I'm doing it with people that I don't feel like I am competing with anyone. But it's just like—it's we're supporting each other. And I love that. And then other than that, it's again that, like, personable. So, we can talk about career, but we can also talk about—knowing that we've got careers that we can talk about, and we have like things outside of careers, makes us very, like, personable. And, again, just connect with them more. So, I think that supportive environment is definitely—it helps me."

Family Support Connected the Student to Their Values

Many of the students described the family support they received in their decision to pursue their doctoral careers. Karen indicates that her decision to pursue graduate school at an institution was because she had "family and other relationships [there]." Family was a key factor in Vishwa's decision to pursue her graduate degree: "Family has been a key factor. The way I grew up being service-oriented is something that I get from my family and my religion. I am beginning to understand who I am. It's the beginning of all that." Vishwa has a similar statement in her first personal statement: "I believe these values are a result of influences of my life that have encouraged me to be service-oriented including religion and family and the lifestyle I want to lead with family coming first." She was also supported by her parents to pursue a science field when she states in her second interview, "so I think positive is the healthcare field. I think both

of my parents are in the field to a certain extent, and I think growing up seeing—especially my dad—like science textbooks, like, really got me excited about science." Her parental support was connected to her values. She gets these values from her family, and they continue to be a strong source of support for her.

Karen described her family as influencing her values as well, and she values work life balance because of her family:

> "When I was slightly older, I noticed more and more that my parents had to try to make it to all my soccer and field hockey games, but they never missed one. That meant the world to me and I always felt terrible for the kids whose parents couldn't be there because of work. My experiences of both having my parents there and not there helped confirm that a decent work/life balance is crucial to me."

Like Vishwa, some of Karen's values come from her parents. Her work-life balance value was something that her parents valued as well. Kate described monetary support that she received from her parents, indicating that like her they valued education. Kate described the financial support that she received from her parents, which allowed her to go back to school:

> "They paid for my undergrad education, so that's a humongous support, like a financial support. When I had medical bills I couldn't pay off, they would. So that takes some of the stress off, being able to go back to school and stuff."

Kate felt that her parents valued education so that they made it possible for her to go back to school. By paying off some of her other bills, she was able to return to school as a full-time student. Like Kate, Liz also received financial support from her parents, which indicated that they valued education. Liz also described a similar level of financial support from her parents in her second interview:

> "They've just always been very supportive of my education. Throughout undergraduate they helped me pay [for] textbooks and housing. They just want me to stay in school forever because... why not? That's what they wanted to do for—and they weren't—they didn't have that opportunity. So, they just are very supportive of the fact that I can keep doing this because I'm funded."

Carrie also indicated that her family valued education, which is allowing her to pursue becoming a first-generation Ph.D. student. As she elaborates, "I'm the first one to get a Ph.D. in my family I believe. But the support has been phenomenal. My parents are excited. My whole family is supportive. And-- my husband and his family are supportive as well." In addition to her parents, Carrie's support includes her spouse and in-laws. She further describes the support later in the second interview:

> "They've just, constantly supported any idea, anywhere I wanted to go. My parents let me go across country to go to undergrad. They've wanted me to pursue whatever I wanted to do. And so, they were encouraging of me going to graduate school. Then I commute, from X [location] every day. And so, my husband and his family have been extremely supportive of that as well and been helpful with that."

Carrie's parents demonstrate again in this example that they value education, which is a common shared value between herself and her family. Pete indicated that his parents have supported his career goals as well. He states, "They encouraged me. My mom has a Ph.D. as well, so she-- she's been through this process before. So, she definitely helps when I feel like I'm in a rut with it." Pete describes that his mother having a Ph.D. can provide an additional layer of support for him. Like Carrie's family, she also values education.

Institutional Barriers were Difficult for Students to Overcome

Participants identified many categories of barriers or challenges in their career development. They included institutional barriers, departmental barriers, internal barriers and professors as a barrier. Barriers were not as frequently reported as supports by these students.

Barriers in Academia

Many of the participants identified institutional barriers that impeded their career development. Academia was one of the largest areas of barriers to career development for the students. Many of the students did not want to work in academia. Pete indicated so in his first interview: “Mostly just for availability with a Ph.D. I am getting, there is not a lot of pharmacology that I could be doing that is not in academia and I don't want to be in academia.” He clearly indicated that he did not want to work in academia. He also indicated a similar belief in his informational interview. “Throughout my graduate career, I believe that I have attained a solid grasp of the day-to-day responsibilities and the requirements of an academic career, and I do not feel that the path fits my interests and strengths.” Academia was not something that interested him or allowed him to play to his strengths. He did not like the daily responsibilities involved in an academic career. One of the largest reasons that he did not want to go into academia is its emphasis on grant writing. He described academia as mainly “writing grants and realizing that I don’t want to do that my whole life.” Grant writing is a barrier to him pursuing a career in academia.

Carrie also had an aversion to academia, which influenced her career path when she stated in her first interview, “I think part of it was definitely my aversion to becoming a P.I. I don’t really want to do the whole grant cycle system.” Like Pete, she also did not want to write

grants. And she states this again in her second interview: “Negatively, I would say just the grant cycle. One of the labs near us is—doesn’t have funding anymore, so all the people in that lab right now are out of a job.” She is also fearful of losing funding and a job if she goes in academia. She did not think academia would provide her with job security.

Karen also did not like the grant-writing aspect of academia, but she also identified another component of academia that she disliked. For Karen, the politics of academia served as a barrier to her as well. She states in her second interview:

> “I will say that being a graduate student and seeing more of the politics of behind the scenes of academia has really driven me to not want to be in academia at all. And just kind of seeing especially— I only know within my department, of course. But, just seeing all the craziness behind the scenes. And I know that’s everywhere in the real world. But just the job security aspect of things, you know, whether your tenure track or whatever. And then seeing the political side of like everything that’s going on behind the scene. I’m just like, no--not for me.”

She did not like the grant writing, politics or lack of job security that she had seen in academia. Like Carrie, she was also apprehensive of the lack of job security in academia. Anne also did not want a career in academia. Anne also described in her first personal statement how she did not want a job that required grant writing:

> “I am least interested in jobs that involve a lot of paperwork, like what I assume intellectual property or research administration would entail. I wrote a grant last semester. The science part of the grant was limited to six pages, which is reasonable. However, the grant required an additional 60 pages of busywork, like the square footage of the various rooms I would be performing experiments in. I found it challenging and

> frustrating to write all the mandatory busywork, especially to gather the information about things that have nothing to do with science, from many different people. I did not like having to waste mental energy on this part of the application. I would not like a job that requires me personally to write grants. "

Anne has similar sentiments in her informational interview of a scientist working for Museum X: "This job requires you to write grants for funding. I dislike writing grants, and I would prefer a job with stable funding. I don't like to have to think about money." Like some of the other students, she was also concerned about the lack of job security in academia and other positions that require grant writing. Her dislike for grant writing is confirmed by both her personal statement and her informational interview.

Graduate School Department Barriers were Easier to Navigate

In addition to institutional barriers, many students found barriers at the departmental level as well. However, unlike the institutional barriers, most students were able to overcome the departmental barriers. Anne describes a departmental barrier of working with several different faculty rather than having one PI:

> "At first it was challenging because I was bounced between labs. I worked for five different people, I got my current PI who asked me to work for several other people. So, I don't have much continuity in what I do and who I work for. What I do each day I just must go along with it. Now I have five different bosses."

She has learned to be adaptable and flexible to overcome this barrier. She had to adjust to the distinctive styles of each P.I. She was successfully pursuing her doctoral studies despite these challenges. She did not let it interfere with her studies.

Carrie had challenges with her academic coursework. She felt that it was too detail-oriented and less of a survey course than it needed to be. She felt that these detail-oriented courses were not geared toward doctoral students. She found it disappointing to be enrolled in such a course:

> "In terms of the academic coursework that I have taken, I was disappointed because I felt like a lot of the classes were tailored toward the certificate program. At least in terms [of the] biochemistry super course, and which is I think a little unfair because as graduate students we have a lot less free time to study like the certificate students had, so we are a little [disadvantaged]. We have less time to study and I thought it was a lot of detail for what was supposed to be understanding the concepts and making sure we knew a little bit about everything. It was a survey course. And exams were testing on insignificant details and I felt that was a theme in a lot of my classes which I wasn't expecting from a graduate school program."

Like Anne, she was progressing satisfactorily in the program, so she was able to overcome that barrier but still encountered some difficulties with the academic coursework. She found the coursework to be challenging.

Pete also encountered difficulties with the academic course load. His concern was different from Carrie's in that it was more an issue of different teaching styles. Like Anne's concern, he had to adapt to the different teaching styles:

> "I guess just the different philosophies between different people. It's not always your advisor teaching you, but sometimes someone wants to hold your hand the whole way through and the next person just throws you a stack of 20 pages and says learn it. And

there is just that wide variation that you must tailor your learning style to be able to fit both perspectives."

He had learned to adapt to the different teaching styles and had adjusted his learning style, so he could be successful regardless of the professor. Liz also had struggled with the coursework:

> "I'm super tired of doing coursework. And it has been less coursework with undergraduate, but not much less so far since I've kind of—my advisor has asked me to take a lot of courses every semester and just get it over with. Which is fine, but then it's hard to keep up with research, on top of taking like three or four graduate-level classes a semester. It's kind of a lot. So that's a struggle right now."

She struggled with the overall number of courses that she was being asked to take. But like the other students, she has been able to overcome that barrier and achieve satisfactory progress in her program.

Undergraduate Departmental Barriers

The participants also experienced barriers at the undergraduate departmental level, and some could overcome the barriers while others were not. Carrie struggled with research at the undergraduate level: "I guess in college the problem that I had was everything was so short-term that I couldn't ever see anything to fruition like the research projects. Even the internships--same idea." It was difficult to decide which area of research to pursue since she was not able to experience success in any one area. She found the research projects to be too short-term. She wanted a longer research experience, but that was not possible in an undergraduate environment. But she was able to overcome the barrier. She continued her research career when she decided to enroll in a doctoral program.

Other students felt like they did not receive adequate career counseling at their undergraduate institution. As Kate states:

> "I didn't feel I had —I went to a small school—… and I didn't feel I had career services that were that good. I said, 'I wanted to be a veterinarian' then, and I thought I took the right classes. And it turns out like I don't know if all the schools are moving towards, like, a whole distinct set of required curricula. But it included like physics and things that you would really guess. But my advisor didn't-- investigate it and didn't know that either, which I mean I should have done that myself and realized that, too, before it came time for me to be applying. But I [was] just young at that point and not-- very independent."

This barrier caused Kate to change her career path and led her in a different direction. She was not able to overcome the barrier. Anne also had a similar complaint, but her statement was much more general: "Well, for undergrad, I did not really have career guidance." She did not really state how that impacted her career development only that she lacked guidance**.**

Internal Barriers Deterred Students from Pursuing Careers

Participants, in addition to the institutional and departmental barriers, also experienced internal barriers that influenced their career development. The instructor of the career development class indicated from classroom observations that career decision-making difficulties can occur at several various levels, but especially emphasized the internal and external conflicts. Prior to the beginning of the career decision-making process, lack of readiness due to lack of motivation, dysfunctional myths, and lack of knowledge about the process are all examples of internal barriers. During the process, internal barriers can also occur due to inconsistent information due to unreliable information and internal or external conflicts. Internal

conflicts are conflicts with yourself; external conflicts involve someone else. She then recommended several coping strategies to reduce career decision-making difficulties.

Liz described an internal conflict she had where she struggled with her ability to believe that she was a good teacher:

> "I think everything I have done has been a wonderful experience. The teaching one with the course to X country. I still think I am not a great teacher so that helped solidify that. I don't like standing in front of people and teaching. Working in small groups was fine. I feel good at directing in groups. That is something that I gained from it. I don't think I will be a teacher."

She struggles to believe that she is a good teacher, and as a result does not want to pursue a career in academia. Her fear of standing at the head of a classroom in front of a lot of people deterred her from pursuing a career in academia.

Kate also experienced an internal barrier in her interview. She also described suffering from imposter syndrome:

> "I had to learn how to code and learn just—but like I have really bad imposter syndrome, so that's probably a big thing. I'm just—being able to be confident in my work again even though I switched like, topics completely"

She was unable to internalize her accomplishments and feared being called out as a fraud. She switched labs during her doctoral program and having to learn new things like coding made her feel like an imposter. She did not believe she was successful. She lacked confidence in herself. In addition to lack of confidence, Anne described her lack of experience in getting in the way of finding a career that is a good fit for her:

> "I don't have much experience interacting with the public. Most of the time I have been working with people who are my equals or the Y program at X Institute. It might be fun in a grand fantasy sort of way to build a side thing. I have no experience in acting or doing things on sets."

She is unsure of her ability and lack of experience in working with outreach programs. She suggested instead that she could work on the side in Y programs; that might be easier for her than a full-time career in outreach. She does not have enough confidence in herself to pursue a full-time position in outreach.

Other students experienced barriers in the program due to their internal lack of focus. Anne also suggested that "Sometimes I don't engage with the material as much because I want to focus more on what I am doing in the lab then to sit down and read material. I don't always get the most out of what I am doing." She had trouble focusing on her classwork when she would rather be working in the lab. She further described this later in the interview: "Sometimes I get very bored by subject material. I don't know if that is too due to the instructor or my own personal interest. But that has deterred me from certain fields." Similar barriers were reported for classroom observations of Anne where she indicated that she does not like crunching numbers and some jobs just sound boring to her.

Professors were Barriers that the Students were Able to Negotiate

Kate described her experience with her previous P.I. before she switched labs. She worked in one lab where she found the PI to be difficult and not supportive of her desire to not work in academia:

> "I get that it is hard to find out what your options are. That is the main thing. I never found out as an undergrad. My P.I. before if you don't go into academia, he was not happy at all. So, they didn't even discuss other options. Even when you are doing research for a company, I didn't get it. The way it was set up or how do you get into it. He didn't talk about it."

She felt like her previous P.I. tried to limit her to academia and did not help her with other options. She switched labs because of this limitation. But Kate was able to successfully navigate this barrier. She was currently happy in her present lab. Karen had a similar experience with her PI which led her to switch labs as well:

> "He showed up to lab maybe once a week. He never responded to emails. It took him 2.5 weeks to respond to an email. I was TA-ing for him at the same time as well, and it was really [difficult]. He was not a good professor. He had a very snarky attitude, which is fine. I can be sassy too and bounce back and forth, but when it is 24/7 and nothing is taken seriously, and when it is taken seriously you are getting yelled at. …. The lack of confidence in me. He made me less confident in myself and behind my mind I thought 'red flag this is wrong.' He said, 'you can switch labs if you want to I don't care'. He said, 'you can just get your masters I don't care'. It felt like he didn't want me there. Seeing as I was he only student graduate or undergraduate I thought that maybe I should have been praised more or valued and have a little bit of caring."

Karen described a more much intense negative experience with her first PI. He lacked confidence in her and was very critical. He was also unprofessional and yelled at her frequently. She felt as if he did not care. But like Kate, she was able to navigate through this barrier and find another lab where she has been happier. Pete described working with professors in the lab and

how they did not really answer his questions. Pete talked about working with professors and some "might give me sort of a vague, uh, wishy-washy answer—and give me a very vague reference to some person to look up." He felt that certain professors interacted with him in an ineffective way that made learning from them more difficult. He found that challenging but did not let it deter him from pursuing his studies.

Teaching Professor as a Barrier

In a large research institution, such as the one that these students attended, many professors did not care about teaching, according to the students. Many students reported that these professors were only concerned about research. Carrie indicated in her second interview that:

> "The ones who are—obviously don't care about the course. And I've seen that a lot more here as the graduate program as opposed to undergrad. Who don't care, lack of interest, or they don't--they just drone on… And they teach to a lot of detail and then test on a lot of detail, but their emphasis is more on big-picture."

She described being taught by professors who did not care about their teaching. They delivered boring lectures and lacked energy and enthusiasm for the material. It made it difficult to learn. But Carrie has still been successful in her doctoral studies. Karen described a similar experience with her professors:

> "when they're focused more on their research, and they don't care about the teaching, the teaching is just so they can be tenure-tracked and get more money kind of thing. They just are—they're there for office hours, but then, you know, they have—like a student

will ask them a question, and they're just like, "Well what you think?" And they don't really answer questions. They just kind of float around kind of thing."

For Karen, she felt that these professors were more concerned about research because there was more money in research than teaching. She also complained that they were not there to help her with questions. She never got a direct answer to her questions which she found difficult.

Pete describes a similar experience from professors using PowerPoint slides. He has had difficulty with some of the presentation styles:

> "a big one is if they're using PowerPoint slides, if the slides are just really messy…Where it's obvious that they had taken this from other instructors' PowerPoints and just copy/pasted it altogether rather than make it cohesive. And then it's entirely dependent on the way that they're presenting it. Unless you record them …you kind of lose the forest for the trees when you go back and try to look at their slides for studying."

Pete, like Kate, also disliked the PowerPoint presentations that these professors gave. He found that they lacked cohesion and were difficult to follow. Plus, they did not all present the material well, which compounded the problem. It became more challenging to study. For Vishwa, it was a matter of making a connection with the professor. The good and effective professors were available and welcoming students to contact them. Other professors were less effective:

> "I think the less effective ones are just the ones who aren't—who aren't there as much…. But it's like they weren't—they weren't there after…. The other ones it was, 'Ah, should I email them'? I have this question about this, but I don't know how they're going to respond, so I'm just not going to email them."

Vishwa did not like the impersonal professors who did not take time to get to know her. She liked being able to connect with her professors. It made them seem more human. She valued the

relationship that she had with each professor. Table 11 summarizes the findings for contextual supports and barriers in career development.

Table 11 *Contextual Supports and Barriers in Career Development*

Findings	***Data Collection Matrix***		
	Semi-structured Interviews	*Documents*	*Direct Observations*
Professor Support	X	X	
Peer Support	X		
Family Support	X		
Institutional Barriers	X	X	
Departmental Barriers	X		
Internal Barriers	X		X
Professor Barrier	X		

Summary of Findings

In this study, the role of the LEAPD program on doctoral student development was examined. Several themes emerged from the data. The LEAPD class informed doctoral student career development in several diverse ways. One important theme was the exposure to different career options that led to career choice confidence. Students either confirmed existing career choices after learning about other career options, or they learned about different career options and felt comfortable about their career choices. Both led to increased self-efficacy. This study gives insight into how that process happens.

Other students stated that the class helped them expand their career options. They were considering careers beyond academia into industry and government. These learning experiences were also influencing career interests and career choices as well.

Another theme that emerged is that career development resources are essential for effective job searching. The career development class served to provide them with tools of career development. Students learned how to conduct informational interviews, set up LinkedIn accounts, network, conduct job searches and revised their own resumes. These tools served to enhance the students' self-efficacy in their own career development. They were more confident in their networking and job search ability. This confidence in job searching is another example of how the class learning experience enhanced their self-efficacy.

The career development class also encouraged self-reflection. Students were encouraged to reflect on their values. Two values in their career that were important to many of the students were life/work balance and job security. The instructor indicated that understanding values was helpful in making career decisions. The instructor compared values and interests but focused more on values. The students focused more on values. Values certainly seem to influence their career choices.

This study also examined the role of past learning experiences on doctoral student career development. One theme that emerged is that academic learning experiences were significant to initiate career interest. These academic learning experiences were often the first experience that the student had which interested them in a career path. These academic learning experiences often started as early as high school but continued into college and graduate school for most of the students. Most of the students reported at least one positive academic learning experience beginning in high school. Success in these areas encouraged the students to pursue the next level of study, which ultimately reached the doctoral level of study.

Another theme that emerged is that experiential learning experiences were important to sustain career interest and development. While academic learning experiences usually came first,

almost all the students reported at least one significant experiential learning experience that contributed to their career development and encouraged them to pursue doctoral studies. Experiential learning experiences were important to these students and included such experiences as research, internships and employment. These experiences also influenced career development and occurred in high school, college and/or graduate school.

An additional theme is that peers' career experiences are a considerable influence on career development. In addition to performance accomplishments, vicarious learning experiences were also found to influence career development. Peers were the largest sources of vicarious learning experiences, with students often relying on peers' experiences to help them decide positively or negatively about certain careers. Students also learned to a certain extent from family experiences as well.

This study also examined the different perceived supports and barriers for the doctoral student. One of the largest supports for the students was their teachers/professors which included high school, college and graduate school instructors. Influential high school teachers were usually in the sciences and very encouraging and enthusiastic. All the students who reported influential high school teachers did well in those science classes, which furthered them in their career goals. This study shows us how supports can influence career choice and affect career interests. This study also suggests that there is a relationship between perceived supports and career choice and interest.

College professors were another source of support for doctoral students in their career development. These college professors played distinct roles that influenced the doctoral students' career development. They helped students find internships and research opportunities. They helped students get into graduate school. They built self-efficacy by making students' feel

prepared and encouraging them. Professor support is another example of how a support can influence self-efficacy.

Students also reported getting support in graduate school from professors. Support included help from their advisor in research activities as well as teaching faculty. Of the students who reported a positive experience with their graduate school advisor, many of these advisors were actively involved in their labs, holding lab meetings, helping students network and exposing them to other opportunities and resources. Graduate school professor support also influenced career choices. Students who reported their advisor was only interested in academia as a career choice often reported switching labs. Other professors who exposed students to other career choices or supported alternative career choices made by the student reported greater satisfaction from the interviewees.

Professor supports appear to be more important than family or parent supports. As suggested in previous research this is likely due to the difficulty of the program. (Inda et al., 2013). Many students gave several examples of professor supports, which suggests a greater level of importance when compared to the few students who indicated parental or family support. In addition to supports, students identified barriers to career development. Institutional barriers were not overcome by these students. Many students identified academia as an institutional barrier that prevented them from becoming professors; they did not like grant writing. Other students reported not liking the politics in academia. These barriers exerted a direct influence on career choice.

Departmental barriers were also identified by the students but many of these barriers or challenges were overcome by these students. Working with different faculty in the lab or in the classroom was also a challenge for the students. Other students had challenges with the academic

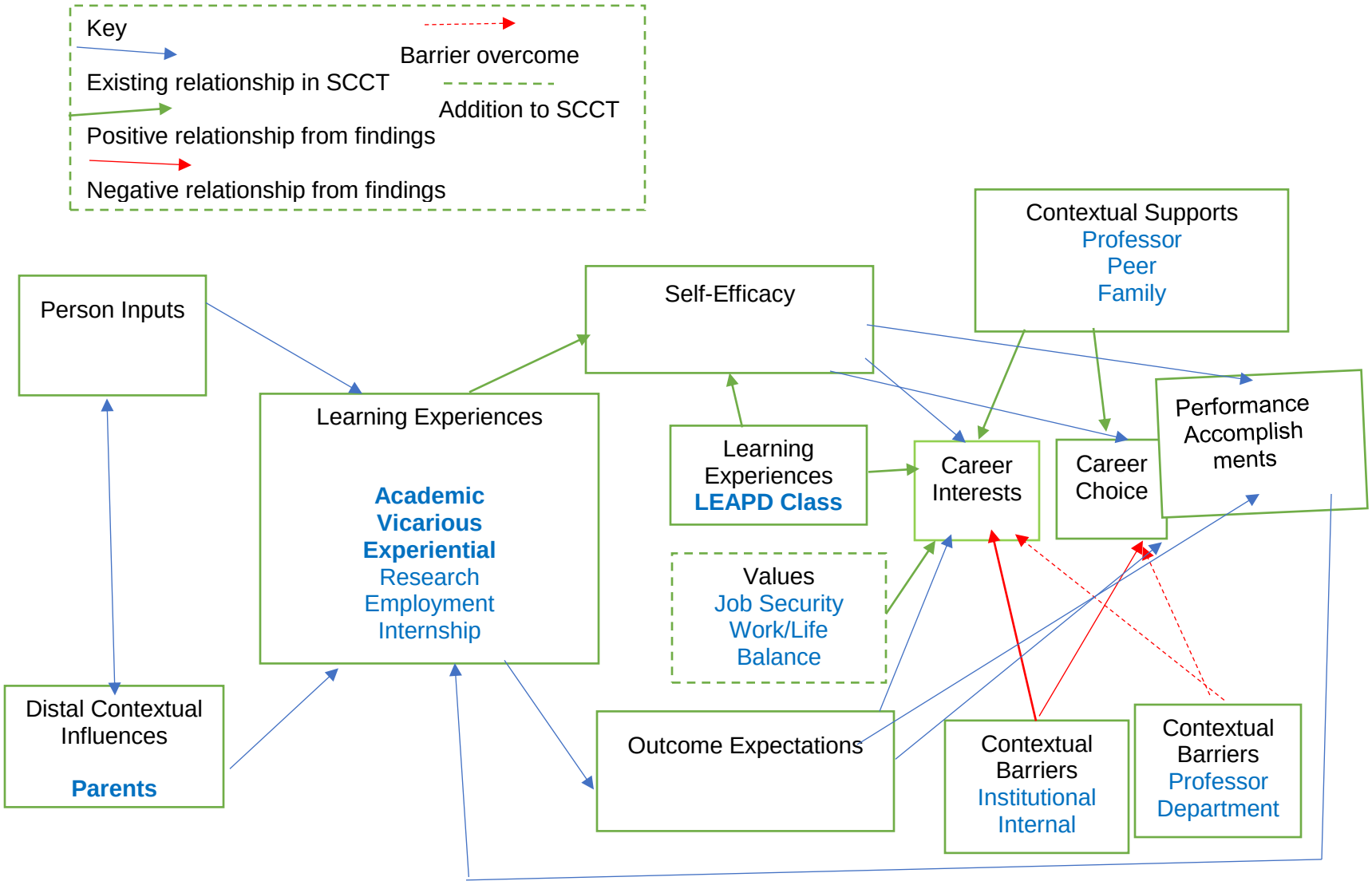
course load, whether it be the number of courses they had to take or the detailed nature of the courses. Departmental barriers occurred at the undergraduate level as well. Some students struggled with the research at the undergraduate level, while others struggled with the career advising they received. They overcame this barrier by adapting to different faculty styles and becoming flexible with their workload. This barrier did not influence career choice, as predicted by the model, since students were able to overcome it. It may have been due to their ability to self-reflect and perceive the barrier. Awareness of a barrier makes it easier to overcome that barrier.

Many students also experienced internal barriers in their career development. Many of these internal barriers prevented them from pursuing certain careers. Students also experienced internal barriers that influenced their career development. The instructor indicated that career decision-making difficulties can occur because of internal barriers or conflicts. Many students expressed a lack of self-confidence or self-efficacy that influenced their career development and career choices. Students were found to change or eliminate certain career choices because of low self-efficacy. Other students lack interest in certain careers also served to influence their career choice.

While professors are often a source of support, many students identified some professors as a barrier. But the students could overcome this barrier. Two of the students switched labs in their doctoral program because of their PI. Other students felt that many professors did not career about teaching or were unable to make a connection with their students.

Figure 4 outlines the findings as they relate to the SCCT model

Figure 4 The Findings listed in the SCCT Model



CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS

Overview

The goal of this study is to better understand learning experiences, supports and barriers in career development for the doctoral student. The triangulation of the research process with interviews, classroom observations and document analysis allowed a clearer understanding of these topics to emerge.

This chapter will begin with the rationale and purpose of the study and continue with the following objectives: (a) summarize and frame the findings within the research questions and the literature review, (b) consider implications and recommendations for practice (c) and reveal the limitations of the findings and to suggest areas for future research.

There are ongoing concerns about the influence of learning experiences and perceived supports and barriers on career development. It is critical that administrators and professors advocate and support students so that the students may be successful in their chosen career paths. Researchers have deliberated over the factors contributing to underrepresentation of minorities and women in the biomedical sciences. These factors include lack of support, insurmountable barriers that cut off career options and differences in learning experiences. It is vital to discover ways to improve the lack of representation and to examine the contributing factors in detail for workable solutions.

Purpose of the Study

This study focused on adding to the literature base on Social Cognitive Career Theory (SCCT) and informing career advising by linking theory to practice. This study further sought to understand how the learning experience, or a career services intervention influenced the doctoral student. One main purpose of the study is to add to the literature base on career development classes offered at universities in terms of how they contribute to doctoral student career development as well as determining the contextual supports and barriers that doctoral students face. When examining SCCT, most studies were conducted on STEM undergraduate students. This study aimed to illustrate specific contextual supports and barriers that are influential for doctoral students.

This study was significant because it contributed to the existing literature base on SCCT. It allowed for understanding of how the SCCT works to influence career development. The study also allowed for a greater understanding of the relationships between the variables of SCCT, such as the relationship between learning experiences and self-efficacy or perceived supports and barriers and career interests. New relationships within the model were also identified. This study was also significant because it informed career development practice in higher education. By understanding the significant supports and barriers for the doctoral students, practitioners can better understand how to advise these students. Professors and administrators alike can help students navigate common barriers and can recommend sources of support for the doctoral student. They have a better understanding of the learning experiences that influence the doctoral student. In addition, professors and administrators will be able to improve learning experiences

in career development as well as other learning experiences that are important to the doctoral student.

Research Design and Questions

This research study employed a phenomenological design at a large urban public research university. The participants were seven doctoral students in the biomedical sciences taking a LEAPD class. The students were interviewed twice, once to determine the context of the class and a second time to determine the role the class had on their career development as well to identify perceived supports and barriers. The study also included document analysis of student writings as well as four classroom observations during the two-month course of the class. All the findings were collected concurrently.

Upon identification of potential participants, an electronic survey was sent to the participants. The survey sought to identify the researcher, explain the purpose of the study and request participation. Prior to the confirmation of an interview, an informed consent was obtained for all aspects of the study. The interviews were scheduled at a convenient time and location for the participant. The interview audio-recordings were transcribed and submitted via email to the participant for review, clarification and edits. The transcripts were then used for final data analysis. Confidentiality of the participants was maintained throughout the study.

All the doctoral students who volunteered for the study were invited to participate. Classroom observations occurred twice in the first month and twice in the second month of the class. The researcher used a field note guide (see Appendix A) to help guide the observation notes. Full notes were then created from the field note guide. Document analysis occurred on the

student writings in the LEAPD program. It included analysis of two career development philosophy papers, one written at the beginning of class and one written at the end of class, as well as a written informational interview conducted on a professional in their career field of interest. All the interview transcripts, student documents and observation notes were uploaded into ATLASti for analysis. Data were coded and analyzed for themes.

Research Questions

The research questions explored in this study are:

1. How does the LEAPD program inform doctoral student career development?
2. What other past learning experiences have the doctoral students had that have influenced their career development?
3. What contextual factors (perceived supports and barriers) have influenced career development?

The Following Findings Have Been Made from the Study:

The LEAPD Program Helped Inform Doctoral Student Career Development

Research question number one was developed to examine the influence of the LEAPD program on doctoral student career development. Learning experiences such as the career development class that is part of the LEAPD program have been shown to have a direct relationship on self-efficacy (Lent et al., 1994). It is important that learning experiences continue to be evaluated to judge their influences on students. The interviews, documents and direct observations yielded themes involving increased confidence, vital career development tools and

understanding oneself thoroughly in terms of interests and values before making career decisions.

As presented earlier, Social Cognitive Career Theory (SCCT) (Lent et al., 1994) bounded the inputs, experiences and influences on goal setting, interests, behavior, self-efficacy and outcomes for students. Building on Bandura's Social Learning Theory (1977) --including his ideas around self-efficacy--several others (Byars-Winston et al., 2010; Fouad & Smith, 1996; Lent et al., 1994) have developed SCCT and applied it across many subjects. SCCT also incorporates how students think they will do in the classroom and in their careers based on their experiences, prior preparation and outcome for learning.

Feelings of self-efficacy of a doctoral student can wax or wane due to numerous factors in learning experiences. As described by Lent, Brown and Hackett (1994) in the context of social cognitive theory, "self-efficacy is not a passive static trait but rather is a dynamic set of self-beliefs that are specific to a performance domain and that interact complexly with other persons, behavior and contextual factors" (p. 84). Over the course of the class, these students experienced an increase in career development self-efficacy. From the simplest activities, like reviewing their CV or conducting an informational interview to deciding a career field, the course influenced their efficacy. Each of these essential career development activities affected how they felt about their career decision-making self-efficacy. Understanding themselves and their values also played a role in participants' self-efficacy. The more they understood themselves, the higher their career decision making self-efficacy appeared to be.

An essential part of the study was understanding the essence of the LEAPD program for these doctoral students. The essence of the course for most students was the career development

resources that they were provided. The participants felt much more prepared to job search when they could create their own LinkedIn profiles, informational interviews and critique their CV. All these course components served to contribute to an increase in career development self-efficacy.

Other Past Learning Experiences Have Influenced Career Development

Research question number two was developed to interrogate the importance of past learning experiences. Formative years can be essential for developing STEM self-efficacy. Almost all the participants reported significant academic learning experiences in STEM during their high school, college and/or graduate school careers. They all had had a positive STEM experience that encouraged them to pursue the next level of study. These experiences affected how they felt about achieving their academic goals. The experiences affected their career goals and outcome expectations. The students all expected to be successful in a STEM field. Their outcome expectations and goals were evidenced by their predictions of success in the doctoral program and their statements of confidence and demonstrated poise regarding their academic ability and were dynamically influenced by the experiences that they had in classes.

SCCT was an appropriate framework to employ and inform analysis of this study. The learning experiences that these seven students described throughout this study aligned well in supporting pathways to efficacy beliefs and in establishing responses and outcome expectations from their academic experiences in STEM. Through their STEM classroom experiences, they found reinforcement of their feelings of efficacy because of instructor interactions, results of assessments and their self-perceptions of their ability and confidence. This study also examined what other learning experiences were important in the doctoral students' career development.

Learning experiences have previously been classified (Thomas & Dahling, 2012) into four categories based on the literature: performance accomplishments, verbal persuasion, vicarious experience and emotional arousal. The two largest categories for learning experiences for these students were performance accomplishments and vicarious experiences. Performance accomplishments were achieved through academic or experiential learning. This learning occurred in high school, college, and graduate school. The students' accomplishments allowed them to go on to the next level as well as raised their self-efficacy to achieve in the sciences. Learning experiences included academic coursework, research, internships, and employment. The students' accomplishments are another example of how learning experiences influence self-efficacy and is part of the SCCT model.

The other large category of learning experiences that influenced doctoral students' career developing was vicarious learning experiences. Participants learned most often through their peers. It would be important to continue to promote peer support and collaboration in high school, college and graduate school. Many students increased their self-efficacy in their career choice through the vicarious experiences of their peers. This is also part of the SCCT model. It may also be important to promote other sources of information about careers to doctoral students given how much they rely on their peers for information. Peers' vicarious experiences also served as barriers in career development. If the peer had a negative experience in a career, it often prevented the doctoral student from pursuing a similar career. It would be important here as an administrator or faculty member to help prevent the student from being misinformed about a certain career path based on the peers' experience. Family also served as a source of vicarious experiences that influenced career development. In some cases, if a family member suffered

from a medical condition, this influenced the student to pursue a similar field. Here the learning experience influenced the career interest of the student, which is also a part of the SCCT model. There has previously been reported a relationship between learning experiences and career interests (Garriott et al., 2013).

Few studies have examined the role of learning experiences in SCCT for doctoral students. These findings from this study seem to be consistent for the doctoral student as those studies conducted on undergraduate students. They support a relationship between learning experiences to science self-efficacy, as did Schaub and Tokar (2005). There also appears to be a relationship between learning experiences and career interests. Instruction in many disciplines focuses on hands-on learning experiences (Kulturel et al., 2011), and this study found that experiential learning was reported by many of the doctoral students. Experiential learning through internships, research and employment was reported to influence career development and choice for these doctoral students.

Six of the seven participants in the study were female. These female students reported positive learning experiences in the traditionally masculine science domain, which has likely contributed to their successes in the science field. Williams and Subich (2006) suggested that more reported learning experiences in a given domain related to high self-efficacy in that domain. Higher self-efficacy then leads to greater career interest and career choice in the science domain. Brierer et al. (2015) also found that medical students' research self-efficacy perceptions increased with exposure to research concepts and experiences. This finding also appears to be true for doctoral students. Almost all the participants had positive undergraduate research experiences that encouraged them to pursue doctoral study.

Contextual Factors (Perceived Supports and Barriers) Have Influenced Career Development

Career persistence may be the outcome of perceived supports. These supports (teachers, family, spouse) appear to increase self-efficacy, which leads to persistence. Having a teacher, parent or spouse who supports a career decision or choice enhances one's ability to persist, which is consistent with SCCT. In addition to education, environmental influences served as contextual support that contributed to career persistence. According to Lent et al., environmental supports can help an individual's effort to reach a career goal (2001), which was significant for all the participants.

The most significant source of support for the students was their teacher or professor. This category included teachers from high school, college and graduate school. Influential high school teachers were usually in the sciences and very encouraging and enthusiastic. All the students who reported influential high school teachers did well in those science classes, which furthered them in their career aspirations. This finding shows how supports can influence career choice and affect career interests which also a part of the SCCT framework. The finding suggests there is a relationship between perceived supports and career choice and interest.

College professors were another source of support for doctoral students' in their career development. These college professors played distinct roles that influenced the doctoral students career development. They helped students find internships and research opportunities. They helped students get into graduate school. They built self-efficacy by making students feel prepared and encouraging them. This impact is another example of how a support can influence self-efficacy, as suggested by the SCCT model.

Students also reported receiving support in graduate school from professors, to include support from their advisor in research activities as well as teaching faculty. Of the students who reported a positive experience with their graduate school advisor, many of their advisors were actively involved in their labs, holding lab meetings, helping students network or exposing them to other opportunities and resources. Graduate school professor support also influenced career choice. Students who reported their advisor was only interested in academia as a career choice often reported switching labs. Students reported greater satisfaction with their advisors when they were exposed to alternative career choices for Ph.Ds. other than academia. This information could be used to support doctoral students in the future; faculty and administrators could better support students with this information.

Professor supports appear to be more important than family or parent supports. As suggested in previous research this is likely due to the difficulty of the program (Inda et al., 2013). Many students gave several examples of professor supports, which suggests a greater level of importance when compared to the few students who indicated parental or family support.

Peer Support is an Important Factor

Another important category of support for the students is their peers. In addition to learning from vicarious experiences of their peers, students also feel supported by their peers. Students reported learning about other career opportunities from their peers. They also found support in studying for exams or working in the lab. They often collaborated with their peers during lab meetings about their research or discussing different careers. Peer support seemed to work to support career choice, as suggested by the SCCT model.

Family Support is Important for Persistence

Many students reported receiving family support in their career development. Many families, which included parents and spouses, were supportive of the student's decision to pursue doctoral study. Students also reported receiving financial support in their studies for their undergraduate educations. Other students were influenced by family values. They have similar values to their parents, which then influences the students' career choices. Family support has a relationship with career choice which is also suggested by the SCCT model. Ferry, Fouad and Smith (2000) also found that positive career outcome expectations are increased by family encouragement and support, thereby leading to persistence.

Many more instances of supports were reported by these students than perceived barriers, suggesting that supports are more important for success than the perception of barriers. This finding is consistent with the research findings of Garriott et al. (2013), that supports may be of relatively greater importance than the perceptions of barriers in the SCCT model.

There are Still Barriers for Doctoral Students

In addition to supports, the doctoral students in this study also identified barriers to career development. Institutional barriers such as academia were indicated by the students. Many of the students did not want to work in academia. One of the reasons suggested for taking the career development class was to explore other career options for Ph.Ds. besides academia, so it is not surprising that this was a barrier for many students. Many students reported not wanting to pursue a career that involved grant writing. Other students reported not liking the politics in

academia. These barriers exerted a direct influence on career choice which illustrates the SCCT model.

Students reported departmental barriers as well in graduate school. They found it challenging working with different professors in the lab or in the classroom. Different faculty perspectives led to different expectations, which students found they had to adapt to. All the students who reported this departmental barrier were successful in overcoming it and progress in their doctoral program. They overcome the barrier by adapting to different faculty styles and becoming flexible with their workloads. This departmental barrier did not influence career choice, as predicted by the model, since students were able to overcome it. It may have been due to their ability to self-reflect and perceive the barrier. Awareness of a barrier makes it easier to overcome that barrier. Olle and Fouad (2015) found that if when students are more aware of a societal barrier, they are better able to navigate and overcome it.

Undergraduate Departmental Barriers

The students also experienced barriers at the undergraduate level. Some students were frustrated with research at the undergraduate level. Since the projects were so short-term students were not able to see the results of their research projects. However, students who experienced this barrier were able to overcome it and continue research into the graduate level. Other students felt like they had not received adequate career counseling at their undergraduate institution. In response, some of the students changed career paths because they felt they had not been adequately informed of the career requirements. Career advisors and other administrators involved in career counseling should be careful to communicate career advice and requirements,

so students understand what courses are needed for any given career. Not all colleges require students to participate in for career counseling. Encouraging, if not requiring, students to come in to career services at least once each academic year could prevent such incidents from happening in the future. This requirement would be an initial step, but students should be exposed to continual requirements to progress in their career exploration.

Students Experience Internal Barriers

Students also experienced internal barriers that influenced their career development. The instructor indicated that career decision-making difficulties can occur because of internal barriers or conflicts. Many students expressed a lack of self-confidence or self-efficacy that influenced their career development and career choice. The SCCT model also indicates self-efficacy can influence career choice. Students were found to change or eliminate certain career choices because of their low self-efficacy. Other students' lack of interest in certain careers also served to influence their career choice, which is consistent with the SCCT model. The model suggests that there is a relationship between career interest and career choice.

Professor as a Barrier

Some students said their graduate school professors were a barrier and influenced their career choice. Two of the students had switched labs during their doctoral program because of the principal investigator in their lab. They had changed their career interest and research focus because of a challenging professor. Other students experienced challenges with the academic courses due to the course load or difficulty of the courses, but most were able to adapt and meet the challenge of a rigorous course load.

Other research has suggested that college student samples might be less likely to report choice-limiting barriers than those who did not make it to college due to inadequate finances, lack of role models and support with the college application (Sheu et al., 2010). This appears to be the case for the doctoral student population as well. Almost all the students reported a role model or positive career support for the sciences. Finances were only reported as sources of support from their family and not as a barrier that prevented them from pursuing the next level. All the doctoral students in this program received funding that paid for their tuition as well as a stipend. Many other students may have reported finances as a barrier.

Institutional barriers were the most frequently reported type of barrier for these biomedical doctoral students. Other studies (Lent, 2003, 2005) have focused on contextual barriers and the negative effects on undergraduate major choice goals. These students seem better equipped to navigate perceived barriers, so that barriers did not influence their doctoral course of study. However, barriers did act to influences their career choice. Like Fouad (2010) these students found influential supports for continuing their education in math and science although barriers still existed.

Conclusions

The findings of this phenomenological study provide insight into doctoral student career development. More specifically, the study identifies significant learning experiences, and perceived supports and barriers for the doctoral STEM student. The following section will discuss three conclusions that illuminate the findings and begin to address the literature gap for

doctoral students in career development. The section will identify conclusions based on the findings. Several conclusions emerged from the findings.

Conclusion 1

The greatest influence on self-efficacy was performance accomplishments.

The most frequently reported finding by all the participants was the influence of performance accomplishments on their career development. Bandura (1994) indicated that the strongest source of self-efficacy beliefs is performance accomplishments. These performance accomplishments began in high school and persisted throughout their doctoral career. They likely contributed to the students' persistence in a STEM field. This finding is consistent with Anderson and Betz (2001), whose findings also determined that performance accomplishments had a considerable influence on self-efficacy. Gore (2006) and Bandura (1986, 1987) suggested that self-efficacy develops over time as a function of prior performance and vicarious learning. The findings are consistent with previously published literature. Self-efficacy is positively related to academic achievement (Bandura, 1997; Schunk & Parajes, 2005; Kennedy, 2013).

Arslan (2012) had comparable results in his study on self-efficacy for sixth to eighth grade students. These students stated that their self-efficacy beliefs were developed mostly by verbal persuasion and performance accomplishments. They also found that vicarious experiences developed their self-efficacy beliefs at a lower level. The factor 'performance accomplishments' was correlated with the students' self-efficacy beliefs and predicted the beliefs in the strongest way. Similar findings were also seen in this study for doctoral students

Past performance is a significant contributor to student's self-confidence and their ability to achieve in school (Bandura, 1993). If students have been successful with STEM and research in the past, they are more likely to believe they will be successful with STEM in the future. Self-efficacy based on vicarious experiences is not as stable (Schunk, 2005). Self-efficacy based on other's success will diminish if students have unsuccessful experiences of their own (Schunk, 2005). The vicarious learning experiences were not as significant to these students in this study as their performance accomplishments. This finding is consistent with the literature.

Conclusion 2

Performance accomplishments were enhanced primarily by contextual supports.

All the participants reported a significant teacher support, which had served to enhance their learning and persistence in the STEM field. But it was probably the combination of all these supports (teacher, family, peer) that led to persistence in the STEM field. Participants consistently discussed being influenced by mentors, colleagues, professors and friends. Experiences such as these influenced the career decisions that the participants made. Garriott et al. (2017) had comparable results when they studied Mexican American high school students. They found that familism predicted performance accomplishments and perceived family supports predicted self-efficacy and goals. Findings support the SCCT designation of self-efficacy as a key factor influencing goals and choice actions. These perceived supports were much more frequently reported than any perceived barriers. This finding is also consistent with the literature from Fouad (2000) that the presence of supports is more important and influential than the

existence of barriers. Garriott (2017) also found that supports were shown to be stronger predictors of SCCT variables when compared to barriers.

In this study, the primary source of support is the teacher or the professor. The primary source of support can vary depending on the age of the participants as well as their race and ethnicity. With a different racial and cultural background of the sample, other literature has reported family as the primary source of support. Studies done by Kenny et al. (2007) on urban adolescents, for example, reported family as the primary source of support for students.

Students described receiving emotional and guidance support from their families, which complemented the guidance that they received from their professors. The proximal contexts of family, professors and peers are likely the most salient life arenas for these doctoral students and thus the most obvious sources of support and barriers (Kenny et al., 2007).

Conclusion 3

A strong sense of self-efficacy and drive along with a supportive environment seemed to minimize barrier perceptions

Self-efficacy and career interest may be more important than barrier perceptions for doctoral students. Participants expressed a high level of self-efficacy and persistence to work through challenges. Students with highly supportive environments are more confident in and committed to their career goals. Most students spoke of a supportive environment with a strong sense of self, which has been found in previous research focused on students pursuing STEM fields (Lent et al., 2005).

Like the findings of Lent et al., students expressed the significance of a strong support network to help them achieve their goals. This support network included professors, peers and family members. These findings are consistent with those of Nauta et al. (1998) who found that role models were influential in career aspirations of women in technical fields

Other studies have reported sources of support as a barrier as well. In this study, professors were indicated to be a source of support but also perceived as a barrier as well. Kenny et al. (2007) identified family as a primary source of support but also as a potential barrier, suggested the importance of the context of culture. It is interesting to note that all the students who described professors as a barrier now have principal investigators who are sources of support and guidance for them.

The relationship between supports and barriers in this study suggest that the presence of supports does not necessarily signify an absence of barriers. The two may play complementary or compensatory roles as suggested by Lent et al. (2018). The greater supplies of support can offset some of the hindering effects of barriers on self-efficacy. Supports may relegate the effects of barriers on self-efficacy.

Limitations

This qualitative study explored student learning experiences and their influence on career development as well as student perceptions of supports and barriers that influenced career development. As a qualitative study, it is not intended to be generalizable rather it looks to discover trends and offer explanations for phenomena.

There are many things that the reader should be aware of in considering the transferability or applicability of this study. The students were not representative of all the doctoral students at Urban Public Research University. They had selected to participate in the LEAPD career development course and consequently demonstrated ambition and/or motivation about their own career development. All the students were in the biomedical science field. Certain students may not have participated in the course as a result lack of knowledge about the course or perceived need to take the course.

The diversity of the sample did not mirror that of the U.S. population or Urban Public University population overall, and white students were overrepresented. The participant sample of this study was 86 percent female.

Implications for Research

This study revealed interesting trends that could be studied in more depth by expanding the size or diversity of the study, pursuing quantitative research on an aspect of the study or focusing on specific subgroups within the population.

This study included seven participants in the most in-depth phase the individual interviews. These participants were predominantly White, with only one Asian American participating in the study. Certain populations of Urban Public University students were underrepresented, which reduced the transferability of the study. Contextual barriers are more prevalent among women (Fouad et al., 2010; Luzzo & McWhiter, 2001) and persons of color (Kenny et al., 2003). Additional studies focusing on a subgroup of women or persons of color may identify more perceived supports and barriers as well as learning experiences.

Much of the research on SCCT has been conducted in middle and high school students. Many of the supports and barriers for these doctoral students fell into the same categories of barriers as outlined by Fouad (2010). For most students, the largest source of support was from their professor. Supports were also found to be a greater importance to the student in their success rather than the presence of barriers. This finding is also consistent with previous research conducted by Fouad (2010), which indicated students found sources of support to continue their education despite the presence of barriers. Further research could also be done on the effects of different socioeconomic levels, undergraduate institutions, or types of classes taken in high school or college. Though these were touched on in the questionnaire and interviews, they were not pursued in the depth that a separate study would allow. Socioeconomic level might help achieve greater diversity in the study and potentially reach more first-generation college students. The interviews and document analysis suggested that the participating students were heavily influenced by their high school teachers and college professors. A study focusing specifically on this influence would also be interesting and helpful to colleges and high schools alike.

There are many areas in which quantitative or mixed-methods research could illuminate the relationship between and among variables. For example, students' perceived support from professors and peers could be examined and quantitatively evaluated alongside the traditional measures of academic success (GPA and degree completion). Most quantitative studies have focused on the relationship between learning experiences and self-efficacy or contextual supports and barriers and career choice.

As biomedical doctoral programs look to expand their enrollment, focus will turn to recruitment and retention of a diverse student population. A broader and deeper understanding of these students' experiences, challenges and successes might benefit both the institution and the students. Many aspects of this study could be taken in broader or deeper directions either. As faculty and administrators work to connect with doctoral students and to facilitate their success in graduate school, an increased understanding of doctoral students' perceived supports and barriers--as well as helpful learning experiences--can offer faculty and administrators practical tools to make those relationships better and easier to all and impact doctoral student success in graduate school.

This study confirmed the importance of high impact practices for undergraduate students. Kuh (2008) indicated that several teaching and learning practices have been shown to be beneficial for college students. These includes high impact practices such as undergraduate research and internships. All the students in this study participated in undergraduate research and most of them had internships as well. It is likely that they advanced to and succeeded at the doctoral level because they participated in such high impact practices. High impact practices such as these should continue to be stressed at the undergraduate level.

Implications for Practice

One of the roles of career counselors and academic advisors is to help students make informed career choices. To be able to provide sound guidance, it is important that these professionals understand the environment affecting students' career choices. Understanding involves having knowledge of the factors that may hinder or help students make clear career

decisions so that appropriate interventions to boost support and combat barriers can be provided. Although the original intent of the study was not to focus on women in STEM careers but based on the actual population of the study the focus became primarily on women in STEM fields. If the goal is to increase the number of women in STEM, it is important that interventions be tailored to meet the needs of this group.

Many participants indicated that they became interested in a STEM field in high school. Therefore, it may be appropriate to apply career interventions to future doctoral students at a younger age than college, when more active and focused career exploration typically occurs. It may be at this earlier developmental juncture that the possibility of going into STEM is either ruled out or confirmed. Specifically, career assessments appear to be appropriate for students in the first or second year of high school (Herbert & Kelly, 2006). After students complete the assessments, career counselors should provide one-on-one or small group feedback and discuss the test results. For example, several studies have shown that when students complete the Strong Interest Inventory (Harmon et al., 1994) and are provided feedback and analysis, career exploration behavior is increased (Luzzo & Day, 1999). If students are given the opportunity to discuss their interests and fears about future jobs, they may be less inclined to rule out challenging career paths in STEM fields. School and college career counselors can play a significant role in stoking the flame of career interests and in helping students find mentors who can encourage their aspirations.

Performance accomplishments had a considerable influence on self-efficacy in this study. Most performance accomplishments are academic and experiential learning experiences. It would be important for administrators and professors both at the high school and university

levels to continue to design learning experiences that expose students to STEM fields and careers. They should consider the influence of perceived supports and barriers when designing interventions and learning experiences. Connecting STEM to the activities associated with specific career paths students express interest in is also important. They should also be cognizant of the strong influence they have as professors and teachers with these STEM students. Promoting teacher and faculty support for students in STEM should be a priority for administrators.

Since the LEAPD class played a key role in increasing the career decision making self-efficacy of these participants, components of the class could be used as a model for other institutions. One key component of the class is to equip students with their own career development tools like conducting informational interviews, utilizing LinkedIn and critiquing their own resume. The other vital part of the class is self-discovery to understand oneself so assessments like Strengths Finder, Strong Interest Inventory and Life Values Inventory are also important to take into consideration.

Next steps for practice should include embedding career courses in the curriculum. Practitioners should consider how to embed career courses in their curriculum. The class was a key factor in raising the career development self-efficacy of these participants. Practitioners should require students to create LinkedIn Profiles and offer tips on how to perfect them. Universities could also help students transform their resumes from basic task-oriented resumes to skills-and-accomplishments based resume. They should help them showcase their skills. Panels of professionals or alumni can be used to share best practices or help students learn to network.

Summary

The study findings add to the SCCT research base addressing the role of learning experiences, supports and barriers in SCCT, particularly in exploring the factors that affect doctoral students' decisions to attend graduate school. Results suggested that self-efficacy is a key factor in SCCT. An intense sense of self-efficacy, combined with a supportive environment, led to persistence in a STEM doctoral program. The greatest influence on self-efficacy was performance accomplishments. Performance accomplishments were more important than vicarious learning. All these students have exposure to the STEM field at an early age. Results also substantiated SCCT posited importance of support, more specifically teacher or professor support, in the pursuit of a career goal. The strong support system that these students had served to enhance their performance accomplishments, particularly when that support came from their teacher or professor. Student also had minimal barrier perceptions; the report of supports far outweighed the presence of barriers. These successful students were able to overcome many of the barriers that they perceived. In addition, values could be added to the SCCT model. Students reflected on values and found the reflection helpful and beneficial. Values seemed to contribute to their career choice decisions.

Through this phenomenological qualitative research design, one may gain a deeper understanding of the experience of a STEM doctoral student. Noting distinct contextual supports and barriers can prove beneficial in career counseling and offer practical implications in career decision making. Further research is warranted to explore learning experiences, supports and barriers on ethnically diverse backgrounds and in different career fields. Additional studies could also be conducted that expand the size and diversity of the population. Contextual barriers are

more prevalent among women and minorities which could be a future focus of a study. Additional studies could also focus on the importance of professor support. There are also other important implications for practice to be considered. Interventions to promoted STEM fields should be conducted at an early high since most of the participants were influenced in high school to pursue STEM. Academic performance accomplishments should continue to expose students to the STEM fields in college and graduate school. Professors should play an important supportive role for these students. Academic and career advisors can help identify student interest in STEM through assessments and experiential learning. The LEAPD class could be used as a model since students' career development self-efficacy increased after participating in the course.

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Appendix A

Instrument #1 Questionnaire

1. Please enter your unique numerical code that was given to you by the researcher.
2. Are you currently enrolled in GRAD 615?
    a. Yes
    b. No
3. Are you willing to participate in two interviews, classroom observations and document analysis for research purposes?
    a. Yes
    b. No
4. Are you 18 years of age or older?
    a. Yes
    b. No
5. What is your gender
    a. Male
    b. Female
6. What is your race?
    a. Black or African American
    b. Asian/ Pacific Islander
    c. Hispanic or Latino
    d. Native American or American Indian
    e. White
    f. Other
7. What is your program of study?
8. What is your age?

Thank you for your participation.

Instrument #2: Interview #1

As part of my research for my dissertation, we are conducting an interview on career development. With your permission, this session will be recorded. Although quotes may be used no identifying information will be included with your responses. This information is confidential. Do you have any questions before we start? Thank you for coming today.

1. Tell me about your program and career aspirations?
    a. Why did you choose to come here over other options?
    b. How would you describe your experience thus far?

2. What goals do you have for yourself?
    a. What do you want to be when you graduate?
    b. Why would you like to be that?
    c. What might get in the way of finding a career that is a good fit for you?
    d. What might help you find a career that is a good fit for you?

3. What steps have you taken to explore careers?
    a. How did you decide to ____ (method of exploring majors and career)?
    b. What benefits did you experience?
    c. What new questions or tasks came out of the experience

4 What learning experiences outside of this class that have influenced your career choice?
    a. High School
    a. In College
    b. In Graduate School
    c. How have they influenced your career choice?

5. What did you take away from these experiences?

6. What benefits did you experience from these learning experiences?

7 What have been weaknesses of learning experiences outside of this class?

8 What did you like about other learning experiences that influenced your career development?

9. What did you not like about other learning experiences that influenced your career development?

Instrument #3: Interview #2

As part of my research for my dissertation, we are conducting an interview on career development. With your permission, this session will be recorded. Although quotes may be used no identifying information will be included with your responses. This information is confidential. Do you have any questions before we start? Thank you for coming today.

Interview #2

1 What do you think of the LEAPD class you are taking (Career Class)

a. What role has this class had in your graduate study?
b. How has the class helped you? What aspects of the class did you find helpful?
c. What would you want to take away from this experience? How might you benefit?

2 What do you like about the class you are taking? What are the strengths of the class?

a. What do you dislike about the class you are taking? What are the weaknesses of the class?

4. How has it changed the way you view your career or graduate study?

a. How has it impacted your career choice?

5. How has your professor for this class helped you with your career development?

6. How has working with your peers helped you in the class?

7. Last time we talked you mentioned a few careers that you were considering such as _____. What careers are you considering now? How did you come to consider these new careers?

8. What career exploration activities did you do? Did you gain something from these experiences? If so, what did you gain? How did you know you gained something?

Supports and Barriers

1. What influenced you to aspire to this career?

a. Were there particular people who were influential in shaping your career choice? (Social, School/Teachers or Parents)
b. What specific experiences influenced your career choice, negatively or positively?

2. What are the struggles or challenges that you have faced in terms of your graduate study or career?

3. Have you come across anything that might get in the way of your career? If so what?

4. Have you come across anything new that might support your career choice?

5 What have been institutional influences (your undergraduate college or graduate college) on your career choice, negative or positive? (School/Teachers)

a. Thinking back to the best professors in your program that you've had, what made them the best?
    i. How did they support your career path or development?
    ii. Why did you like their classes?
    iii. How were other professors less effective or helpful?
b. How has your department supported or hindered you?

6 What is the parental or family influence on your career choice, negative or positive? (Parents)

    a. How did they encourage or discourage you?
7. How have peers in your program supported or inhibited your career development (Social)
    a. How have role models influenced your career choice?

Instrument #4: Observation Field Notes Guide

Learning Experiences

1. Were any of the student's learning experiences **performance accomplishments?**
2. Were any of the student's learning experiences **vicarious experiences**?
3. Were any of the student's learning experiences **verbal persuasion**?
4. Were any of the student's learning experiences **emotional arousal**?

SCCT and the LEAPD Program (How does the LEAPD program illustrate the SCCT Framework)

1. Did learning activities focus on raising student **self-efficacy**? Which ones?
2. Did learning activities focus on developing **career interests?**
3. Did learning activities focus on **outcome expectations**?
4. Did learning activities focus on developing **supports** for a career?
5. Did learning activities focus on overcoming **barriers**?

Supports and Barriers

1. Did students discuss parental or familial supports or barriers?
2. Did students discuss institutional supports or barriers
    a. Did they discuss departmental influences on career development?
    b. Did they discuss the professors' influences on career development?

3. Did the students discuss financial or environmental influences on career development?
4. Did the students discuss social influences (peers)?
5. Did the students discuss internal influences?

Vita

Madeline Beers Goldman was born on April 13, 1972 in Charlottesville, Virginia and is an American citizen. She graduated from Lafayette High School in Williamsburg, Virginia in 1990. She received her Bachelor of Arts in Biology from University of Virginia in 1994. She received a Doctor of Dental Surgery from Virginia Commonwealth University in 2002. She was a practicing dentist in Richmond, Virginia for eight years. She then worked as an adjunct faculty in Biology at Thomas Nelson Community College for two years. She received a Master of Education in Higher Education Administration from the College of William and Mary in 2013. She has worked at Virginia Commonwealth University since 2014 starting out in the Graduate School and currently working as a Career Counselor in the School of Business.