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Do Mentoring Programs Make a Difference? A Qualitative Case Study on the Journey of Latino Students in a STEM Track

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DO MENTORING PROGRAMS MAKE A DIFFERENCE?

A QUALITATIVE CASE STUDY ON THE JOURNEY OF LATINO STUDENTS

IN A STEM TRACK

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by

Juan Miguel Morata

2017

To: Dean Michael R. Heithaus
    College of Arts, Sciences and Education

This dissertation, written by Juan Miguel Morata, and entitled Do Mentoring Programs Make a Difference? A Qualitative Case Study on the Journey of Latino Students in a Stem Track, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: November 15, 2017

The dissertation of Juan Miguel Morata is approved.

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Dean Michael R. Heithaus
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Andrés G. Gil
Vice President for Research and Economic Development
And Dean of the University Graduate School

Florida International University, 2017

DEDICATION

Querida familia,

Este trabajo es dedicado a todos vosotros y ante todo a mis hijos Santiago y Camila.

Nunca imaginé ir a la Universidad y menos aún lograr ser Dr. Morata.

Gracias a mi madre María Dolores y a mi padre Juan Miguel que siempre estuvieron detrás de mi y me empujaron a ser quien soy. Pero esto no hubiera sido posible en absoluto sin la insistencia de mi madre. Gracias a ella, mis hermanos y yo logramos el sueño de ser profesionales gracias a tu perseverancia.

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Jean Michel

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ABSTRACT OF THE DISSERTATION

DO MENTORING PROGRAMS MAKE A DIFFERENCE?

A QUALITATIVE CASE STUDY ON THE JOURNEY OF

LATINO STUDENTS IN A STEM TRACK

by

Juan Miguel Morata

Florida International University, 2017

Miami, Florida

Professor Benjamin Baez, Major Professor

A number of studies have sought to identify factors influencing STEM students' success in colleges and universities (Crisp et al., 2009; Excelencia, 2011; Hagedorn & Purnamasari, 2012). However, there are few qualitative studies focusing on students' perspectives and how they make meaning of their experiences as participants in a mentoring program.

The main purpose of this research was to explain the perceptions of Latino students in a STEM Mentoring Program at Miami Dade College. Because this study sought to gain an in-depth understanding of how students involved in a mentoring program make meaning of their experiences, the type of qualitative research that fits this inquiry was a single case study. This study was undertaken to address these questions: (a) How do STEM students make meaning of mentorship? (b) How do STEM students construct their experiences in the Program? (c) To what extent do gender and ethnicity play a role in how students make meaning of their mentoring experiences? (d) What do students identify as important for succeeding in a mentorship program?

The major findings of this study were: (1) For the participants, a formal mentoring programs offers various forms of academic support, but they found interpersonal support with informal mentors; (2) For the participants, in a formal mentoring program a career match between mentor and mentee is essential; (3) For the participants, the required number of meetings in a formal mentoring program was burdensome, but other required activities were important; (4) For the participants, the peer mentoring experience was important and self-fulfilling; (5) For the participants, the gender or race of the mentor was insignificant, but some believed that sharing the same cultural background made them feel more connected with their majors; and (6) For the participants, encouragement and emotional support from their families was important, but only those with college-educated parents received the academic and financial support necessary important to succeed in college; (7) For the participants, a mentoring program will be successful if there are opportunities for building community among students and faculty, but ultimately, what matters for success are the personal characteristics of students.

This study was significant because it provided insight into what students understand are key experiences of being in a mentoring program, and it also identified the kinds of institutional support students themselves thought would help in STEM careers. This information can help institutions of higher education plan and administer effective mentoring programs in STEM or even other fields.

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CHAPTER I

INTRODUCTION TO THE STUDY

The participation and success of racial and ethnic minorities in science,

technology, engineering, and mathematics (STEM) fields is of increasing concern in the

field of higher education (Florida Center for Research in Science, Technology,

Engineering, and Mathematics [STEM], 2011). This issue has led to studies, including

the present one, seeking to improve the successful completion rates of STEM majors of

racial and ethnic minorities. The effectiveness of the strategies promoted by these studies

is still a matter of discussion (Florida Center for Research in STEM, 2011; GAO-12-108,

2012).

This chapter provides an introduction to this research, the background of the

problem, the problem statement and the significance of the study, the purpose of the

study, the research questions, the framework, the definitions of terms, and the limitations,

delimitations, and assumptions of the study. In addition, this chapter provides a summary

and organization of the study.

Background of the Problem

A number of studies have identified issues affecting students' persistence at

colleges and universities (Astin, 1993, 1999; Hagedorn & Lester, 2015; Milem & Berger,

1997; Page 2013; Spady, 1970; Terenzini & Pascarella 1980; Terenzini, Springer,

Yaeger, Pascarella, & Nora, 1996; Tinto, 1975, 1982, 2006). However, there are limited

studies on issues influencing Hispanic student persistence in South Florida. With regard

to the area's higher education, programs should be designed to improve equal opportunity

because South Florida Latino students still struggle to enter and complete their college

1

degree successfully (Florida Center for Research in STEM, 2011). This is especially important because college graduates, on average, earn $1.2 million more than high school graduates over their lifetimes (Seidman, 2005). Further, it is imperative to recommend programs that could make a difference in Hispanics' lifetime earnings, their quality of life, and their future generation's ability to attain a college degree.

Areas of great concern are STEM education programs, to which the federal government is allocating funds in order to enhance Latino students' competitiveness in finishing a degree in a STEM field (Florida Center for Research in STEM, 2011; GAO-12-108, 2012). In addition, the research has indicated that if the U.S. wants to remain economically competitive in the global workforce, students should obtain equal benefits from education (Excelencia, 2011, 2012; Florida Center for Research in STEM, 2011). In order to achieve this equality, the financial and academic support of underrepresented students must be increased (Davies, Mangan, & Hughes, 2009). It is also necessary to identify reforms that successfully address higher education's weaknesses, as well as recognize the support required by underrepresented students (such as Latinos, women, and part-time students).

In order for Hispanic students to achieve high levels of long-life earnings and success, researchers' recommendations have entailed fostering conversations among state legislators, public officials, education stakeholders, and college/university leaders (Zalaquett, 2005). Governmental agencies have not come to a general agreement about the problems posed by racial, ethnic, and gender disparities in higher education, and they have struggled to find policies to support underrepresented groups better (Gonzalez & Kuenzi, 2012). These agencies must first recognize the disparities in degree attainment

related to gender, race, socioeconomic status, and ethnic backgrounds. Changes in policy and the creation of effective STEM education programs could result in the improvement of Latino students' rates of college degree attainment, in their greater enrollment in access programs, and in their increased acquisition of merit-based financial aid (Excelencia, 2012).

Research has also indicated that one of the reasons the graduation rate among Hispanics is lower than that of other racial/ethnic groups is because many Hispanic students may not see the long-term benefits of earning a degree and the steps it takes to obtain such a goal (Seidman, 2005). Because of cultural, language, and financial barriers, many Latino students and parents do not fully understand or recognize opportunities available to them (Zalaquett, 2005). One example is the policy known as *high tuition, high aid*. This refers to the phenomenon that if tuition increases, then the financial aid will also increase (Paulsen & Smart, 2001). However, most Hispanic students and their families do not see the entire picture, and so they do not enroll because they think that their debt will be increased because they only see the "high tuition" portion.

The 2012 issue of *Excelencia in Education*: *What Works for Latino Student Success in Higher Education* has identified the most effective programs in the nation in helping Hispanic students reach their final academic goals. However, even though Miami Dade College (MDC) and Florida International University (FIU) have the highest numbers of Latino students enrolling in and completing 2- and 4-year college degrees in the country (Excellencia, 2014), the programs analyzed in the 2012 report were mostly from California, Texas, and New York. None were from South Florida. According to the report, successful programs collect data and conduct evaluations, view Latino students as

a community, remove pathway barriers, use research-based strategies, have clear goals, invest in long-term viability, improve institutional commitment, and allocate sufficient resources. Moreover, successful programs integrate mentoring, learning communities, interactive groups, and scholarships to achieve student diversity (Seidman, 2005; Zalaquett, 2005). Because of the positive impact of these types of programs, policymakers have created grant opportunities to foster additional programs. However, there are many colleges that lack sufficient processes to assess their program effectiveness (Gonzalez & Ballysingh, 2012).

Studying mentoring programs is important because of what the research indicates is importance for student persistence. According to Tinto (1975) the process of dropping out from college can be viewed as a longitudinal process of interactions (involvement) between the individual and the academic and social systems of the college. The person's experiences in those systems (environment) continually modifies the person's goal and institutional commitments in ways that lead to persistence and/or to varying forms of dropout. Tinto (1975) and Astin (1993) have argued that individuals enter institutions of higher education with a diverse set of attributes, precollege experiences, and family backgrounds.

According to Astin (1999) and Tinto (2006), community colleges are institutions in which most of the faculty members are part-time and the student/faculty interaction is minimal. However, if the institutions provide sufficient social interaction and integrate programs to enhance good academic performance for low SES students, then these students' college attrition will be reduced (Tinto, 2006). The Mentoring Program that is

the subject of this dissertation is one that seeks to promote academic and social integration to improve persistence in STEM fields.

Problem Statement

A number of studies have identified factors influencing STEM students' success at colleges and universities (Crisp et al., 2009; Excelencia, 2011; Hagedorn & Purnamasari, 2012). However, there is a lack of qualitative studies focusing on Hispanic student populations or on their respective Hispanic-serving institutions. Many of the mentoring programs are focused on institutional success but not necessarily from the students' perspectives or on how Latino students make meaning of their journey in the STEM field (Crisp et al., 2009; Excelencia, 2011, 2012; Hagedorn & Purnamasari, 2012). Furthermore, the literature is lacking much research that focuses on the students' perspectives and how they make meaning of their experiences as participants in a mentoring program.

In the United States, 22% of the K-12 population is Latino. In 2008, Hispanics represented 19% of U.S. higher education students, and by 2018 Hispanics enrollment is expected to increase to 36%. It is important to note that of the 40% of Latino higher education students enrolled full-time, 28% had a job. In 2008, 48% of Latino college students were studying part-time compared to 30% of Whites; 74% of those Latino part-time students had a part-time job, and 43% worked 35 hours or more per week (Excelencia, 2011; Martin & Meyer, 2010). Additionally, as stated in *Excelencia* (2011), 34% of Latinos are both low-income and first-generation college students, compared to 17% of White students (Excelencia, 2011). Furthermore, the 2006 National Center for Education Statistics has indicated that while Hispanic students were 19% of the college

population, only 8% of them received a bachelor level STEM degree (Brandt, 2011). In another comparison, in 2014, 17% of the U.S. population was Latino, but only 20% of Latino adults (25 and older) had earned an associate degree or higher, compared to 36% of all adults. In the United States, 41% of Latino students graduated within 150% of program time for first-time, full-time freshmen, compared to 50% of all students (Excelencia, 2014).

Similar to the national percentage, 23% of school-age children (ages 5 to 18) are Hispanic in Florida. According to Excelencia (2014), the median age of Latinos in the United States was 27, compared to 42 for White non-Hispanics. However, only 16% of all Hispanics in Florida, compared to 24% of all Floridians, have earned a college degree by age 25. Even more alarming are the facts that only 49% of all Hispanics in Florida earn a bachelor degree within a 6-year period, and that less than 25% of bachelor degrees awarded in 2010 were in STEM fields (Florida Center for Research in STEM, 2011). As far as enrollment in STEM majors, 30% of college students seek to be in a STEM track nationwide. Florida STEM college students' interest in 2015 in STEM was nearly 39% for male students versus only 16% for female students. The Florida Hispanic overall STEM track enrollment in higher education was 27% (Florida STEM Report Card, 2016).

In order to improve Latino students' enrollment in STEM careers, the National Science Foundation (NSF) requires institutions to conduct research and internal evaluation of student success, especially for Latinos in STEM programs, so they can identify and share frameworks that have been effective (Santiago, 2010). The Florida STEM Strategic Plan (Florida Center for Research in STEM, 2011) advised that one statutory goal is to "create a statewide sustainable STEM leadership organization to align

existing and emerging STEM initiatives and represent Florida's one voice in meeting STEM demands" (p. 31).

The Miami Dade College STEM Program

This study interviewed students in the Accelerate, Retain, Complete with Opportunities and Support (ARCOS) program at Miami Dade College (MDC). The Program's goal is to enhance academic success, leadership, and campus community through interactions between faculty mentors, peer mentors, and mentees. This program adopts a three-tier model in which faculty guide second-year peer mentors that in turn mentor first-year-students in the Program. The faculty mentors' role is to serve as role models and coaches for their mentees (i.e., peer mentors) to help them mentor the first-year students in the program. The peer mentors are supposed to help first-year students learn about leadership and help them achieve academic success. This Program has requirements for acceptance, such as having a declared STEM major and a GPA of 3.0 (on a 4.0 scale).

Significance of the Study

The literature indicates that mentorship could have positive psychological and career-development effects on a mentee's success and feelings of belonging to an organization (Robinson & Reio, 2012). However, there is limited peer-reviewed qualitative research related specifically to South Florida Latino STEM mentoring programs and their participants in an Associate degree program. A qualitative study with that focus could offer information to help administrators and faculty in higher education understand the experiences of South Florida Hispanic students in these majors. Such study can help explain how students understand their mentoring interactions, including

whether these interactions help them persist in their career paths (Yin, 2003). It can also help determine the environmental effect of the Mentoring Program from mentees' points of view, as well as provide insight into student perspectives of how mentoring experiences contribute to their persistence. Furthermore, a qualitative study can assist in identifying resources and support necessary for helping Latino students persist in their STEM careers.

Qualitative research is based on the belief that all meaning comes out of people's understanding of things, and that truths are socially constructed. All truth comes from how people are making sense of their world and making meaning of their lives (Merriam, 2002). This study can contribute to the literature because it can tell us how the students think, feel, and construct meaning about their STEM program experiences. Higher education administrators should want to know what students say is important in designing mentoring practices that can affect their lives.

Purpose of the Study

The main purpose of this study was to understand the perceptions of Latino students in a STEM Mentoring Program at MDC. This qualitative study examined the Mentoring Program experiences of 11 Latino MDC STEM students who returned to the program for the second consecutive year and were mentored by STEM faculty. Participants were six women and five men from various STEM fields. Through two semi-structured interviews, participants were asked to describe and reflect on their experiences with their mentors, their personal beliefs, and their first year STEM experience. The decision that "enough" students had been interviewed was based on data saturation (Seidman, 2013).

Research Questions

This present is study is about second-year MDC STEM students who have participated in a mentoring program. This study was undertaken to answer the following research questions:

1) How do STEM students make meaning of mentorship?

2) How do STEM students construct their experience in the program?

3) To what extent do gender and ethnicity play a role in how students make meaning of their mentoring experiences?

4) What do students identify as important for succeeding in a mentorship program?

Definitions of Terms

Associate Degree. For the purpose of this study, an associate degree refers to a 2-year undergraduate degree from a community or state college. An associate degree can be (a) an Associate in Arts (AA), (b) an Associate in Science (AS), or (c) an Associate in Applied Science (AAS).

Ethnicity. This refers to a particular group of people with the same national origin, culture, religion, and beliefs (Merriam-Webster's Collegiate Dictionary, 2005).

Faculty Mentor: This refers to the faculty who are formally parts of the Mentoring Program at issue in this study.

Formal Mentor: When used in reporting data for this study, this refers to the faculty members who are formally part of the Mentoring Program.

Grade Point Average (College GPA). For the purpose of this study, college GPA refers to a student's college GPA at beginning of fall 2014 term.

Hispanic or Latino. These terms are used interchangeably throughout the literature. For the purpose of this study the term refers to a person who has an ethnic background from Spain or from Latin America (including Brazil).

Hispanic-Serving Institutions (HSIs). HSIs are defined as degree-granting undergraduate colleges in which at least 25% of the student population consists of Hispanic full-time students (Crisp et al., 2009).

Informal Mentor: When used in reporting data for this study, this refers to the faculty members who are not formally part of the Mentoring Program.

Mentee. Merriam-Webster's Collegiate Dictionary (2005) refers to one who is mentored as a protégée.

Mentor. There are two types of mentors: formal and informal. A formal mentor is paired with the mentee by a third party; an informal mentor is chosen by a student (Zalaquett & Lopez, 2006). In this study, faculty and peer mentors were assigned to the students; thereby, formal mentorship is applicable to the current research.

Mentoring Program. The WOLFPACK Mentoring Program adopts a model in which faculty guide second-year students, while the second-year student (i.e., peer mentor) mentors first-year-students. This program is often referred to in this study as the "Mentoring Program."

STEM Degree Participant. Student who has declared a science, technology, engineering, or mathematics major.

Success or Retention. For the purpose of this study, a student who persists in the STEM pathway for the second or third consecutive academic year.

Underrepresented Student. For the purpose of this study, this population refers to non-White male and female students.

Limitations, Delimitations, and Assumptions of the Study

Limitations

Limitations are factors beyond the researcher's control that may affect the results of the study or the interpretation of the results; in contrast, delimitations are parameters set by the researcher (Heppner & Heppner, 2004). One limitation of the study was that I could only interviewed current students in the program, and I did not have the ability to contact former participants. The case study consisted of 11 participants who attended MDC, and they all were students from its Wolfson campus. As a result of the site selections, findings may not be transferrable to other STEM students who are at another MDC campus. Furthermore, STEM Latino students who are attending other institutions such as 4-year institutions, private universities, Historically Black Colleges and Universities (HBCUs), or any other 2-year institution may demonstrate or express different understandings of their experiences in mentoring programs. In addition, Latino demographics in South Florida are unique in comparison to Latino populations in other states.

For this study, 11 second-year student members of the STEM Mentoring Program were invited to participate and were recruited using gender, ethnic background, academic year in the STEM program, and STEM major. The participants' national origins were Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, Nicaragua, and Spain. It is possible that students of other ethnicities might have different perceptions about mentorship.   As far as the career of goals, seven of the participants wanted to become

engineers, three biologists, and one a computer scientist. Unfortunately, I was not able to contact students from the mathematics field, since none of them were available. The participants' views could differ according to their career background. Having wider participant representations of different STEM majors could merit examination in other contexts.

Another limitation that I found was the inability to contact a student who had left the STEM program. Unfortunately, once a student leaves the 2-year institution, it is extremely difficult to track them down. I might have received different responses had I been able to interview a student who had left the STEM program.

Delimitations

The delimitation of the study is that it was focused on six women and five men who are Latino students attending MDC, completing a 2-year STEM associate degree and their second year as participants in a formal MDC STEM Mentoring Program. Thus, my findings relate only on the kinds of students I interviewed.

Assumptions of the study

A qualitative study assumes that understanding how individuals make meaning is central to understanding their experiences. In this study, I assumed that the participants are telling the truth as they see it. I assumed that students' meanings are key to understanding how they behave and what they see as factors that influenced them to succeed.

Summary and Organization of the Study

Although there are a number of studies that have identified factors influencing STEM students' success at colleges and universities, there are a limited number of

qualitative studies focusing on South Florida Hispanic students, especially those completing a STEM associate degree. This is a qualitative study of 11 participants in a STEM Mentoring Program at MDC.

Chapter 1 provided an introduction to this research by offering a brief background to the problem of how STEM Latino students are faring in higher education. This chapter described the problem statement, purpose of the study, and the study's research questions. Chapter 2 will include a review of the literature relevant to the present study, focusing on key demographics, challenges, and the mentoring of minorities and women. Chapter 3 explains the research design in this study, focusing especially on the methods related to interviewing. Chapter 4 discusses the results of this study, including brief profiles of the participants as well as the study's major themes. Last, Chapter 5 summarizes the major findings and provides implications and recommendations for practice and future research.

CHAPTER II

LITERATURE REVIEW

The main purpose of this qualitative case study was to explain the perceptions of

Latino students in STEM in an MDC STEM Mentoring Program. This study was

undertaken in order to address these questions: (a) How do STEM students make

meaning of mentorship? (b) How do STEM students construct their experiences in the

Program? (c) To what extent do gender and ethnicity play a role in how students make

meaning of their mentoring experiences? (d) What do students identify as important for

succeeding in a mentorship program?

Although there are a number of studies on factors influencing STEM students'

persistence at colleges and universities, there are few studies focusing on Hispanic

students or on Hispanic-serving institutions (HSIs). Furthermore, peer-reviewed

qualitative research pertaining to Hispanic students from the South Florida region and

their experiences in a 2-year STEM mentoring program are limited.

This chapter includes a literature review that analyzes applicable studies and

journals to support the proposed research. This chapter is divided into the following

sections addressing community college trends, Latino students and demographics, Latino

student barriers, student retention, mentorship, and STEM programs.

Community College Trends

Sources have established that the first community college was established in

1901, originally serving populations transferring to 4-year institutions or to the workforce

(Boggs, 2012). Gentry, Lawrence, and Richards (2016) stated that "recent research

suggests that almost half of all students who have completed bachelor's degrees during

the 2013-2014 academic year had previously completed coursework at two-year institutions" (p. 536). However, just as MDC has done, many ($n = 37$) community colleges have transformed themselves in the past century, and they now offer baccalaureate degrees in applied fields such as teaching and nursing (Boggs, 2012). Nonetheless, the missions of most institutions have kept to the original community college core, that is, to "(1) offer a terminal degree in a subject area, (2) provide the first two years of a four-year curriculum in preparation for transfer to a four-year institution, and (3) train students in technical or vocational degrees" (Boggs, 2012, p. 536). Therefore, at the center of the community college is the goal of providing greater access to higher education (Boggs, 2012; Gentry et al., 2016).

The community college core, as Boggs (2012) defined it, affords access to diverse groups of students, mostly characterized as non-traditional. Defined by the National Center for Educational Statistics (2006), some of the characteristics of the non-traditional student are delayed enrollment in postsecondary education by a year or more after high school graduation or attending college only part-time; having dependents other than a spouse; being single parents; working full-time while enrolled; financially independent from parents; and not receiving a standard high school diploma but some type of certificate of completion. Moreover, the Center for Community College Student Engagement (2014) described the community college students as those who those who attend classes while working and also care for dependents. These students often struggle to balance personal, academic, and financial challenges. This segment of the higher education population has an average age of 28; interestingly 46% of higher education students were reported in 2007 to be 21 years or younger (Boggs, 2012). In 2014, 17% of

the U.S. population was Latino, and 20% of Latino adults (25 and older) had earned an associate degree or higher, compared to 36% of all adults. In the United States 41% of Latino students graduated within 150% of program time for first-time, full-time freshmen, compared to 50% of all students (Excelencia, 2014). The 2006 National Center for Education Statistics indicated that Hispanic students were 19% of the college population but only 8% received a bachelors STEM degree (Brandt, 2011).

Latino Students and Demographics

Nationally, the Latino population is large and still growing. For instance, in Florida, 23% of school age children (age 5-18) are identified as Hispanic, and 66% of Hispanic Floridians who achieved a bachelor's degree were foreign-born. Latino high school completion numbers are disappointing; in this group about 23% who are 25 years old or older have not completed high school or a GED (Santiago, 2010). According to MDC's 2015-2016 institutional research report, MDC has a student population that is 72% Hispanic, 58% female, 60% part-time students, and 94% Miami Dade County residents.

In 2008, Hispanics represented 19% of students attending U.S. higher education institutions. By 2018, it is expected that Hispanic enrollment will increase to 36%. In 2008, 60% of Latinos were studying part-time, compared to 30% of Whites. It is important to note that of the 40% of Latino students enrolled full time, 28% had a job. In addition, 70% of Latino part-time students had a job. Furthermore, of the Latino students enrolled in college, 43% work 35 hours per week or more (Excelencia, 2011; Martin & Meyer, 2010). As far as students enrolled in STEM majors, in 2015, 30% of students sought to be in a STEM track field nationwide. In comparison, Florida STEM interest in

2015 was nearly 39% for males and only 16% for females. Florida Hispanics overall on a STEM track career was 27% (Florida STEM Report Card, 2016).

Researchers must identify reforms needed to address the lack of support provided to underrepresented students (African-Americans, Latinos, women, and part-time students) that could help these students to continue in their STEM careers. These reforms should also be allocated for the recruitment of underrepresented students who have a great need for financial and academic support (Davies, Mangan, & Hughes, 2009; Zalaquett, 2005). Moreover, in order for Hispanics to persist in college, researchers' recommendations have fostered conversations among state legislators, public officials, education stakeholders, and college/university leaders so that new policies can be created to foster educational equality. Governmental agencies have not had general agreement about the problems posed by racial, ethnic, and gender disparities in higher education, and they have struggled to provide support for these underrepresented groups (Gonzalez & Kuenzi, 2012). Henceforth, changes or improvement in STEM programs could translate into improvement of Latino students' college degree attainment, or their increased access in program enrollment, or their getting more merit-based financial aid (Excelencia, 2012; Zalaquett, 2005).

The federal and state agencies' goal of promoting equal educational opportunities through policies and interventions is not easy to achieve. The fact that U.S. demographics are changing and becoming more diverse makes this task even more difficult. Further research must be conducted to create effective program types and designs to help Hispanic students persist in STEM careers (Excelencia 2011, 2012; Zalaquett, 2005)**.**

Latino Student Barriers

There is research that indicates that Latinos find support from family, friends, people in the community, and education leaders, and in their sense of responsibility toward others, their sense of accomplishment, and their ability to get scholarships (Evans, Forney, Guido, Patton, & Renn, 2010). However, Zalaquett's (2005) qualitative study confirmed that the most important barriers for Latino access to higher education were minimal adult supervision, misinformation, and poor career choices (e.g., choosing the wrong major or the wrong courses within the major). Latino students face barriers as they enroll in higher education institutions, and these barriers include having a low socioeconomic status (SES) and a lack of academic preparedness (Zalaquett, 2005).

Socioeconomic Status

There are financial programs from the federal government, state, institution, or private sources that provide different type of assistance to diverse socioeconomic and ethnic student populations; however, there access is not equal (Zalaquett, 2005). Low-income Latino and first generation in college students have limited knowledge, information, or assistance about their financial aid options, which in turn affects their success in access to college and degree completion (Malcolm & Dowd, 2011; Zalaquett, 2005). The fact that three-fourths of the Hispanic population does not enroll in college is due to a lack of exposure to better information (Santiago, 2010). Therefore, institutions should ensure that accurate information is given to students about financial aid, not only before enrolling in college institutions but also when progressing toward the degree (Chen & DesJardins, 2010).

This support is important because many low SES minority students do not apply for financial aid when they are faced with the obstacle of cumbersome applications, such as the Free Application for Federal Student Aid (FAFSA). As Zeidner (2006) mentioned, lowering these barriers probably would be beneficial, making more money available to the student. In other words, by easing the application process, more students would benefit. The federal government is also trying to evaluate different alternatives to make the application process easier. Lederman (2007) stated that one idea to overcome would be to use commercial tax preparer organizations, such as H&R Block, to help students fill out the FAFSA application, at no cost to the students. Another alternative could be to train mentors so they can help mentees in the financing process.

Enrollment drops as tuition fees increase (Paulsen & Smart, 2001). Financial aid funding can be obtained from an array of resources, such as federal, state, and local agencies, private lenders, and directly from colleges and universities. Even though there are myriad funding options, recent changes in policy have changed opportunities more toward loans or merit aid. Research suggests that this shift will have an impact on students' decisions about obtaining monetary resources (Chen & DesJardins, 2010). This is because ethnic groups (especially those of low-economic status) tend to make financial decisions differently than others when it comes to attending the various types of institutions of higher education (Chen & DesJardins, 2010; Zalaquett, 2005). For instance, Asian American students have been shown to be the most sensitive to the rise of tuition, followed by Hispanics (Heller, 1999; Malcolm & Dowd, 2011). Latino undergraduates have been awarded lower rates of federal financial aid than the rest of the student population, and only mildly higher rates of Pell Grants (Excelencia, 2011).

Among all ethnicities, Hispanic students apply at the lowest rate for school loans (Florida STEM, 2011). Thus, with the creation of scholarships and grants, financial incentives would increase Latino degree completion (Zalaquett, 2005). Seidman (2005) found that Hispanic students perceive a loan as high debt and do not make a connection between the debt and the benefit of enhancing future personal and professional success. Many students, particularly Latinos, do not know how to get financial aid, where to apply, or who to approach (Florida STEM, 2011).

Government agencies need to find a way to ensure funding directed toward programs that can improve enrollment and persistence of Latinos in higher education (Zalaquett, 2005). Many institutions and policy makers have agreed that greater use of merit- and need-based criteria is the solution. These monetary incentives are given to students during college; however, many argue that if incentives were given as merit-based scholarships in earlier school years students would be more motivated to continue their education and persist in college (Santiago, 2010). The media could also facilitate this process by disseminating college application information, and by promoting information about the positive outputs or fruitful gains Latinos could obtain with a college degree (Santiago, 2010). One reason for conducting this present dissertation was to determine if STEM MDC Latino students believe they were well-informed about their financial options, and what financial information they obtained from their STEM programs. Specifically, my research was conducted to evaluate, from the students' perspectives, how the STEM Mentoring Program is informing students during their first-year experience about available financial options, such as scholarships.

Academic Preparedness

Studies show that students attending 4-year institutions have better academic preparedness and have a higher probability of succeeding when compared to those attending 2-year colleges (Astin, 1999; Malcolm, 2010; Nora, Cabrera, Hagedorn, & Pascarella, 1996). Other studies indicate that Latino students who start their education at 2-year programs tend to withdraw and never return to school (Page, 2013). This also happens because process for transfer to a 4-year institution is clearly not defined, and there is no reciprocity between the institutions (Hagedorn & Lester, 2015). Hispanic populations generally lack the academic preparedness necessary to be part of higher education success (Excelencia, 2011, 2012). The state and federal governments are willing to help improve STEM education.

Many researchers agree that if the teaching of mathematics and sciences are not improved in the K-12 areas, the STEM higher education attrition levels will diminish (Cole & Espinoza, 2008; Gonzalez & Kuenzi, 2012). Due to lower academic achievement in middle and high school, one-third of Latino students perform below average during college preparation and thus need post-secondary remedial courses. It is essential to prepare students during middle and high school years, but if not, then they need to be in postsecondary remedial classes to prepare them academically and on how to select, apply, and pay for college. It is recommended that by developing K-16 partnerships between academia, community organization, and the private sector, Latino higher education achievement could be improved (Hagedorn, Lester, & Cypers, 2010). Research has revealed that more inclusive and meaningful curricula, in which Hispanic students learn to identify with current trends and diversified cultures, has led to overall

academic improvements (Seidman, 2005). An evaluation of MDC STEM program components and the interactions between the mentor and mentee are crucial in order to determine if students believe it help their academic success and persistence.

Theories of Student Retention

Extensive research has been conducted on student retention for the past four decades (Astin 1993, 1999; Irlbeck, Adams, Akers, Burris, & Jones 2014; Milem & Berger, 1997; Terenzini, Springer, Pascarella, & Nora, 1996; Spady, 1970; Terenzini & Pascarella 1980; Tinto 1975, 1982 1988, 2006). It is worth noting that the most-widely accepted theoretical framework has been Tinto's 1975 theory on dropout from higher education (Terenzini & Pascarella, 1980). Spady (1970) was the first researcher to derive a model from Durkheim's theory of suicide, which is based on the idea of individuals breaking their ties with a social system due to lack of integration into the common life of society. Spady (1970) focused his attention on the interaction of the students' attributes and the influences present in their environment that determine whether students decide to stay or dropout. Spady (1970) provided recommendations on the importance of further delineating two kinds of dropouts: the students who leave voluntarily after their first academic year and those who are forcibly dismissed from the institution.

Expanding on Spady's (1970) study, Tinto (1975) correlated student social involvement and student persistence. Tinto (1975) emphasized the importance of distinguishing the difference between dropouts due to academic failure or voluntary withdrawal. According to Tinto (1975) the process of dropout from college can be viewed as a longitudinal process of interactions between the individual and the academic and social systems of the college during a person's experiences in those systems

(environment). Tinto (1975) argued that individuals enter institutions of higher education with a diverse set of attributes, precollege experiences, and family backgrounds. These characteristics have direct and indirect impact on students' commitment to the institution and ultimately on college completion (Astin, 1993; Tinto, 1975). The more information about students' high-school academic record is known (background), the better prediction may be made about students' college experience and degree completion. Therefore, internal and external impacts, individual characteristics, goals, commitments, past experiences, and institutional commitment would all affect the integration of the student into the academic and social system of the institution, and therefore directly relate to the continuance of the student in academia (Astin, 1999; Tinto, 1975).

Tinto (2006) and Astin (1993) determined that higher SES students are less likely to drop out than lower SES students, and they are less likely to attend a 2-year college because they are more likely to have parents who also attended college. However, students from all economic statuses attending high-quality small or large 4-year colleges are more likely to graduate because of the resources available, the environment and sense of belonging (Tinto, 1975). Researchers' recommendations on college attrition include continuing the study of the relationship between race and gender and dropping out from higher education, on exploring the relationship of SES and involvement in particular institutions, and on the interactions between student and faculty in residential and nonresidential institutions. Recommendations also include addressing the external forces in the students' immediate environment, such as finances, external peer groups, family, and social backgrounds (Astin, 1999; Irlbeck et al., 2014; Terenzini & Pascarella 1980; Terenzini et al., 1996; Tinto 1975, 1982, 2006).

Most studies have focused on student dropout during their first year of enrollment, but there is a lack of literature focusing on student populations. Furthermore, there is little research focusing on why students stayed in their majors and in college (Tinto, 1988; Terenzini & Pascarella 1980). Tinto (1988) used Van Gennep's study, *The Rites of Passage,* for understanding how students adapt to the college environment; Van Gennep explained how members of a tribal society move through membership in one group to another. Tinto (1988) similarly believed that in order to become a new member of a college community the student must be able to achieve separation from the past and seek to transition and incorporate into the university. Separation from the past means that the student has to dissociate herself physically and socially from her past communities.

Astin (1999) also stated that the most important environmental pervasive factor in students dropping out is being in residence. Astin's longitudinal study showed that spending more time on campus would increase involvement with other students, with faculty, and with collegiate life, thereby decreasing the possibility of dropping out. However, Tinto's recent findings contradict that result: students succeeding in college are not necessarily the ones in residence. For instance, commuter students see more benefit to staying home and having family support; these students see college involvement as happening in the classroom, and not in traditional activities of college life, such as fraternities or sororities (Tinto, 2006). Research on involvement, like Tinto's, pertains to almost exclusively 4-year residential institutions and does not address 2-year colleges (Hurtado & Carter (1997). It is therefore important to study involvement at 2-year institutions. Because MDC students are not residential students in a 2-year college, the

present study was undertaken in part to find out if such students see their interaction in a mentoring program as a determinant for academic success.

Astin (1993, 1999, 2012), however, concurred with Tinto that the more the students are involved with their institution, the greater the chances that they will persist and graduate. Astin (1999) described student involvement as the amount of physical and psychological energy that a student devotes to the academic experience. Hence, Astin's (1993) Input-Environment-Outcome (I-E-O) involvement theory states that in order to examine the overall educational evaluation system of college students, the information on student inputs (I), educational environment (E), and student outcomes (O) should be addressed in any study of retention (Irlbeck et al., 2014). Astin (2012) remarked that the I-E-O student involvement theory model has looked at student characteristics in the past; however, Astin failed to look at student experiences and meaning-making in the college environment because his focus was on institutional demographics and institutional-success perspectives.

According to Pascarella and Terenzini, Tinto's interactionalist model of individual student departure is similar to Astin's theory of involvement in its dynamic (as cited in Milem & Berger, 1997). Tinto's (1975) and Astin's (1984) theories are related to the extent they incorporate social integration, student involvement, student background, and the environment of academic experience as predictors of persistence. However, as already mentioned, Astin's involvement theory is more concerned with the environmental behavioral mechanisms or processes that facilitate "how" student persistence occurs at the institutional level.

A study conducted by Milem and Berger (1997) contrasted Tinto's and Astin's theories and views of institutional support. Milem and Berger (1997) found that social integration in their institution was a significant indicator of student persistence, but institutional support did not have an effect on academic integration. Their view is that Tinto and Astin underestimated involvement in the first six weeks of the academic term. This involvement is significant in determining persistence at the institution. Therefore, further research (especially with HSIs) on the role of early involvement with faculty role models and mentorship programs appears to be necessary (Milem & Berger, 1997). My study seeks to fill this gap.

Mentorship

According to Astin (1999), students who interact more frequently with faculty is more likely to express satisfaction with the institutional experience, courses taken, intellectual environment, friendships, and administration. Astin expressed the importance of further research to find ways to encourage more faculty interactions with students because such interactions could be a highly productive activity for most campus environments (Astin, 1993, 1999). Formal mentoring programs provide the opportunity for student-faculty interaction.

Types of Mentorship

There are two types of mentorship: formal and informal. Formal happens when a mentor is assigned to a mentee; informal mentoring refers to when a mentee voluntarily chooses his or her mentor (Allen & Poteet, 1999). According to Allen and Poteet (1999), mentoring may never reach the full potential because a protégé may not know how to make the most out of a developmental relationship with a formal mentor. Largely, this

could also depend on the personality of the two parties and on the fact that some students rely more on structure and on meeting special needs than other students. Regardless of the type of mentorship, the interaction between the mentor and the mentee continues to serve the purpose of career or psychological development (Robinson & Reio, 2012; Zalaquett & Lopez, 2006). What is important is that the mentee benefits from the mentor. Some desired benefits of the experience are increased motivation, self-efficacy, and achievement (Schunk, 2012). MDC STEM programs currently utilize formal mentoring.

Schunk (2012) found that mentoring should involve fostering survival strategies and skills, advising, and training. Schunk noted that in the formal setting, the mentor is assigned to a mentee based on organizational structure and procedures, but informal mentorship occurs spontaneously and would not be structured or managed. According to a study conducted by Ghosh, Reio, and Haynes (2012), an electronic survey was sent to over 2,000 individuals at three corporate organizations that had a formal mentoring program. The programs had predominantly male, older, and experienced mentors. Their findings suggested that perceptions of engaging in reciprocal support in mentoring yielded a modest relationship with organizational citizenship. The authors did not find that the type of formal or informal mentoring to be a significant variable.

Generally, the findings presented in these studies were useful in understanding a formal mentoring program at MDC. The studies indicate that mentoring is important especially when involving the faculty. Getting the perspectives of student mentees is rare and would be beneficial for understanding what they see as good mentorship. It is important to know as well whether race or gender has bearing on mentorship.

Mentoring Women

Spady (1970) and Tinto (1975) pointed out that grade performance (extrinsic reward) was the most important factor for student persistence in college. However, when gender is taken into account grades tend to be more important for men than for women. Tinto (1975) suggested that women interact more with the faculty and are more concerned with intrinsic rewards, such as intellectual development because of the pressure they feel for future occupational development. Academic performance and career enrollment are also changing; more women are now enrolling in STEM fields than men, and women are outperforming their male counterparts (Agosto et al., 2008; Hagedorn & DuBray, 2010; Hagedorn & Lester, 2015; Hagedorn & Purnamasari, 2012). However, these studies were conducted at 4-year institutions and do not necessarily reflect 2-year colleges or HSIs.

Robinson and Reios's (2012) research studied the effects of gender on role model and mentoring. Their study used an online Tailored Design Protocol (TDM) questionnaire designed to produce high quality information and high response rates. The sample consisted of 359 African American men; 87 % of them had male mentors. Through multiple regression analysis they showed empirical evidence of a strong relationship between mentorship and job satisfaction, supporting the hypothesis that being mentored was significantly related to having a strong organizational commitment. However, most of the participants were male mentees and only 13% had a female mentor. Studies show that women tended to get more psychological and career support when their mentors were female. A study conducted by Price (2010) indicated that female students perform better in a course taught by a female professor and with female mentors.

Blake-Beard, Bayne, Crosby, and Muller (2011) conducted a survey of over 2,000 students and collected data about their demographics, mentoring support, mentoring experiences, and academic outcomes. Their regression analysis results showed a significant effect when mentees had a mentor of the same race or gender, especially women. Females felt that they had more help and support from women mentors, although the mentorship relationship did not have an effect on academic outcomes. It is important to determine if mentees attending 2-year colleges have a preference on the gender of their mentor

Mentoring Racial and Ethnic Minorities

Interestingly, mentors also prefer to advise, teach, or help mentees of the same ethnic and race background (Robinson & Reio, 2012). Agosto, Gasson, and Atwood (2008) offered student' perspectives of the importance of mentoring racial and ethnic minorities and of their role models. Their finding was that mentorship not only helped students learn but also is about learning using hands-on practices. The authors indicated that mentors not only should teach mentees how to learn but how to behave as professionals, which is best learned from role modeling. According to the authors, good mentoring should involve reciprocal teaching in which both the mentor and mentee benefit. Agosto et al. also stressed the importance of minority students having a minority mentor, which would improve mentoring quality and retention. Schulze (2010) also mentioned that a good match between a minority mentor and mentee improves happiness, communication, work habits, research interests, personal value, and career aspirations.

In a study of mentoring for African American, Robinson and Reio (2012) found that there is a lack of research related to ethnic interactions in mentorship. Their findings

indicate that matching ethnicity, race, and gender between mentor and mentee improves the relationship, creates interpersonal comfort, and enhances psychological support. Price's (2010) study of Black instructors serving as mentors for Black students, however, indicated that such matched mentorship did not have a significant effect on persistence after the first semester, and that there was no negative impact when the mentorship was between individuals of different races or ethnic backgrounds. These findings demonstrate a need for more research on the relationship of mentorship and ethnic background. The present study was conducted, in part, to determine whether STEM students had views about cross-ethnic mentoring in HSIs.

Mentor Competence

Research indicates that mentors in organizations tend to be highly competent in their fields, older, and more experienced than their protégés (Ghosh et al., 2012). Also, if the mentor has the same career, gender, and ethnic background as the mentee, there should be a good outcome. However, if the opposite occurs, then the experience could be demoralizing. The mentor and mentee relationship does not always lead to positive results because there may be structural changes in the program; because individuals may go through personal problems; or the mentoring relationships may not succeed because of differences on their personality (Bower, Diehr, Morzinski, & Simpson, 1998; Elcigil & Yildirim, 2006; Ghosh et al., 2012; Robinson & Reio, 2012). This dissertation addressed how students understood the mentoring relationship.

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STEM Programs

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Governmental agencies have capitalized on their statutory power and have created 25 programs through the National Science Foundation, and 40 programs through the

Department of Health and Human Services (HHS). Furthermore, 75 STEM programs

have been created to provide students with scholarships or fellowships in order to

increase student STEM degree completion; 65 programs have been targeted for minority,

disadvantaged, or underrepresented groups (GAO-12-108, 2012). The federal

government's approach demonstrates clear action to help remediate the country's need to

support the advancement of scientists and educators in these fields.

STEM Program Effectiveness

In order to improve programs' effectiveness, the NSF requires institutions to

conduct research and internal evaluation of student success, especially for Latinos, so that

institutions can identify and share frameworks that have been effective (Santiago, 2010).

The Florida STEM Strategic Plan (Florida Center for Research in STEM, 2011) advised

that one statutory goal is to "create a statewide sustainable STEM leadership organization

to align existing and emerging STEM initiatives and represent Florida's one voice in

meeting STEM demands" (p. 31). In part, my study was conducted to determine if MDC

students' views indicate that the Mentoring Program has been a positive experience for

them and has made a difference in their progress and career paths.

Mentorship Program Efficacy

Ghosh et al. (2012) argued that efficacy of mentorship becomes collective when

participants' effectiveness in the relationship develops within their organizational roles.

They found that when the mentees and mentors increased their feelings of self-worth,

they also increased their feelings of self-in-relation to their organization. According to

another study's analysis of mentoring of African American men, mentoring is also a

benefit to an organization, since it increases organizational communication due to the

alliances between mentors and mentees. This sentiment is propagated across all of the organization's levels, thereby increasing collective efficacy (Robinson & Reio, 2012). In turn, this collectively improves efficacy of mentoring, and, overall, there will be an emotional sentiment of attachment to the organization. This is also seen in academic settings when (student) mentees achieve higher-level goals and communicate their achievements to other students, both of which increase program retention, program success, and the overall participant population (Ghosh et al., 2012; Shaw & Dukes, 2005; Zalaquett, 2005).

Chapter Summary

According to the literature reviewed in this chapter, the backgrounds that students bring to a program and their environments have major impact on their persistence. Although earlier studies indicated that Latino students' family background, school environment, and community did not have an impact on degree attainment, recent research indicates the contrary (Tinto, 2006; Zalaquett 2005). Most of the studies discussed in this chapter were based on 4-year institutions and corporate organizations. It is imperative to show if there are any variations based on MDC's 2-year Mentoring Program.

Research studies discussed in this review have shown that when protégés and mentors have the same race and/or ethnic background, this can increase students' motivation, psychological well-being and professional progress. The present study sought to investigate whether students believed this was the case for a particular mentoring program.

Researchers have recommended that further studies be focused on student involvement and retention, on programs enhancing persistence, on creation of programs to achieve better student and faculty interaction, on student persistence in 2-year colleges, and, more precisely, on HSIs (Astin, 1993, 1999; Milem & Berger, 1997; Spady, 1970; Terenzini & Pascarella, 1980; Terenzini et al., 1996; Tinto, 1975, 1982, 2006). This present study sought to investigate whether this particular mentoring program is achieving these tasks from students' perspectives.

Data concerning Latino students' demographics, barriers, socioeconomic status, culture, and academic preparedness help researchers understand the different backgrounds of this population. The review of student retention and environment studies was significant in order to understand the relevant theories, all which point to the need for student-faculty interactions. The review of the studies on mentorship pointed to non-collegiate organizations but did not address in great detail how mentoring improves the collegiate experience for Hispanic students, something that my study seeks to remedy.

CHAPTER III

METHODOLOGY

The present investigation is a qualitative study focusing on the experiences of South Florida Latino students in a STEM 2-year Mentoring Program at MDC. This study is significant because it provides insight into how mentoring experiences contribute to student success as understood by the students themselves. This chapter begins with a brief reminder of the purpose of the study and research questions. The qualitative case study design is then discussed, followed by the role of the researcher. The procedures that were used in the research, including descriptions of the site location, the sampling, data collection methods, and data analysis, are also discussed.

Purpose of the Study and Research Questions

The main purpose of this qualitative case study is to explain the perceptions of Latino STEM students at MDC relating to mentoring and succeeding in a STEM mentoring program. The study answers the following research questions: (a) How do STEM students make meaning of mentorship? (b) How do STEM students construct their experiences in the Program? (c) To what extent do gender and ethnicity play a role in how students make meaning of their mentoring experiences? (d) What do students identify as important for succeeding in a mentorship program?

Qualitative Case Study

This study sought an in-depth understanding of how students involved in a mentoring program make meaning of their experiences; therefore, qualitative methods were appropriate. A qualitative study in general seeks to understand how people make meaning of their lives; it assumes that meanings are important because they influence

how persons behave (Merriam, 2002). In particular, this study constitutes a qualitative case study.

The students in the STEM Mentoring Program at MDC constituted a "case study." According to Stake (1995) and Yin (2003), a case study permits participants to tell their stories, thereby chronologically enabling the researcher to understand better the participants' own understanding of their experiences. This type of qualitative study provides intensive comparative descriptions of *single units*, the students, and the *bounded system*, the mentoring program (Merriam, 1998). In other words, Merriam (1998) indicated that the case study is most appropriate when it gives the researcher opportunities to explore or describe a phenomenon (student experiences) within their contexts (the Mentoring Program). The case study was most appropriate, therefore, because my interest was in the context rather than in specific variables, and I sought to understand meaning-making rather than confirmation that mentorship is necessary; that is, I was more interested in the process that students experience specifically in a MDC mentoring STEM program rather than on STEM outcomes.

Stake (1995) and Yin (2003) based their approach to case study on a constructivist paradigm, in which the participants tell their stories, thereby enabling the researcher to understand participants' actions. Multiple data sources provide more credibility to the study as these sources provide more rich data, enhancing trustworthiness (Baxter & Jack, 2008). Using a variety of data sources, such as interviews, student journals, and electronic communications, helped me to understand better the participants' stories.

Role of the Researcher

In this section, I tell my story. I believe it is important to tell my story because my experiences parallel somewhat with the experiences of the STEM students who I interviewed. I also tell my story in order to alert readers of my biases in favor of formal mentoring programs, so that they can gauge the veracity of my claims (Bogdan & Knopp, 2006).

I am a professor of the Natural Sciences department at Miami Dade College (MDC), recipient of the 2011 and 2017 *Endowed Teaching Chairs* Award for best teaching practices. I began my assignment as a Biology instructor for the Department of Natural Sciences, Health and Wellness at the Wolfson Campus on August 22, 2005. I teach biology, microbiology, and biotechnology courses, and I strongly encourage student involvement in science and in nonprofit health organizations. I have collaborated closely with other colleagues to improve student learning and in creating a new baccalaureate degree in biology. I have also created a learning ccommunity linking biology and college algebra, attended seminars, and given presentations for colleges and universities emphasizing the importance of mentoring. I have helped with the new Biotechnology AA and AS initiative and also served as a faculty research mentor and grant Co-Principal Investigator for the following National Science Foundation (NSF) grants: Biotechnology Research Collaborative (BRLC)**,** Tools for Success, and Windows of Opportunity and STEM Innovations Generating Maximum Achievements (SIGMA) scholarship.

I am a first generation Hispanic college graduate from Spain who started his professional career in 1998 in the pharmaceutical/biotechnology industry. Following my

mother's request, I entered college, but I did not know what direction to take as far as a career. However, I knew that I had an interest in the sciences and mathematics and successfully pursued a BS in Biology/Chemistry from Montclair State University. In December 1995, I graduated with a bachelor of Biology and Chemistry and then moved on to graduate studies at Montclair State University (New Jersey). I continued my education and graduated in May 1998 from the same institution with an MS in Biology. I am currently at Florida International University as part of the Doctor of Education Program in Higher Education. I am deeply aware that these achievements were thanks to my family background, good influences from friends, and, most importantly, my mentors and guides.

Since the beginning of my tenure at MDC in August 2005, my role has been not only teaching but also mentoring STEM students. It is from this role that my motivation and interest in understanding student experiences and what mentoring means to them derives. Some researcher might see my mentorship involvement at MDC as having the potential for bias in data interpretation; however, I believe that my experience with the MDC STEM community and my familiarity with the topic facilitated my gathering very important and resourceful data. Furthermore, in order to deal with my bias, I asked MDC colleagues to analyze my data and results. I think it helped me discover and explain the value of mentorship experiences from the students' perspectives.

My past experiences are my motivations to be a mentor and to understand better how mentorship experiences can help underrepresented Latino students. This study was also conducted to provide insight into the academic developmental process those students and their families go through during their STEM pathway experiences. I can relate to

Latinos and their experience in college. I find this case study to be intrinsic and useful to better appreciate the situations and interventions STEM students experience in the MDC program.

Site of the Study and Population

The site of this research study was MDC. This site was selected because of its Latino population diversity; because it is considered a Hispanic Serving Institution (HSI); and because limited studies focused on the experiences of South Florida STEM students participating in a mentorship program. MDC has the largest undergraduate enrollment of any U.S. college or university, with more than 170,000 students, and the largest Hispanic student enrollment nationally. According to MDC Institutional Research Office (2016), the student body is 70% Hispanic, 58% females and 94% Miami Dade County residents. According to the MDC Fact Book, MDC has admitted more than 2 million students. Currently, sixty-one percent of the students attend part-time, and the average student's age is 26 (MDC, 2013). MDC serves underprepared students. For instance, in fall 2013, only 32% of incoming students tested college-ready. Furthermore, 51% needed at least one remedial class in reading, writing, or mathematics (MDC, 2013).

The Natural Sciences department of MDC, in conjunction with the National Science Foundation (NSF) and the U.S. Department of Education, has created scholarships and programs (i.e., grants) to broaden the participation of underrepresented or financially challenged students in STEM. An important asset of these programs is the fact that students involved in STEM majors have the benefit of a having monthly contact with faculty mentors who are preferably in a career related to the student's field of interest.

MDC has eight campuses. This case study is focused on the Wolfson campus's WOLFPACK Mentoring Program, which serves students completing a 2-year STEM associate degree. This program is a student collaborative effort between the MDC Wolfson Campus' Accelerate, Retain, Complete with Opportunities and Support (ARCOS) Grant and the STEM Student Association (STEMSA) Grant. The WOLFPACK Mentoring Program adopts a model in which faculty guide second-year students, while the second-year student (i.e., peer mentor) mentors first-year-students. The faculty mentor's role is to serve as a role model and a coach for their mentees (i.e., peer mentors) so that their mentors become good mentors for the first-year students in the program. The peer mentors help first-year students learn about leadership and in any way that helps them achieve academic success. The Program's goal is to enhance academic success, leadership, and campus community through interactions between faculty mentors, peer mentors, and mentees. The Program has acceptance requirements, such as having a declared STEM major and a GPA of 3.0 (on a 4.0 scale).

One asset of the MDC Mentoring Program is the fact that students involved in a STEM major have the benefit of a scholarship as well as having monthly contact with a faculty mentor. Additionally, students have access to a student success center (where they might benefit from tutoring), and they also receive academic advising, career advice, workshops, forums, fieldtrips, and specialized courses. At the time of this study, this 2-year program had 15 peer mentors and 30 first-year STEM students. Each peer mentor had a faculty mentor and two first-year mentees. Second-year students peer mentors are recruited from late spring through the summer, and they are required to have achieved 24 credits in their first year. The first-year students are recruited during new student

orientations and are paired with a peer mentor. The new mentees and peer mentor sign a

contract requiring at least a one-hour meeting per month and bi-weekly contacts (e.g., by

text or phone). Peer mentors' meetings with their faculty mentor are mandatory and are to

be reported on a monthly basis.

Participants

I used purposeful sampling to select the participants in this study. According to

Merriam (1998), purposeful sampling is on based on the assumption that the researcher's

intent is to discover, understand, and gain insight into particular matters. It is important to

select a sample from which the most can be learned. The purpose is not to gain opinions

but to get special expertise and experiences from the subjects. The students who are

selected constitute a *typical* sample because they reflect the average person, situation, or

instance of the phenomenon of interest (Merriam, 1998): in the present case, the mentees'

experiences in the STEM Mentoring Program. Six women and five men participated.

According to Seidman (2013), within the limits of the study, the goal is to sample

purposely the widest variation of sites and people. Therefore, for variation, it was

imperative to interview STEM Latino students from a variety of STEM majors who were

participating in the second-year Mentoring Program.

The reason I chose male and female Latino students of various STEM career

pathways is because the literature indicated there was a need to study this population. The

purposeful sample within the case reflects the population of interest (Creswell, 2009).

The purpose of these interviews was to explore the experience of those mentees, not to

predict or to control for that experience (Seidman, 2013).

In order to avoid biases and to encourage students to share freely their experiences, the students were chosen from the Mentoring Program data files and contacted via email. Since there could be a debate about whether being an "insider" researcher would be more biased than an "outsider," I interviewed candidates who have never had me as a mentor and do not know of my current involvement with the Mentoring Program. These strategies were used to help students give honest answers, and, therefore, enhance the case study's credibility (Creswell, 2009).

The participants chosen for the case study were Latino second-year STEM students who were part of the WOLFPACK Mentoring Program and who persisted in Program. The reason the second year returning students were chosen is because I was interested in making distinctions about their stories in the program, what the participants understand about their success, and whether their mentorship program experiences helped them decide to stay in the STEM field for the second consecutive year. Overall, it is assumed that the sample selected provided the most general information possible, thus providing a deeper understanding of the students' experiences and interactions with mentorship, as well as a more nuanced perception of the factors that Latino students give for persisting in their education pathways.

There is no clear answer to the question of "how many in a sample?" (Merriam, 1998). Although the initial sample was 10 students, I found it necessary to interview an additional student, who I recruited by using snowball sampling. Since I originally had six females and five males, I felt that one more student could confirm that my data had reached the saturation point. Snowball sampling was effective because the students recommended others who have the same goals (Merriam, 2002). Once I had achieved

"data saturation," which is when new themes cease to emerge, and I recognized that I was not learning anything new, I determined my number of participants involved was sufficient (Seidman, 2013).

Ethical Considerations

I approached my participants via email approximately a month prior to the actual interview in order to explain the nature of the study, to discuss with them the nature of the research, and to ask them to participate in this study. Also, I expressed to the participants that the meeting would be audio recorded. The students were informed that their identity would not be shared with anyone and that pseudonyms would be used. I also obtained written consent prior to our meeting to clarify to the participants that their comments would be anonymous, and that they would not be in danger or risk of removal from the Mentoring Program (see Appendices A, B, and C). These participants and I had never interacted before in the MDC Mentoring Program or in any activities related to this Program.

<div align="center">

Data Collection

</div>

As mentioned before, a qualitative case study is premised on a belief that meaning making is central to understanding behavior. More specifically, I chose interviewing as the primary method of data collection. Interviews helped me explain how students constructed their experiences in the Mentoring Program, how they interpreted success factors related to staying in the STEM program, and how mentorship might have a different meaning for female versus male participants.

Interviews

The data were collected primarily from the interviews with students in the MDC Mentoring Program. Interviewing allowed for the analysis of the participants' reflections within a particular context. Open-ended questions allowed me to get unexpected comments, reflections, meanings, and feedback from the participants. The purpose of these interviews was to understand the meaning of experiences, and to interpret the interviewees' answers in order to make distinctions about what they believed was success or failure in the Program. This was accomplished by observing not only what they said but also their facial expressions and other bodily gestures (Brinkmann & Kvale, 2015).

The interviews used semi-structured questions that were broad and open-ended, in which participants were invited to talk freely about their mentoring experiences (Merriam, 2002). This was done to get as close as possible to what were the participants' experiences, and to get the students to provide details and explanations about those experiences (Brinkmann & Kvale, 2015). Questions also followed an open-ended format, allowing participants to speak freely about their thoughts and concerns, and as new topics emerged they allowed me to probe with new questions (Brinkmann & Kvale, 2015).

I conducted one long interview session (about 60 minutes) and a shorter follow–up session with each participant (about 30 minutes). According to Merriam (2013), there is no defined rule on the length of interviews, as long as the researcher allows the appropriate time in a session for the candidate to express his or her thoughts. The first interview related to students' experiences using the original interview questions (see Appendix D). In order to enhance the trustworthiness and credibility of data, my interviewees sent me an email after the meeting, reflecting on their experience during the

first interview. During the second interview, I asked them to review the transcripts to provide feedback about whether their interview comments were accurately recorded. The second interview's purpose was to confirm if student's answers were consistent throughout. It also provided me with an opportunity to probe with new questions, which gave me the opportunity to ask for feedback about possible themes that emerged from the first interview session. This review process increased the likelihood that my interview reflected the meaning of the students' experiences (Creswell, 2009).

The participants were interviewed between the months of February and May 2017. The interviewees were asked the questions in an open-ended format and their answers were probed in order to see which themes emerged. The interview protocol used in this study was designed to provide the researcher with an opportunity to focus on discussing meaningful mentee experiences, relationships, and influences on the students' participation in the Mentoring Program; to explore the factors the students gave for persisting with their STEM pathway; and, in short, to understand students' mentoring experiences from their perspective. All interviews were audio taped, field notes and transcripts were saved, password protected, and stored in multiple computers and in Google Drive. A professional transcriptionist made the transcriptions, but I reviewed all of the transcripts while listening to the interview recordings to ensure the transcripts were accurate. All hard copies and records were stored in binders in my locked office file cabinet. The records will be destroyed three years after completion of this research project.

Interview Setting

According to Guba and Lincoln (1985), the interview setting must be very carefully chosen and without disturbing elements. Based on the naturalistic approach, I chose the office environment as the natural setting for the interviews, which replicates the interaction setting that mentees have with their mentors. However, had the students preferred another location (which was not the case), where they would be more comfortable, the request would have been granted. I planned and avoided any distractions by not having other appointments during those time periods, and electronic devices aside from the recorder were turned off during the interviews. I scheduled a time that was mutually convenient and allowed participants to freely express their experiences and/or concerns. Again, the average time for the first interview was approximately 60 minutes and about 30 minutes for the second.

<div align="center">**Data Analysis**</div>

Coding helped in the prioritization of useful data gathered from field notes. It is a continuous process of data analysis and identifies the emergent themes that could answer the research questions (Creswell, 2009). After the interviews, transcripts were read prior to identifying codes. This process helped me to focus on potential thick descriptions and reminded me of the participants' facial expressions and body language during the interviews (Miles & Huberman, 1994). The first step in coding was finding text that was connected my research questions. The next step was to go back to the transcripts to look for different segments of data that would connect these codes (Creswell, 2009). For example, in order to answer the research question about what students identified as

important for succeeding in a mentorship program, I highlighted any quotes that seemed related to that research question.

The strategy was to identify key words, comments, opinions, and feelings of interviewees that would connect my codes and thus help my thematic analysis. Miles and Huberman (1994) have a very creative system for coding. Their approach to coding is to attempt understanding the underlying patterns and explanatory meanings of data. I found their suggestions to be excellent, since they explained how to derive themes from the research questions. Miles and Huberman (1994) also provided examples of how to perform a thematic analysis, how to analyze transcripts, and, included examples of codes and sub-codes used in research excerpts. When analyzing transcripts, they suggested looking for main themes, key words, and sentences that could connect to codes. Such codes were classified in a codebook in order to determine the emergent themes. For example:

> My parents are very supportive. I mean, the reason that I am here is because of them. If it weren't for them I wouldn't have left Cuba. If it wasn't for them, I wouldn't be in college; I wouldn't have the food and the shelter, and everything that I need to study. They are very supportive of me.

In the sample quote, I determined that it related to the emerging theme related to family support.

In order to determine themes, transcripts were analyzed first and highlighted with different color pens. Then I came up with codes with the use of technology that assisted to me to come up with my findings. I used a computer-aided qualitative data analysis software called NVivo. This software package was useful with the coding and data management in the present study because it helped me match different categories from

the codes. However, as already mentioned, even though I could do the data management using a computer, I still reviewed the transcripts line by line (Creswell, 2009).

Data Integrity

Case study research design principles lead themselves to including numerous strategies that promote credibility or trustworthiness. In order to enhance trustworthiness, the interviews included annotated field notes, digital recordings, and post-interview self-reflective memos used for journaling purposes. A couple days after our meeting, I asked the participants to write a brief essay asking them to reflect on their interview experience and thoughts. My interviewees were cooperative and sent me their reflections via email. Going back and reading all the transcripts, comparing them with my reflective memo and participants' reflections, helped me to check my biases and enhance the credibility of my results (Janesick, 1999). During the second interview the information gathered previously was reviewed with the participants to reassure me that I understood their answers and comments. This additional *member checking* technique enhanced trustworthiness, credibility, and accuracy of findings (Lincoln & Guba, 1985).

Furthermore, the transcripts and coding were peer-reviewed by a professional colleague from work, Professor Alfredo Leon, who is a MDC instructor and who completed his dissertation using qualitative research. I chose this colleague because he was also completing his dissertation at the time, using the same qualitative data analysis techniques I was using, and we were able to discuss our findings from our respective research. The feedback that I got from him helped me with the findings and insights of this study. Also, the scholarly feedback was a good resource to see if the thick descriptions that I was developing were reflective of the data. Finally, in order to

maintain confidentiality and to help establish trustworthiness, the participants were given

pseudonyms and informed consent forms indicating that their identities would remain

anonymous (see Appendix A).

Chapter Summary

In this chapter, I restated the purpose of the study and the research questions, and I

included a discussion of my qualitative case study design. My study was of 11 peer

mentors in the MDC Mentoring Program, and interviews were the primary method of

data collection. This chapter also explained the sampling, data collection, management,

and data analysis procedures used in the study. In the next chapter, I discuss my results,

including a brief profile of each of my participants.

CHAPTER IV

RESULTS

This chapter presents the results of interviews with 11 Latino students who successfully persisted in a STEM Mentoring Program at MDC. To remind readers: A qualitative case study analysis was conducted with the objective of exploring the perceptions of Latino STEM students at MDC related to mentoring and succeeding in a STEM mentoring program. The study sought to answer the following research questions: (a) How do STEM students make meaning of mentorship? (b) How do STEM students construct their experiences in the Program? (c) To what extent do gender and ethnicity play a role in how students make meaning of their mentoring experiences? (d) What do students identify as important for succeeding in a mentorship program? The Chapter explains briefly the context in which students' comments are to be understood; then it offers a brief profile of each student participating in this study; and then it addresses the major themes of this study.

The Context: The MDC Mentoring Program

This case study focused on a STEM Mentoring Program at MDC, and it serves students completing a 2-year STEM associate degree. A strength of this Mentoring Program is that students involved in a STEM major have the benefit of monthly contacts with faculty mentors who are, preferably, in a field related to those of participants. This Mentoring Program has adopted a hierarchical model in which faculty members guide second-year peer mentors, who in turn mentor first-year-students. The faculty mentors' role is to serve as role models and coaches to the second-year students so that they can become mentors to first-year students in the Program. The Mentoring Program's goal is

to enhance academic success, leadership, and campus community through interactions among faculty mentors, peer mentors, and mentees.

Introduction of Participants: Profiles

For this study, 11 second-year student members in the STEM Mentoring Program were invited to participate in an interview for the purpose of understanding their experiences in the Program.

Table 1

Participants in Study

Name	Gender	Age	Discipline	Origin	Generation in College	Formal Mentor
Camaguey	Female	27	Biology	Cuba	Third	Mr. White I (Biology)
Chile	Female	20	Engineering	Chile	Second	Mr. Cuba I (Biology)
Rola	Female	20	Engineering	Colombia	Second	Mr. Haiti (Mathematics)
Cachaca	Female	21	Engineering	Colombia	Second	Mr. Haiti (Mathematics)
Nicaragua	Male	22	Engineering	Nicaragua	First	Ms. Cuba (Statistics)
Madrid	Female	21	Biology	Spain	Third	Ms. White (Statistics)
Avila	Male	20	Biology	Cuba	Second	Mr. Cuba II (Physics)
Bauta	Male	20	Engineering	Cuba	Third	Mr. White II (Environmental)
Tico	Male	19	Computer Science	Costa Rica	First	Mr. White I (Biology)
Salvadora	Female	20	Engineering	El Salvador	First	Ms. White (Statistics)
Carioca	Male	24	Engineering	Brazil	Third	Mr. White II (Environmental)

In this study, participants were given pseudonyms (based on their family's country or city of origin) to protect their identity. I also gave pseudonyms to the mentors indicating their racial or ethnic backgrounds as well as to let readers which of the participants shared the same mentor. In the table above, participants are listed in the order in which they were interviewed. It should be noted that they were the first students to reach their second year in the Mentoring Program and thus to serve as peer mentors to first-year STEM students in the Program. The student participants in this study were recruited and selected to maximize diversity in terms of gender, ethnicity, and STEM field.

I offer next a brief profile of each participant. I craft these profiles, I used the transcripts, the notes I took during the interviews, my reflective memos and journals, and the reflection emails received from participants. From these profiles, readers should be able to see how the students how the participants saw mentorship, and how they constructed their experiences in the Mentoring Program.

Camaguey

Camaguey is a 24-year-old woman, born in Cuba, who came to the U.S. at age twenty. Although she grew up with strong family support, she is financially independent. During her childhood, her parents moved to Africa to work for the Cuban government, so she spent her adolescent years with her grandmother in Cuba. Her goal is to become a dentist and an entrepreneur like both of her parents. Although at the time of her interview her GPA was 2.5, she strongly believed that her grades did not reflect her qualifications. She stated that her GPA has decreased due to her heavy work-life schedule, since she works full-time and volunteers at a dental clinic doing research.

During the first interview, Camaguey said that her mentorship experience with her faculty mentor was generally beneficial. She shared what she learned from him, but she wished to see him more than the "once a month routine." She said that her conversations with her faculty mentor were very nurturing, and that the conversations with him were not strictly related to academics.

During the second interview, she said that the only component that she did not enjoy about the Mentoring Program was that she was required to be a peer mentor. For her this was a problem because her peer mentees were not cooperative. She also claimed that she had to meet with the peer mentees twice a month, and this requirement took too much of her time.

Chile

Chile is a South American 20-year-old woman who was born in northern Chile and came to the U.S. at age fourteen. Her family background included farmers on her father's side and butchers on her mother's side. However, her father and uncles became engineers and computer scientists. Her two older sisters are industrial engineers, and they became her role models and inspiration to pursue a career in engineering. Her father is engaged in Chile's academics and is very supportive of her becoming an engineer. Chile shared that her mother, who is in her family's restaurant business, does not care about the Chile's career so long as her daughter makes "good money." Although Chile has successful parents, her GPA has plunged from 4.0 to 2.5 for reasons she cannot explain.

In the first interview, Chile mentioned that her mentorship experience shifted from poor to "ecstatic." She explained that in the beginning, her faculty mentor and she was not a "good match," but once Chile became more personal and interactive they have

become "best friends." For her, the best part of the Mentoring Program was becoming a leader for the other students in the program and having a faculty mentor who does research and made her his research assistant.

During the second meeting, Chile affirmed that the most important component of the Mentoring Program was the research experience she has gained with her faculty mentor. Also, for her being a peer mentor was a very good experience because it gave her a sense of leadership and was valuable to her career.

Rola

Rola is a 20-year-old Colombian woman who moved to the U.S. during middle school. She has a 4.0 GPA and is seeking to finish her degree in engineering. She considers herself to be a very independent, self-motivated student. She explained that she had to be independent and do homework on her own at very early age because her mother had to work full-time. While Rola goes to school full-time, she also helps her mother financially because her father "was not really there." Her goal is to succeed so she can make her mother proud. Her mother was the parent who seemed to be dedicated to Rola. For instance, Rola's mother, who is a college professor, is always reminding her that education comes first. Rola decided to become a biomedical engineer because she says that science and mathematics have always been her "passion."

In the first interview, Rola indicated that mentorship is very important, but she complained about what she believed were "flaws in the system" (i.e., the Mentoring Program). She found her mentor to be very supportive, but there was confusion about "who to go to when you have a question." Rola indicated that while she loves to visit her mentor, she would usually go to another faculty member, who was not her assigned

mentor. She explained that going to this other professor (i.e., informal mentor) gave her a better feeling of identity, since they spoke about personal topics and how to prevent becoming "burned out."

In the second interview, the aspects of formal versus informal mentoring were discussed. Rola explained that she enjoyed going to her assigned faculty mentor, and that they have a good connection and good conversations, but they spoke only about her academics. She feels encouraged and motivated by her formal mentor, but she talks about personal matters only with her informal mentor.

Cachaca

Cachaca is a 21-year-old Colombian woman who came to the U.S. at age twelve. Her family has a strong educational background. Cachaca's mother is an education professor, and her father is an engineer. She stated that she had good family support, but that her mother was more present in her life because her father works too many hours. However, she noted that neither parent really assisted her academically because they have great expectations for her and knew that Cachaca has potential to do things alone. Cachaca feels that her parents' aptitudes and expectations "molded" her to become a perfectionist. She works 20 hours per week, has a 4.0 GPA, and considers her good grades to be the results of good study habits.

During the first interview, Cachaca discussed the importance of having a reliable and available mentor. Specifically, she sought someone who is motivating and helps her plan courses so that she can graduate without wasting time. Cachaca feels that not having a mentor in her STEM field made it difficult to be able to plan effectively the courses in

her major. Cachaca viewed mentorship as an important component of the program but did not believe she needed it to succeed in her career path.

The second interview was somewhat contradictory to the first interview. This time Cachaca stated that her mentor was very effective and "knew his stuff." She clarified that her mentoring experience was good, but it would have been better had her mentor had an engineering background like hers. In the second interview Cachaca expressed that being a female in STEM was difficult because many male professors and students in the program underestimated her. She indicated that her male mentor helped her overcome this barrier and develop more confidence. Cachaca also claimed that she felt more comfortable going to a chemistry professor, who is not her formal mentor, because he gave her better guidance and had good interpersonal skills. She felt that she could be more personal with this professor than with her faculty mentor because they had a similar academic field.

Nicaragua

Nicaragua is a first-generation male college student, born in Miami, with a Nicaraguan family background. Nicaragua is 22 years old and said he came from a very humble family with a low socioeconomic status. His goal is to become his family's first college graduate and to earn a STEM degree in engineering. His motivation to become a mechanical engineer is so that he can be able to have a good salary to help his family in Nicaragua. His family is very supportive of his academic goals and tries to help him financially so that he does not need to get a job. Nicaragua sees himself just as an average student but always looks for ways to improve his academics.

During the second interview, I gathered that Nicaragua believed that his mentor was a great influence on him even though they did not share the same career background.

Nicaragua would meet with his mentor in the once-per-month scheduled meeting but would also stop by and talk with her occasionally. He met with his faculty mentor mostly for academic reason but also requested help with personal matters, such as family issues and conflicts with friends. Nicaragua stated that the most important thing about the Mentoring Program was the motivation and advice he got from his faculty mentor. He also liked the networking components in which he met people from the Program, and this made him feel he was in an environment in which he was in a team. Another thing that Nicaragua valued about the Mentoring Program was that he liked being a role model for his first-year mentees.

Madrid

Madrid is a 21-year-old woman who grew up in Spain and came to the U.S. at age 17. She is a Biology student with a 3.94 GPA, and her goal is to become a clinical geneticist. She said that her family had good professional backgrounds going back to her grandparents, as all were in the engineering field. Since her family is composed of professionals, Madrid feels pressure to complete a degree. She indicated that if the degree were not in the STEM field, her family would be disappointed. Nonetheless, she explained that this is all "good pressure," and it is what made her "a curious student who enjoys learning." She said she is always eager to explore and to expand her knowledge.

During the first interview, she said that her experience with her mentor was a monthly routine to discuss academics; no personal matters were shared with her mentor. She said that the Mentoring Program "did not make a difference in my life," especially because she did not have a connection with her formal mentor. She came to this conclusion because her faculty mentor was not in the same career or had the same

professional background as she did. She stated that there was another professor (informal mentor) who she met with voluntarily on a weekly basis.

I decided to revisit Madrid's comments about the Mentorship Program to see if she felt the same. She affirmed that perhaps she did not need the Mentoring Program to "succeed." However, she noted the importance of having a mentor, calling it "essential." She also claimed that her assigned faculty mentor gave her academic support, including getting recommendation letters, strengthening her motivation to overcome barriers, and developing the strength to continue her career goals. Another topic that was brought up by Madrid was the peer mentoring experience in the Program. According to Madrid, being able to provide mentorship to first-year students was a wonderful experience, one in which she could help and "flourish" in new friendships.

Avila

Avila is a 20-year-old Cuban man who came to the U.S. at age fifteen. He indicated that he has strong family support, financially and academically. His father is an engineer and his mother is a lawyer. Both parents were influential in Avila's decision to pursue a college degree. However, he said that his parents had an "easy going" attitude and are not "on top of him" concerning personal or academic aspects of his life. His goal is to become a medical doctor, but he first wants to become a biochemist. Although Avila believes himself to be a good student, his current GPA recently dropped to 2.85 due to his struggles with his calculus course.

During the interviews, Avila said that one of the things he found valuable about the Mentoring Program was the tutoring sessions he obtained from his faculty mentor. Another aspect of the Program that he appreciated was that his mentor came from his

same hometown and, therefore, Avila identified with him. Avila mentioned that mentoring was important, but he did not like the routine of having to report to his monthly meetings with his faculty mentor. It seemed that his attitude during the interviews showed him to be someone with confidence in himself, or, as he said, "in total control of his life and academics."

Bauta

Bauta is a 20-year-old Cuban-American man, second-generation college student, whose father is an engineer and mother a housekeeper. He described his mother as being very nurturing and dedicated to her children. Bauta's father, being an engineer, was his inspiration to go to college. He proudly described his family as very supportive academically and financially. He believes that thanks to his family, he has the time to study and participate in the college environment. Bauta has a 4.00 GPA and is pursuing an engineering degree in the same field as his father.

In the first interview, Bauta was very enthusiastic and thankful about participating in the Mentoring Program. He communicated that the Program was extremely helpful and supportive with the transferring process from the community college to the next "higher level" institution. Overall, he believed that his mentorship experience helped him with time management skills, and, most important, his faculty mentor encouraged him to stay in the STEM field. Bauta also emphasized that the mentorship and program activities gave him the opportunity to interact with the STEM faculty, making him feel that he formed a "strong" relationship with them.

In the second interview, a new topic of conversation emerged regarding the contract that the participants have with the Mentoring Program. Bauta stated that

although the Mentoring Program worked really well for him, the only concern he had was the required number of times he had to meet with his faculty mentor and first-year mentees. Although he found it necessary to have meetings in the first half of the academic semester, after that the required number of meetings was very time consuming. Bauta saw these mandatory meetings as part of a contract that he must fulfill, but he deemed this requirement unnecessary.

Tico

Tico is a 19-year-old man who was born in Costa Rica and came to Miami at a very early age. He is a first-generation college student, and his parents only partially completed their college degree in nursing. Although his mother wishes for him to become a medical doctor, he decided to go into computer science. Tico described himself as an "antisocial child" who had an obsession with video games and who developed the curiosity to become a video game designer at an early age. Tico is currently in good academic standing and wants to earn a Ph.D. in computer science.

During the first interview, Tico indicated that his communication with his faculty mentor was very beneficial, and that he would talk to his mentor in person and via Skype. Tico said that his faculty mentor's college experience motivated him even further to study out-of-state. He felt that his mentor was a great influence in building character and developing an outgoing personality. Tico also found that his relationship with his faculty mentor helped him figure out how to create icebreakers, especially when Tico had to establish a relationship with his first-year mentees. He saw the Mentorship Program as a positive experience because he could network with professionals and connect with other students in the Program.

During the second interview, Tico stated that he felt some of the required seminars did not relate to his STEM field and were taking time away from his studying. However, he indicated that it would be very valuable if the Mentoring Program scheduled more events, such as field trips, so that he could interact more with the STEM community.

Salvadora

Salvadora is a 20-year-old first-generation college student born in Miami. Her Latino background is from El Salvador. She currently has a 3.57 GPA, and her goal is to become a mechanical engineer. Salvadora stated that she loves her family very much, and her purpose is to make her mother proud by getting a college degree. She has never left Miami and would like to go out of state so that she can have different experiences and learn about different cultures. However, she explained that it would be very difficult for her to do this because her mother is afraid for her safety and the financial burden on her family would be heavy.

Salvadora asserted that she was fascinated with her faculty mentor and with the leadership role she played with her first-year mentees. One of the positive influences for her was the connection she established with her faculty mentor, which grew to be a personal friendship. Salvadora believes that her mentor offered academic support but, even more important, was a friend who helped her to overcome stress and her anxieties. The only thing about the faculty mentor-mentee relationship she would have changed is the location in which they met (his office); Salvadora would have rather met in an "open" space like a cafeteria or park.

When we met for the second time, Salvadora discussed her experiences with her first-year mentees. She indicated that she met them regularly, and she believed that she was very inspirational to, and had a good influence on, her mentees. However, she said that the mentees were not very good at keeping up with appointments. She also felt that the Mentoring Program should have been sponsored more activities or the STEM students; more events would have given participants in the Program more opportunities to interact with each other.

Carioca

Carioca is a 24-year-old South American man whose family is from Brazil. His motivation to become an engineer and entrepreneur was greatly influenced by his brother, who is a mechanical engineer, and his girlfriend's father, who is a businessman. He described himself as a non-traditional student in comparison to his peers in the Mentoring Program because he is 24 years old who has returned to school after taking a "four-year break."

During the interviews, Carioca stated that he was happy to be part of the Mentoring Program, but he believed that he did not need it in order to achieve his career goal. Nevertheless, he shared that mentoring would be important, especially for the first-year students who just started their STEM career right after secondary school. He felt that the program needed to improve the career matches between mentors and mentees. Carioca indicated that had his faculty mentor shared his career background and "passion" he would have found the mentorship more valuable.

In the second interview, Carioca confirmed his feelings about the Program, but he spoke about how grateful he was to have been a peer mentor. He said that this experience

was very beneficial for both him and his peer mentees; because he was able tell his mentees not to make the same mistakes he did, such as dropping out of school. Additionally, Carioca reflected on his own good qualities as a person and student.

In summary, these profiles indicate that the participants were overall satisfied with their mentoring experiences and the Mentoring Program. With the exception of 3 of the 11 participants, they were mostly middle social economic status. Additionally, 8 of the participants happen to second or third generation college students.

The rest of this Chapter presents the major themes of my research. These themes relate to 8 areas: (1) the importance of STEM to the participants, (2) mentoring as meaning (academic and interpersonal) support, (3) the need for career matching of mentors and mentees, (4) the necessity of the required number of meetings and events, (5) the importance of the peer-mentoring experience, (6) the importance of family support, (7) the role gender and ethnicity in mentoring, and (8) what makes for successful mentoring programs. I will discuss each of these themes in turn.

The Importance of STEM

The participants generally indicated that their goal to become STEM majors was grounded in the "passion" and dedication they have for their fields as avenues for successful careers and pride. All participants indicated that being a STEM major makes attending college useful. For example, Carioca mentioned, "Nothing you are learning is worthless, even if you think it's worthless. Like, think of it from the angle that it's improving your ability to retain knowledge." For example, Carioca, Bauta, and Tico believed that as STEM majors they "keep on learning all the time." All participants found that their degrees are valuable and, in the long run, they hope to gain economic rewards.

For example, Avila, Bauta, and Carioca saw the value of getting a degree in STEM as important for getting a competitive job and "good monetary incentives during their lifetimes," as Bauta put it. However, Nicaragua explained that getting a degree provides him with financial stability and the ability to help his family "back home" and in Florida economically:

> Well, the [STEM degree is] going to help me because from where I came from [Nicaragua], there is a lot of poverty; there are a lot of troubles that nobody can go through, and I found the opportunity here that will help me to build my success as a motivation to succeed and complete my goals "[pause]." My mom, my uncles, my aunts, and my grandparents, none of them have a college degree or anything above from high school [pause]. Because of economic reasons that they used to live in my country, they couldn't go more [to school]; they didn't have the resources that I have right now.

For participants who are first generation students like Salvadora, Nicaragua, and Tico, the meaning of earning a STEM degree was also to make their family proud. For example, Tico stated, "Because my mom, she couldn't even finish that [degree] 'cause she had me. She only got partially to the nursing degree." Overall, the participants believed that in being STEM majors, they felt intellectually challenged, gave pride to their families, their degrees will be valuable, and, in the long run, would have more economic incentives in the future.

Mentoring Means Support

The participants gave their views of the support they received through their mentorship experiences. They appreciated the interactions they had with their mentors, and these interactions made a difference in the type of support they sought or expected from their mentoring relationship. This theme has two subthemes. First, the participants generally indicated that they sought and received academic support mostly from their

formal mentors; that is, the mentors assigned to them as part of the Mentoring Program. But they sought interpersonal support from informal mentors; that is, faculty not formally involved in the Mentoring Program. I will discuss each of these subthemes in turn.

Academic Support

For the participants, the most important aspect of the Mentoring Program was the academic support they received from their faculty mentors. The types of academic support the participants mentioned as most important related to reinforcement to stay in the major, program support, and career development. I discuss each of these in turn.

Reinforcement.

The most important kind of academic support for the participants was the fact that their faculty mentors reinforced their decisions to stay in their majors, sometimes merely by serving as role models and by explicit reinforcement. Many students leave the STEM fields because of a lack of motivation, college readiness, or support (Crisp et al., 2009; Excelencia, 2011; Hagedorn & Purnamasari, 2012). I asked the participants to talk about this. Chile, for example, shared that her mentor's influence was a substantial reason why she stayed in the STEM track: "I do feel like it's a very big part. My mentoring is a very big part of, like, staying in the STEM field."

Not all participants felt this way, however. Carioca and Avila believed that their mentor's influence was not significant, and that they would have remained as a STEM major regardless. Carioca indicated that perhaps views like his related to the age and maturity level of students:

> I think maybe when you are 18, and you have no idea what you are doing, or anything like that, [mentoring] could be useful. And I don't think it's [because of

the mentoring program or] anything. I knew what I wanted, and I didn't need someone to help me find what I wanted.

Carioca explained that he feels because he is 24-years old, and because of this his mentor did not have much of influence on him in relation to staying in his STEM major. Avila also stated that he did not need any encouragement from his mentor to stay in the STEM track, but he also believed that a faculty mentor could be influential to first-year mentees:

> A mentor could help students stay in the field, but I feel we [second-year students in the Program] have been here [already] for a year. I guess if you have not quit already, you will pretty much stay. So that's not that big of a problem in that sense.

Avila believed once the students make it to the second year, they "would not have the urge to leave anyway." It seems that both Carioca and Avila understand the value of mentoring in terms of the maturity of the student, but do also think that the mentoring of first-year students is important.

For the most part, however, the rest of the participants found their mentoring experience important for reinforcing their decisions to stay in their majors. Salvadora, for example, described that the fact that her mentor shared personal accomplishments and failures with her was a learning experience:

> It was a learning experience because even though she did work within the computer industry [she was a statistician], it wasn't like there … no connection … to [my field], so it was, like, okay… It was, like, a learning experience for me because, like, I got to learn what did she did. Like, what were her steps [in her profession], what were her accomplishments, what were her failures, and it was, like, it was a learning experience on both ends.

Salvadora believed that her mentorship helped her to determine she was in the correct career path and inspired her to continue towards her career goal. Salvadora also stated that she felt that she had such good influence from her mentor that she is likely to return

and visit after she has finished the Mentoring Program: "I will continue visiting her because she's my instructor for this semester, but even after the Program is over [I will continue to visit her]… She's done so much to help me both academically and emotionally."

Six of the 11 participants indicated that they felt at times that they were not "on target" or were falling behind in their programs. The reminders sent by their mentors and their mentors' reinforcement of the importance of the goals they established helped them stay on track. For example, Nicaragua explained that his GPA had dropped dramatically due to personal matters, and thanks to his mentor's persuasion and reinforcement, he was able to increase his GPA. This led him to develop a closer relationship of trust with his mentor. Nicaragua described how his mentor always tried to put himself into his situation, and told him what he did when he was a student:

> He will say something like, 'Oh, what is your hardest class right now? Why do you think this?' You know, like, stuff--things that will get us to try to have a conversation, or [he'll] try to relate some stuff, like, you go talk about some of his classes that were hard when he was in college, and how he [dealt with] them and the whole experience.

Nine of the participants indicated that reinforcement from their mentor pushed them into getting things done in ways that connected academics and life experiences. Madrid echoed this feeling when she stated, "I would say, like, he coached me to do better. To try different things, and he gave me some opportunities. Like someone that puts you to do something that you felt like you were not capable of." Bauta described his advising experience with his mentor as "going to a priest," in which you came in for your mentoring session with a sense of no direction:

Have you ever felt that way? That you go to someone that--in the end the person didn't do anything for you; the person just listened to you, saying, you'll be all right. It's like going to, like, a priest. You just confess what's wrong with you, and you leave a little, you know, clearer with yourself.

Bauta further explained that at the end of that meeting, "you knew exactly what the next steps to be taken were and what needed to be done." Chile similarly described that "feeling welcome" and having a mentor who is a good teacher made all the difference for her:

With my mentor, I can ask him anything. Why? Because the way he treats me. He welcomes me, and stuff, like, that makes a lot of difference. And I see that--you know what I mean? He's a good mentor. He's good at teaching others and promoting, like, you can come to me whenever you need something.

Reinforcement was particularly important because the participants indicated that studying sciences in the beginning of their college journeys was very difficult for them. They believed that the sciences require critical thinking and learning approaches that they felt they learned from their mentors. Madrid referred to a story of how her mentor helped her friend stay in the STEM field even though her friend was convinced of changing her major to culinary arts:

So, she was, like, I'm going to change my major to culinary arts, and that mentor was, like, "Why? Like, give me the reasons… Let's find another way so you can study or come to my office, and after class we are going to do problems. Let's find the best way you can study." He gave her the truth. "Like, okay, you are not doing well because of this. Change it. Then we can talk, and then you can change you major or whatever but stick to your path."

Moreover, because Rola and Cachaca believed that being a woman in STEM fields was a challenge, and that they were always fighting "against all odds," reinforcement had particular importance to them. They explained how their common

faculty mentor said that such challenges were not only felt in the classroom but also in

other Mentoring Program activities, such as science forums and fairs. Cachaca said:

> [My mentor' was like, "You know what it's like in STEM. Many times, you are going to encounter people who will make your life hard because you're a girl, and because you are from a different culture, and because you are in STEM, so be strong and just keep up because you are smart. You can make it."

Overall, according to the participants, the mentor's reinforcement was a key factor for

them to stay in STEM majors and, thereby, stay on track. Their mentors' support and

reinforcement gave them a sense of "not feeling alone" in their career journeys.

Program Support.

According to 9 out of 11 participants, reinforcement to stay in the major was

crucial, but almost as important to them was the mentoring necessary to complete their

studies. For instance, Tico said that he only visits his faculty mentor to discuss matters

that relate to the Mentoring Program and academics:

> I would normally speak to him when it's academic-related. I want to keep our conversations mostly in that spectrum… [I go to him] When it has to be something regarding maybe the program… or something school related.

Nicaragua also explained that thanks to his mentor he could obtain academic support and

information about available resources:

> It always helped me to have somebody to support me and… when you are struggling in classes you can ask that person what can I do… or who are my resources. What can I use to improve my abilities to perform better in the class or taking the test... or if I need help writing an essay. I know where to go to [g et help].

The mentors provided the participants with good study habits. For example,

Salvadora described how her mentor helped her understand how things should be

prioritized:

> I just remember what [my mentor]… mentioned to me about, like, the time management. She had mentioned to me that I would have to separate things into important, not important, what's a priority, and what's not a priority. And so, something that is important and is a priority goes at the top of the list, and then if it's not as important, it's not a priority.

Bauta appreciated also the time-management skills he obtained from his mentoring. He claimed that the experience he gained not only helped him with his grades but also was the "key" to the completion of his application process to the schools he is applying for transfer:

> I go to [my faculty mentor] for advice on overall everything, and an example of that would be how to manage my time when it comes to applying to schools and all that. So, by having that time managed, like the time I have to spend on my applications, I have time left to study for school, and if I didn't have the time I wouldn't have the grades that I have. So, indirectly, [my faculty mentor] is the reason why I have my grades right now.

So, in addition to Salvadora and Bauta, Madrid, Tico, and Nicaragua stated that study skills gained from their mentor involved dealing with test-anxiety, acquiring note taking techniques, and other strategies to help them stay on task.

But advising for grade improvement or passing classes was not as most important to the participants as what courses needed to be completed each term. For example, Camaguey, who has a full-time job, stated that her mentor guided her on how to balance her work requirements with her academics: "He helped me by advising me how I should schedule my work; how I should organize my schedule for school; what things I should take right off my list; so, and that's why I stick to him [faculty mentor]." Cachaca, who also has a job, felt that her mentor was very helpful in advising her on how to balance her course level expectations and work: "So he pretty much told me, if you will take these classes and then work, it's going to be too much for you." Thus, receiving advisement

related to balancing work and a school schedule was beneficial to the participants who were employed and went to school full-time.

The reason course scheduling and balancing work/school obligations were important were because doing this well meant that the students would be to graduate and transfer to a 4-year institution. And when this did not happen, the mentoring experience became less important. Two participants expressed that their mentor lacked important information for the transfer process to a 4-year institution. Cachaca, for instance, did not see a benefit to visiting her faculty mentor because "even if I have a question about, like, if one class is going to be transferable, or whatever about my transfer or about the class, he won't be able to give me the information I need." Rola was actually indignant about this matter:

> They need just to be, like, a little bit more prepared if they know they are going to be mentoring someone who is going to be in certain major or science or certain something. Just read a little bit before; have an idea of what's going to go on; and, like, be really honest. If they don't know, it's not a problem. Just, like, "Hey, I'm not completely sure about all the details, but we can try to figure it out together"…We [mentees] are just asking for someone who is going to be, like, "Hey, hey buddy. This is what you are going to do. Okay? Let's make sure that that's the right thing you want to do, and then let's make sure you get everything ready to do what you want to do." Like, let's try to walk through it.

Rola was referring specifically in this quote to the transfer process; she did not believe that her mentor did enough to investigate the transfer process, and she did not find her experience entirely beneficial because the lack of preparation on her mentor's part would delay her graduation.

However, 7 other participants expressed they felt otherwise. For example, Bauta described how his mentor encouraged him during the transfer process and helped him especially with his essay:

We were just looking at my essays, and he said that he really liked them, and that was partly because of him because he helped me to get them done. And then after that he told me that he wanted for me to send in, like, the final copy to him so that he could use it as an example for one of his workshops that he is doing on the [transfer] application.

Madrid also believed that her mentorship helped her to "stay on task and complete all the transfer process documentation and essays."

They also all shared that one of the benefits of the Mentoring Program was the opportunity to get recommendation letters from their faculty mentors, which would help them with the application to 4-year institutions. For example, Bauta indicated that not only did he see this an advantage of the Program, but it also pushed him to visit his faculty mentor more often, which in turn got them to feel closer. Nine of the eleven participants were satisfied with the knowledge their faculty mentors had about the transfer process, as well as the courses they had to fulfill before graduation. For instance, Salvadora and Tico wanted to study out of state, and even though their faculty mentors did not share their same career background the mentors helped them clearly distinguish the difference between the transitions to an out-of-state versus an in-state university.

Career Development.

All the participants discussed how much of their meetings with their faculty mentors concerned career development.

Cachaca described how once when she got concerned about making the right career choice; her faculty mentor helped her to decide if she was in the correct path:

[My mentor said,] 'Hey sit down, like, think about it. Is this really what you want? I mean if you want [this career], okay, go to it, but, like, try to like see what is going to be your future around that career… You are going to be doing really cool stuff, but, like just make sure that you really like it, that you really love it, and I think that's really important because, like, STEM is going to require a lot of

work"… So, like, [he] was making sure that that was something that I really liked. Because every question he asked just made me realize, like, Hey, I really like this. Like, honestly, I do like it.

It was not that Cachaca believed that her mentor gave her the answers about her future career path; it was that the faculty mentor who helped her think critically about her professional doubts.

One way that the participants believed their faculty mentors helped them with their career development as by engaging them in research. One clear benefit of engaging in research with their mentors was that the Mentoring Program gave two of the mentees a stipend. But more important to them was how engaging in research was a kind of career development. The two participants receiving stipends said that they found the program beneficial because they got to do research and could present their results in science conferences. At these conferences, they networked with individuals from other institutions who were members of the scientific community, and this could help them with transferring or future employment. So, research involvement was an important asset to the participants in terms of enhancing their resumes.

This was the case for Chile and Madrid, who both had different faculty mentors. Chile felt that having the opportunity to share time with her mentor during research made her feel they got closer professionally, and that they developed a friendlier relationship:

> I never had a relationship like that with someone, like, mentor-student relationship, and I think that it's very strong… He gives me something, and I give him something in return; he gives me knowledge, and I give him, like, good work and good research in return and, like, good presentations. And, you know, he shows me that he wants to--how do you say--he's kind of, like, investing in me, and I'm showing him, like, yes, your investment is doing very good…. He appreciates a lot that I went out of my way, and I just dedicated this whole thing to getting everything done, and, good, we are moving on.

Similarly, Madrid, appreciated this research experience, especially since she was aware that most students do not have this opportunity at the associate-degree level:

> I really liked the research experience, especially where I'm working, and where I did research with [mentor], because usually undergraduate students don't have access to research where they can, you know, do things that--you know, hands on research, and I have been able to do that. I got to be able to work next to faculty… They know how research works, and they teach you, so I really liked that experience.

Both Chile and Madrid indicated that the research-assistant experience gave them hands-on experience directly from an expert of the field in they are interested.

The Mentoring Program's STEM Center was important for the participants in terms of networking. As Bauta indicated:

> It's useful for networking 'cause then you start meeting the others, you know, STEM people"… It has provided me with contacts of students that have already graduated from here, and then from there transferring to [4-year] institutions. And I've gotten to talk to those students, and I really like what they are doing.

Nine of the participants enjoyed having a place such as the STEM center because, as Salvadora said, "It was a place where they can meet with other members of the Program." For the participants, a crucial aspect of the Mentoring Program is the career opportunities it afforded its students.

Interpersonal Support

A significant meaning of mentorship for the participants was interpersonal support, such as advising related to personal matters. For example, Bauta observed, "It is easier to talk to your mentor… as when you have a friend that you can connect very well, and it's very natural to talk to a friend." Camaguey indicated that her mentor's interactions motivated her to "Make the time to connect and talk to another human being,

exchange ideas, and worry a little bit about something else." Avila, Nicaragua, and

Madrid believed that sharing personal struggles helped them to make better connections

with their faculty mentors and student mentees. These three students felt that when a

mentor and a mentee have experienced similar academic or personal struggles, the

connection between them becomes stronger, and the relationships could become more

personal as in friendship. But here the participants were referring to mentoring in general,

and not specifically to the Mentoring Program.

Indeed, 9 of the participants found it uncomfortable talking about personal matters

with their formal mentors. Carioca reported that he found it unprofessional, and that

personal issues should be dealt privately: "I don't believe that my emotions should be

discussed… I have a professional relationship with them; I don't need to talk to them

about their problems. My problems are my problems; their problems are their problems."

Tico had a similar opinion:

> I haven't talked to him about, like, most of my personal problems. I think that
> goes against the Program itself … You should connect to your mentor, definitely,
> but I think some of the more personal topics should be kept for other situations.
> Like, I think I wouldn't like my mentor to carry the weight of, like, my problems
> as well.

Tico implied that is unnecessary to reveal personal matters to his faculty mentor. In other

words, he felt that it was unnecessary to give the mentor "more problems."

But it is not correct to say that the participants refused to talk about personal

matters with their faculty mentors; it is more accurate to say that they felt uncomfortable

doing so. It was clear to me that a participant indicated talking about personal matters

with their faculty mentors, even though she was not aware of it. For example, while Rola

stated that she did not like to get personal or emotional in her mentoring sessions, she

seemed to have to have gotten personal when she spoke about her academic stress with her faculty mentor: "Not really personal stuff; but sometimes [I do get emotional], mainly when I'm on my final; I'm, like, freaking out. [My mentor], like, tells me, 'calm down, chill, study and you are going to make it.'

Salvadora and Nicaragua who both had different mentors, also expressed to me that they shared private matters with their formal mentors. Nicaragua said that he felt so close to his faculty mentor that he even discussed his immigration status with him, as well as the stress that status brings to his family. Nicaragua stated that "there was no option for [mom] to be here in the U.S., but she helped me… She told me that I just need to visit like a lawyer so I won't be ignorant about it." Furthermore, Nicaragua shared that the personal support he got from his mentor was a positive factor to his dealing with stress management and finding solutions to his personal problems:

> She really advises me, make me feel not so worried that I have to stress too much because it just messes up my head, like my brains…so she kind of helped me relive the stress… a solution that I should try, "like you should do this, maybe you should do that… and maybe if it works then you should keep doing it" to improve myself.

Salvadora also said that while her mentor and she talk mostly about academic issues, she felt at ease discussing personal matters with her:

> Like, she is always there. I told her about family problems that have happened, and she sort of, like, walked me through it. I would have to say, like, one of the key moments was from, like, last semester where I had an anxiety attack. What I mean is that she helps me emotionally, mostly dealing with the panic attack.

Salvadora shared during her interview that she has gone as far as discussing family and health issues, such as panic attacks, with her mentor, and her mentor helped her

overcome these problems with stress management techniques. Salvadora even felt that her "mentor is someone I can trust personally."

Tico expressed that when he was in high school he considered himself as an antisocial child, but that the Mentoring Program helped him with his personality:

> So, what I've gotten out of the program so far is a lot of [conversation] experience. A lot of, you know, … my mentor leads the conversation, and he keeps, like, kind of teaching me how to lead a conversation with someone. Like how do you approach someone, how do you keep in contact… [how do you] become active or something. So, you know, [how to apply these tips] through conversations and, like, any icebreaker, basically.

According to Tico, being in the Mentoring Program and getting help from his mentor enhanced his communication skills and helped develop self-esteem, something which he considered as personal support. Tico also said his faculty mentor spoke with him many times and told him how college was about "changing yourself and becoming who you truly are," about the need to be on "your own, preferably out-of-state," and about the need to "develop your character." Tico began college without any idea of what to expect, and thanks to his mentor, he could build on his character and personal goals. Tico even said the relationship with his mentor was more than "just a mentor-mentee relationship; I consider him my friend."

Tico was referring to his formal mentor. Yet, 8 of the participants sought interpersonal advising with mentors they chose voluntarily (i.e., informal mentors). That is, for the most part, the participants looked for interpersonal support from mentors who were not officially part of the Mentoring Program. For example, Carioca shared that just being near to his informal mentor was "truly inspiring." He stated:

I've never seen someone so passionate about something in my life. So, the relationship with him--it's not like we are best friends or anything like that--but just being able to be near him has been kind of an inspiration in a way.

Carioca felt that he was always talking to a "savant." He went further and described how his informal mentor influenced him to recognize what field was of interest to him and of the need to pursue a Ph.D.:

He made me realize that there's something that I'm missing in my life, and, like, how I distract myself with idle "BS" that doesn't have any meaning, like, video games and being with friends. But there has to be some sort of purpose that I'm really good with. I have a rare set of skills, I would say. And I just need to find what I [want] to [do]. He made me realize that. I'm considering doing a Ph.D., almost solely because of speaking to him.

Other than Nicaragua, Salvadora, and Tico, the participants indicated that they felt more comfortable talking about personal issues with informal mentors who they visited on a more voluntary and frequent basis than with their faculty mentors. For example, Madrid stated:

I feel like it's easy to talk to [my informal mentor], and he's always going to have an answer to anything I ask him. So, … he gives you another point of view, so that … if you ask him a question like, 'Oh, should I do this?' He's going to give you his answer. You need a mentor that will give you the truth. [It's] like I have a friend.

Similarly, Tico indicated that:

It's not an environment in which you have to be super formal with him. It's more open, and from both parts. So, I'd say, definitely, I could contact him after and see … if I need some help; you know, get information from me, get some help, get some tips on how to survive as I move forward 'cause, definitely, someone who has gone through the process knows what it is to leave home, you know, and leave home, and be on your own. Survive basically.

As Rola explained:

Recently I had a problem in one of my classes, not STEM related. It was, like, a required course. So, I was not doing as well as I like to do. I was kind of mad at myself and mad at the class, and I wanted to drop the class and everything. I went

to him, and I complain about what was going on, and he told me, like, 'Oh, you're going to be fine. You always do good, I've known you for this long, and you know, you can overcome [this]. That's not a problem for you.' So, that's giving you strength, I guess.

Generally, according to all of the participants, the ability to "open-up" and discuss personal matters had much to do with the personalities of the mentor and mentee, shared experiences, and, most importantly, as Madrid stated, "the ability to make the connection." But it seems that most of the participants felt that interpersonal support was received from an informal rather than the assigned mentor.

To sum up this major theme on mentoring meaning support, the participants described the Mentoring Program as making a difference in their collegiate life by reinforcing the need to stay in the STEM field, by providing program support, and by giving them career-development. They also pointed to the importance of interpersonal support, which for some was found in the Program, but for most of them such support was found with informal mentors.

Career Matching Between Mentors and Mentees

The faculty mentor's career field was important to the participants, shaping how much they valued the mentoring they received. Some of the participants believed that mentorship was more effective when the mentor and mentee shared the same field. For instance, because he and his mentor did not share the same career background, Carioca did not believe his mentor was "a good match" for him. He went on: "Again, not to discredit [my faculty mentor's] actions; it has nothing to do with that. [My mentor is in] an unrelated field, you know, [we're] different people." Carioca believed that since his mentor was in environmental science and his was engineering, they could not develop a

personal relationship, and so they did not have much to talk about other than the

"monthly-checklist visit" routine. Madrid echoed Carioca's sentiments:

> I think mentoring is essential because you have someone that can guide you
> through, and sometimes when you are stuck that person can help… But with my
> mentor…if she had something that I would be interested in, [I] would probably
> connect more. But since she didn't have her career, wasn't something I was
> interested in, I wouldn't ask her anything related to that, and there will be less
> conversation…Probably someone else who got a different mentor and--I don't
> know--they connected better; they got a better experience. But for me it wasn't,
> like, something I would talk about [with my mentor], you know.

Rola and Cachaca also concurred that they felt the need to share the same career

background with their mentor, and they would rather visit other faculty members who

have careers associated with their STEM paths.

The four participants who believed that the lack of a match in career backgrounds

was a problem of the Program also indicated that the flaw starts with the selection

process, when the mentees are paired with their mentor. These participants suggested that

the solution to the problem could be in allowing the mentee to choose his or her faculty

mentor. For example, Carioca stated that if the mentee could pick a mentor, it would lead

to a better mentoring experience. He stated, "I mean, the selection process on the

mentors, you know, like, who gets to what professor, maybe [if I had someone] a little

more in my field, I would have been more interested." Rola similarly felt that not being

able to choose her mentor was a flaw in the system, and she indicated that having a

mentor not share the same career background as the mentee could lead to improper

advisement and delay the graduation of the student. She said about her mentor: "He's not

a biochemist; he's not an engineer; he's not in this specific major; so, he doesn't have,

like, the accurate information and the accurate path to lead every single person under every single major."

As Madrid explained, mentoring can be positive, but the connection made with a mentor is essential: "I think it works, but you have to find the right mentor, and you have to connect with that person. If you don't connect with the person, there's no point in mentoring… Nothing is going to come out." Madrid did add that the personality of the mentor has a strong influence on the mentor-mentee relationship, but more important was having a mentor related to the same career path.

The rest of the participants, however, did not find the mentor's career background all that important. Nicaragua, for example, did not have the same career background as his faculty mentor, but he did not think it "makes much of a difference." As Nicaragua stated, "What matters is the knowledge, not the same career background." Even though his mentor was not in his field of engineering, he appreciated the mentor's life experiences. Nicaragua also felt that it was important that he identified with his mentor's personal background because his mentor was also a first-generation student who went through similar struggles as he was: "So, we kind of relate in the sense that we are here to have a better life, and whatever decision her [his mentor's] parents took, good or bad, whatever consequence, it was for a better life and better opportunities." Chile also realized that the faculty mentor professional background "turned out to be later on insignificant," even though she initially thought that having a different STEM background was going to be a problem.

In the end, when asked to think about what they really valued, for most of the participants what was more important than career match was the "connection" they made with their mentors. Camaguey said:

> To me, it's more about the connection... [It's] more about the connection, like, if the professor or the mentor know how to approach the student, how to word it, how to keep them motivated… or in other words, [it's about] having a "good chemistry" in the mentor-mentee relationship.

Even when they had mentors who did not share their fields of study, the participants were satisfied with the mentoring experience. Most participants felt that the motivation, the confidence, and the interpersonal relationship they got from their faculty mentor were important. For example, even Carioca, who felt strongly about matching the career of the mentor and mentee, said:

> I don't know exactly what the biggest thing would be, I mean, I really like that maybe it was just reinforcing ideals I had deep down in myself that I didn't realize I had, you know. That might have been it. Like, it helped me become more confident…I guess a confidence boost is a pretty useful thing that came out of it.

Required Number of Meetings and Events

While all of the participants appreciated that mentors had an "open door" policy, Carioca, Camaguey, Avila, and Bauta found it inconvenient to meet with their faculty mentors or first-year mentees on a monthly basis because of conflicts in their schedules. They believed this requirement was time consuming. As Camaguey said, "It is not that everyone did not want to meet; it is just that either party was busy with his or her academics or jobs." Bauta stated that even though they enjoyed meeting their faculty mentor, they went to see them because they were "forced to" do so. He expressed that while he does not mind going a few times during the semester, going every month was very time consuming and took away time from his main academic priorities.

Nevertheless, Bauta also stated that since the Mentoring Program pushes the

mentees to visit their faculty mentor at least once a month, this turned out to be very

beneficial for his academic outcomes:

> It [the Mentoring Program contract] forces you to go to someone and ask for help. Sometimes it can be scary to approach someone and say, "Hey, I need help with this and with that." And so, I guess the program is kind of, like, what pushes you look for someone to help you, and that could be very, very beneficial to you.

What appears to be a contradictory position for Bauta are not really so. One can

distinguish in the participants the idea of having to meet with the mentors on a regular

basis, which is beneficial for the reasons Bauta stated, with the reality of having to do so

given their other commitments.

Indeed, Tico did not see mandatory meetings as necessary only because of a

contract but rather as a commitment:

> I think definitely my experience has been positive for the most part, you know, coming to my mentor, learning from him, "[pause]" being, like, trying to improve, trying to, like, show him that I care, and that I am trying to be the best possible person myself. But at the same time, I feel that, you know, there should be commitment… It's definitely a Program that you have to take seriously. Like, if you want to be part of it, you should definitely like taking the time for it.

Like Tico, Salvadora did not regard the office visits to her mentor as time consuming and

went to see her mentor at least twice per month:

> I think it's because it's just pure talking for 45 minutes…that's why there's, like, an emotional bond between us. Because it's not, like, okay, we are just sitting in a room for 30 minutes of silence, and then, like, maybe [there's] 15 minutes [of talking]. No, it's like constant back and forth talking, sort of like a conversation that I would have with a friend. Like, I would always spend hours talking with a friend, so it felt like talking to a friend. I'm still going to visit her over the summer, even though it was not required of me.

Salvadora also said that she would have liked to "get out of the office and be more in open area environment." She felt that meeting her mentor outside the office would break the monthly meeting routine, and the relationship would be even more rewarding.

Still, 6 of the participants indicated that it is difficult for them to keep up the required schedule with their faculty mentors or first-year mentees. Carioca and Tico stated that there were other modes of communications that could work just as well, such as Messenger, Facetime, or Skype. Tico, for example made the time to visit his mentor at least twice a month, but he used electronic modes of communication to do so:

> My mentor was in Ecuador doing some research throughout my first semester, so I wasn't able to see him. We had calls through Skype, through Google Talks, and all this stuff. So, we were in contact, but we weren't, like, knowing each other [enough]. So once [my mentor returned] he was, like, "Okay, we are going to meet up in my office."

Tico's comments suggest that the required face-to-face meetings need not be the only way mentors and mentees need to meet. Skype, Google Talks, or other forms of electronic communications can also work.

Unlike the required monthly meetings, however, the participants did not necessarily find attendance at other events wasteful. The Mentoring Program offers an array of events such as science fairs, forums, and field trips in which students are expected to participate. The purpose of these events is for STEM students to engage with the scientific community. While the participants felt these events were important, Carioca and Tico indicated that the Mentoring Program could have done a better job in selecting the individuals who came to give seminars or the topics that were chosen for some sessions. Also, Avila stated that he did not appreciate the experience because of

other obligations. Nicaragua also complained that attending these events was an

inconvenience because doing so would take away time from his studies:

> It's hard to be more active on STEM related activities, you know… [We have] busy schedules, so it's kind of sometimes really difficult to fit in that seminar. The [students in the Program] are already busy with their academics and other stuff, and sometimes they find the program, you know, kind of an extra obligation they have to do. [Also,] there is not a lot of commitment from [for] some students.

Bauta echoed this feeling and stated that the inconvenience was especially when he had

to attend events that were scheduled around final exams.

However, the rest of participants felt the events provided a benefit because they

were exposed to scientific projects, and it gave them the opportunity to network and

interact with the scientific community. Chile, for example, saw these gatherings as an

opportunity for networking and as chance to contact alum with which she had lost

communication. Tico believed that activities relating to their fields would bring the

Mentoring Program members closer and enhance the sense of being a team:

> So, I think [what's beneficial is] maybe a field trip, maybe an activity, maybe a presenter, something that, you know, makes us [go away from everyday routine], or something that makes us relate, I would say. At the end of the day, I think the important thing is that we all have to understand that we are all [in] STEM, and we are all on the same field, and there is stuff that we all go to together.

Salvadora similarly expressed seeing the fieldtrips and activities as positive factors in

forming a "STEM community:"

> I wish there was, like, more events for me as a mentee to [interact more with] my faculty mentor. [I] think one comment that I would have to say is that I really did enjoy this Program. Like, I am enjoying it as [it's] still continuing on. It has been a great experience because of the bonds that I've made with both my faculty mentor and with my [first-year] mentees, and that it has had, like, an impact … I've impacted people's lives [i.e., her first-year mentees] and, like, my life as well as been impacted because of this Program.

Tico and Salvadora expressed that they would have liked more meetings with their first-year mentees, more forums, and more specialized field trips in which they could be exposed to hands-on scientific inquiry.

While some participants found the Program's activities to be inconvenient, others believed these activities to be necessary and valuable. For Salvadora and Tico the events proved to them that they were in their correct fields. Additionally, as Bauta said, while activities "forced" the participants to become engaged, they also provided them with opportunities to create networks and connections with a variety of people.

Importance of the Peer-Mentoring Experience

The participants were each given the responsibility of mentoring two first-year mentees to help them get through the first year. Eight of the 11 participants expressed that being a peer mentor provided them positive outcomes, such as leadership skills and responsibility towards others. Madrid, for example, felt proud that her mentees looked up to her.

Carioca, in particular, felt that his peer-mentor role gave him the opportunity to counsel "younger students" so that they do not make the mistakes he made. Carioca stated that being a peer mentor was one of the best things he ever did. He believed he benefitted from peer mentoring because he was older than his first-year mentees and thus had more wisdom. He even said that he got more out of his first-year mentees than he did from his faculty mentor. For him, being able to see himself as a role model and to listen to himself while coaching his mentees "served as self-reflection" on what he needed to do to keep himself on track. Carioca said, "I've been giving them only my best advice. I'm hearing myself rationalizing my own best advice, which was really damn helpful.

But, yeah, the with the mentees, usually what I would tell them is suggestions on professors and stuff like that."

Salvadora said she enjoyed meeting with her mentees, and the most important thing is to "create a bond on the very first day at the beginning of the academic year." Salvadora expressed that she learned her mentoring style from her faculty mentor, which was essential in order to be able to advise and share different academic positive attitudes with her mentees:

> Like, how my mentor would talk to me, and that's what I would do to my mentees…so I try to sort of mimic that [way of talking] when I [tutor] at the STEM center…. I guess that, like, the experience that my mentees [had with me] was a good one, and they wanted me as their peer mentor.

According to Salvadora, the leadership experience she gained also was essential in order to be able to advise and share different academic advice with her mentees.

Tico also shared his thoughts on peer mentoring. He liked that he could connect with his peer mentees. He called this "a win-win situation, where the peer mentees get to learn from the more experienced second-year peer mentors, who have learned from their faculty mentor." He saw this relationship as an opportunity to help the first-year students become aware of all the available resources they can get out of the Mentoring Program.

Not all of the participants found that the peer mentoring experiences met their expectations, mostly because it was too time consuming and not all their mentees took the experience seriously. For example, Camaguey indicated that she became very frustrated because her first-year mentees did not care: "I was always texting them, and they were not really there. They didn't really care…. I wish I could have shared more with them, but, I don't know, they weren't cooperative." Avila did find the experience

valuable: "I don't see it as that valuable of an experience anymore. Yes, I do get to know my mentees; I get to help them out; but, I don't know, it's like being tired…. I don't really find that much joy in it anymore.

Avila's views seemed to result from having to deal with competing demands. Similarly, while Madrid enjoyed the peer mentor experience, she found it difficult because it was too big a responsibility:

> It was hard in the sense that I had to try to be a [role] model… And, also, they look at me, and they are, like, "Oh I want to do as good as she is doing. I want to be like her or something like that." So, it was hard in that sense. Even though, like, the program is over, like, the semester, I keep in contact with one of my mentees, and so she's always talked to me about her problems and all that.

The relationship the participants had with their first-year mentees depended on the age of both mentors and mentees and on the willingness of both parties to agree on a time to meet. Bauta and Madrid believed that because they were young, they were not taken seriously as peer mentors. For example, Bauta said that because of his age it was hard to draw the line between mentorship and friendship:

> I needed to balance the sense of being a mentor, somebody that's above them, with also being someone that can connect with them 'cause, you know, I'm also 19, and so are they. So, I had to like to learn how to balance those two things: friendship and mentorship.

The participants who were younger or as young as their peer mentees perhaps felt the age difference was a problem. But for the older participants, age did not matter for whether or not, the peer-mentoring experience was important. Carioca, for example, who was older than his mentees by six years, believed that his peer mentoring was effective because his mentees appreciated "his life experiences." Other participants were older than their mentees, and age did not seem to be significant to them either. For instance, Camaguey,

who is 27-years-old, said that her problem with the peer-mentoring requirement had to

with the fact that her mentees did not listen or kept up with their appointments:

> I need to still learn how to approach the students… I don't think I gained their trust. Maybe I didn't work enough, but they weren't giving me feedback. They weren't collaborating. I'm sure they were very busy as well with the school schedule; that's the excuse they were giving me. [For the] majority of times, because I did text them, sometimes I feel like I was being a little too pushy.

She expressed in the second interview that perhaps her problem with her mentees is that

she might have been approaching the situation appropriately, and that she could have a

done a better job with her peer mentees.

More problematic for the participants was trying to schedule times to meet with

their mentees. Carioca, for example, pointed to the difficulty the participants had in

meeting with their mentees:

> One of my mentees had a complete opposite schedule from me, so sadly I didn't get to see her too much. Luckily for me, both of my mentees were very competent people. They very much cared about what they were doing. I don't know, it was a pretty good experience…. I mean, sometimes the program is a bit time consuming, like, you know, it's very easy to forget about something that you do once a month versus something that you do once a week, and aside from that we didn't all have too much of an incredibly personal relationship. Like, they wouldn't be texting me all the time like some of the other mentors had, but whenever they needed something [they did].

The participants believed the required meetings with their mentees were time

consuming. A couple of students believed that this requirement, and the reports that they

had to submit, were "overwhelming and unnecessary, so much so that Avila and Bauta

indicated they were not enjoying this experience. Camaguey offered some advice on how

to remedy the logistical problems of meeting with their mentees. Referring to the

Program's opening ceremony each year, she said: Everyone has to be there in the

beginning of the ceremony… It's nice to meet your faculty members [and the first-year

mentees]. That's very important as well for us." Camaguey indicated, however, that the Program did not reinforce this outside of the opening ceremony, and this made it difficult to create a social bond with their mentees during the rest of the semester.

Despite the logistical problems associated with mentoring other students, 9 of the participants felt that the social interaction with their mentees was a positive experience. Nicaragua, for example, expressed that he enjoyed the leadership skills he was learning as well as being a role model for his mentees:

> I'm struggling right now, and I'm helping other people become better too. So, I lead people too. I have [gotten] advice from my faculty mentor, and that helped me in my classes and also in building my character as leadership… Also, I get to help my mentees. Also, this brings me a lot of confidence because I talk to them [about] how they can solve their problems too.

Generally, the participants were glad to contribute to their mentees' academic success by helping them with their struggles.

Salvadora believed that being having mentees and being with other STEM peers keep students like her away from "the wrong people:"

> I think it's just the support from other peers, and how, I guess, it's just within the group, like, sort of a group dynamic… Because if you are with the wrong people, then most of the time you won't be getting the support that you would need. But since I spend most of the time with, like, STEM students…it's like a "one on one," like, supporting each other.

Cachaca similarly stated, "They can follow their peer mentor's path… as far as the courses they need to be taking… She's [first-year mentee] is always keeping in contact with me… and asking how am I doing with my classes." Nine of the participants formed strong bonds with their mentees. Salvadora even said that working with her mentees was "like they are, like, now family to me." Overall, the participants expressed that the

leadership skills, advising, and role modeling they learned from the peer mentoring experience was a positive outcome of the Program.

Importance of Family Support

Perhaps more important to the participants than a formal mentor was the family support they had. Their families supported them by serving as role models because of their professional backgrounds, as well as by giving them financial, emotional, and academic support. Even though 5 of the participants had a part-time or full-time job, their family's monetary support helped them dedicate time to their education.

Bauta shared that he was grateful to his parents for their support, not only financially but also for bringing him to United States to get an education:

> My parents are very supportive. I mean, the reason that I am here is because of them. If it weren't for them I wouldn't have left Cuba. If it wasn't for them, I wouldn't be in college; I wouldn't have the food and the shelter, and everything that I need to study. They are very supportive of me.

All the participants stated they received encouragement to pursue their college degrees. Nicaragua stated that his family supports "me emotionally…like, when I'm struggling in my classes… They push me by telling me 'you going to do this, you a great kid'" For Nicaragua and Salvadora, whose parents do not have college degrees, talking about the encouragement they received from their families made them emotional during the interviews.

Having family members with college degrees allowed the participants to receive not just emotional support but actual academic support. For example, Avila said his parents give him "their [academic] perspectives and advice." Carioca, who is pursuing an engineering degree, similarly stated:

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> If I want to do something, they [his parents] won't out-right tell me not to do it, but they will give me every possible reason as to why it's a bad idea, and if I should go in another direction… But if I want to go ahead with what I'm doing, they support me. If I want to know how to study, I don't need to talk to [my faculty mentor]. I can just go to my parents. They are both engineers. I don't need to ask a third party. I can just talk to a family member.

While much of the academic support came from their parents, in some cases, such as Chile, the participants had siblings who also supported them.

The rest of participants, however, noted that they never got any academic support from their parents throughout their secondary or college school years. Cachaca, Madrid and Chile said it was because their parents busy with work; or it was because their parents them as independent. Rola, for example, said, "Academically speaking … [my parents] … knew… I was going to succeed always, so they were never on top of me." But the participants who felt strongest about the lack of academic support from their parents were those whose parents did not have a college degree, Tico, Salvadora and Nicaragua, whose parents did not finish high school.

Salvadora and Tico shared a mentor who encouraged them to attend a 4-year institution outside the state, one in which could have a traditional college experience, such as living in a dorm. But these participants felt that their families would not support them attending school away from home. Salvadora, for example, said:

> Like, I think [my parents] would prefer me to go to FIU. Like there's nothing wrong with FIU, but, like, I see myself going further. Like there are more opportunities outside of Miami for, like, what I want to do with mechanical engineering…. I think the reason that they want me to stay is that they are just worried. Just like how most parents are, they are just worried if I am going to be okay by myself over in a different either in a different city or in a different state… But I think the most worry is from my mom, and she's just worried that I'm not going to be able to pay for college or for university.

The idea of their children going away for college worried Salvadora's parents because of finances, and Tico's parents because of fear for his well-being. Salvadora explained that her parents concern is not only because her family's low socioeconomic status, but also because her mother's friend's daughter dropped out of college and left her family with great financial debt. Salvadora indicated that despite her parent's concerns, she planned on transferring to an out-of-state institution.

With the exception of Salvadora, Nicaragua and Tico, the participants were in families with middle to high socioeconomic statuses, and they were either second- or third-generation college students. Most of these participants' parents also had STEM degrees or similar backgrounds, and these parents expected no less of their children. Madrid called her parents' expectations about college "good pressure." Bauta stated his father's professional status was a key motivation in his own decision to pursue a STEM degree: "So, especially my dad, he's very excited for me to continue my studies, and he has encouraged me to follow a career in engineering."

It appears that having college-educated parents gave many of the participants an advantage over the two that did not, such as Salvadora and Nicaragua. All of the participants had emotional support and encouragement, but only those with college-educated parents had an expectation that they were supposed to move on to a 4-year institution and a professional career. Most of the participants were motivated to graduate because their families expected this, and they could offer the economic necessary to make it happen.

Gender and Ethnicity

Most of the participants, and all the males, did not indicate they cared about having a faculty mentor of the same gender. More important to them was having a knowledgeable mentor who had a similar career background. Two of the women, however, indicated that having a male mentor alleviated some of the issues they had in being in male-dominated majors. Similarly, most of the participants did not indicate they cared about having a mentor of the same ethnic background, although the 3 participants who had Latino faculty mentors believed that sharing the same cultural characteristics connected them more with their mentors.

Gender

According to 9 participants, having a mentor with their same gender would not have given them a different, or significantly different, experience. For instance, Carioca stated bluntly, "It wouldn't have helped me more if it [my mentor] would have been a man." What mattered more was the knowledge and experience the mentor had. Nicaragua said: "No, I don't think [gender] makes a difference, but what she knows is what makes her different. Because anybody could be a mentor, but [the knowledge] she gave to me is what makes her special." Tico, who has male mentor, said his mentor's gender did not matter because "It wouldn't change the outcome." Tico was focused only on what he wants to do with his career, not his mentor's gender. Camaguey, a woman, said, "Female or male, it doesn't matter. Sometime males are better; sometimes females are better, and sometimes the female were idiots to me." For Avila, who is from Cuba, what matters is that the mentor understand his experiences: "Yeah, so coming from [Cuba], we kind of have to endure the same things at one point or another, and that's adapting here."

Some of the female students, however, had a different stance toward the issue of the mentor's gender. Madrid, for example, while stating that the gender of the mentor was not important, also said she appreciated doing research with a female professor, despite their cultural differences because she felt identified with her. And Rola and Cachaca pointed to the challenges female STEM students face. Rola stressed that being a STEM female was not easy, and that she felt underrepresented, but that her male mentor was always there to meet her academic needs, even though she was a woman:

> Probably because you are a girl in STEM, you are going to have issues with that, which is a fact: In the STEM, sometimes as girls we do have problems. But, like, [my mentor said,] 'don't worry if you [do this career] because you deserve it. You are going to be fine. Just keep working hard,' like, that kind of support ... He probably saw that I was, like, really stressed or, like, freaking out about the transfer, and he just sat down and gave me this really nice, like 'Hey, you are going to be fine.'

Rola indicates in this quote that having a male in STEM comfort her was important.

Cachaca, was also a female STEM student, made this point more explicitly:

> He pretty much has told me, and has told one of my friends too, that he sees the potential that we have, and that I have "[pause]" Just because I'm a female, it doesn't mean that I'm less intellectual than any other guy who is in the STEM majors. So that's what he pretty much told me time after time. That I can actually meet with him because he sees my potential. He sees that I can actually do it. It doesn't matter that I am a female.

Having male mentors inspire and motivate them made these women feel that they were not inferior to male STEM students.

Race and Ethnicity.

The faculty mentors participating in the Mentoring Program come from an array of ethnic and racial backgrounds, such as Cuban, White (Italian American and Irish), and Haitian. The participants in this study were studying in a diverse college (MDC), and so

they were used to sharing and having experiences with people from different ethnicities and races. None of the participants believed that race influenced their mentoring experiences. And Tico and Salvadora reported that having a mentor of a difference ethnic background was a benefit. For example, Tico was happy his mentor was White because he could explore and learn about a different culture. Nonetheless, although he felt that this cultural exchange was a nice experience, he did not believe his mentor's race affected his own academic success.

Having a mentor of the same racial or ethnic background was unimportant to the participants. For example, Camaguey said, "The color of the skin doesn't matter… It is all about the connection." Carioca and Salvadora, who had two different White mentors, believed that race did not matter, and what mattered was that, according to Salvadora, the mentors are "there for the student." Similarly, Bauta said, "I don't think it would make a difference, to be honest. I've dealt with a bunch of professors. They've all been from different races, and they behave the same way with me."

Avila, Madrid, and Nicaragua however, said they would feel more connected with their mentors if the latter shared their cultural background. Avila expressed that because his mentor and he was Latino from the same country he identified more closely with his mentor: "My mentor is also Hispanic… He is from the same country [Cuba], and we pretty much shared the same struggles." Nicaragua also thought that sharing the same cultural background mattered to him. Referring to his mentor being a Latina: "So, we kind of relate in that sense that we are here to have a better life, and whatever decision her parents took [just like mine], good or bad, whatever the consequences, it was for a

better life and better opportunities." These students believed that Latinos share the same struggles, and so having a Latino mentor was important to them.

However, one participant, Chile, felt an "outsider" in the Program because she was from Chile and most of the Program's participants, like her mentor, were from Cuba:

> And there are moments where I do feel like they speak in their "Cubanized" way, and I'm just, like, feel lost at times… But no, I do not feel like there's a specific, like, preference or difference towards us being Hispanic. I do not feel that way.

Despite feeling somewhat of an outsider because she was not Cuban, Chile did not believe that, overall, this was "a big deal." For the most part, the participants concern with their mentor's background related more to the field than to their gender, racial, or ethnic identities.

Successful Mentoring Programs

The participants identified what they believed was necessary to make a formal mentoring program successful. Two subthemes emerged from the analysis. First, the participants focused on institutional factors, such as the importance of creating a "community." Second, the participants felt that success in any program has to do more with individual characteristics, such motivation, than what any program can do. I will discuss each of these sub-themes in turn.

Institutional Factors

The key institutional factor in making a mentoring program successful, for the participants, was the need to create a sense of community among STEM students. Bauta, Tico, Salvadora, and Chile pointed to the importance of collaborating with other students. Bauta, in particular, indicated that the participants in the Program formed close friendships, which he believed would last beyond the Mentoring Program. Camaguey

said that for her the Program meant moving "out of the [usual] student experience to make connections [with] the 'big family' of the student and professors, so everyone can succeed." Similarly, Salvadora said the Program could change the student culture of only going to class and then home:

> Some students would just go to class, stay for the lecture and then go home. Like I used to be like that in the first semester, but then I started going to, like, the resources that are here at the STEM Center. I started to meet new people, got to know, like, it was just like another community that I found myself into…. So, like, it would just be, like, a day that we would go either to, like, a park or something along those lines, like, an outdoor area, and we would just be there, like, competing against one another [in a friendly way]. Like, I think it would be a good opportunity to sort of have, like, that learning experience of, like, working in teams, cooperation, and, like, friendly competition.

Having access to the STEM Center facilitated the "strong bond" the participants felt with others in the Program. This Center offered them not only a sense of community, but also tutoring, working in teams, and forming networks for academic and career purposes.

Rola, Cachaca and Carioca stated that they did not understand why the Mentoring Program was not accessible to all MDC STEM students, or why the Program was not advertised better. They indicated that many MDC STEM students were unaware of the Mentoring Program or of the availability of the academic support offered by the Program. Salvadora said she found out about the Program by "word of mouth" from an older friend of hers who participated in the Program the year before. Cachaca believed that there is a lack of communication by MDC, which she called a "flaw in the system:"

> I have met a lot of STEM majors who didn't even know there was, like, a STEM office here. They did not know. So, I guess it's, like, a lack of communication. They need to improve that… I would say that they should, I don't know, inter-connect each one [of the departments], and then if a student goes to the [advising department] for the general career advisement to ask for classes, [advisors] should take a look at the major, and then call the respective department with 'Hey, look. I

have this guy, with this ID, so I'm going to send him to you so that you can actually help out with [his] classes.' It's that easy.

Mentees such as Carioca, Cachaca, and Rola said that the Mentoring Program's availability to the STEM student population could be resolved as easy as sending an email to all the students with a STEM major via the Natural Sciences department.

The participants were asked if they could provide insight into why some students dropped out of the Mentoring Program. Mostly, their responses focused on individual flaws, such as a lack of readiness for college, an inability to handle stress, or a lack of ambition or motivation. But Cachaca, and Rola, who knew two students who had left the STEM career track, observed that the "drop out" problem was due to the Mentoring Program itself. According to these participants, students dropped out because they were encouraged enough by their mentors. Rola said that Program participants were not asked correct questions about the students' programs, or the faculty mentors were not clear to their mentees about possible barriers, such as the academic rigor required of majoring in STEM fields. Rola suggested that the Mentoring Program should give a "vocational test" to new students to determine if the students "belong" in a STEM track:

> Take, like, a vocational test because that can help you out and can give you an idea… Do a test to see if, like, that will be helpful for, like, those [incoming students]. I do believe that the people that dropped out from the Program, if they were asked or suggested initially to do something like this [i.e., assess whether they belonged in a STEM track]; this whole [drop out] problem would have been avoided.

Salvadora noted that the financial difficulties students at MDC face, and this could result in dropping out of the Program. Indeed, addressing students' financial burden may be a significant factor in keeping in college at institution like MDC, which has a significant number of students of low social economic status.

Individual Characteristics

The participants in this study saw a successful mentoring program as less an institutional matter than an individual one. The individual attributes for success most identified by the participants were time management skills, maturity, "understanding your studying methods," being independent, being committed, and being "secure about your goals." As Carioca stated, "When I hear something I have the ability to remember the information," so the ability to retain information was seen as important for succeeding in a mentoring program. Madrid also believed having curiosity was crucial: "When I'm studying, and I find something interesting, like, I will research and go in depth. So, I think that's one thing." Chile contended that "being able to combine your academic with your social life as a whole" are attributes that contribute to academic success. Nicaragua even stated that being bilingual could give people more future options: "Meaning I speak a different language, which it makes me look better because I will know two languages."

But the individual attribute identified by the participants as the most important was self-motivation. Camaguey, Madrid, Rola, Cachaca, Avila, and Carioca expressed that to stay in STEM one had to have inspiration and getting "priorities straight." Carioca explained that students who come into a STEM program believing they can do it with only minimum effort lack the necessary self-motivation:

> It is plausible that you could do this [STEM career], but a lot of people don't even put in a slight amount of effort, you know. They [STEM students] are just expecting it to be handed to them, and I think that kind of comes from how public schools in this country are, you know. High school is way too easy sometimes.

Nicaragua explained that the Program's participants the resources they need to succeed, and if they drop out it is only because of personal choices: "If they drop out it will be

personal, not academic, because they have the resources to succeed in college and they

know what they can do about it."

Madrid explained that if students lack motivation, then it does not matter what a
mentoring program does:

> It's like for me, I know that I want to become a clinical geneticist. I know that I'm
> going to have to struggle. I'm going to have struggles on my way to med school
> and after that. But what motivates me is, like, overcoming these obstacles. So, I
> think, like, they need motivations… Even though you have a good mentor, you
> need [motivation] yourself.

Lack of motivation may also be the result of improper motives for starting a STEM

major.

Cachaca shared the story of a student who entered engineering only because he

was interested in making money:

> This guy, he thought that it was going to be easy, and that he was going to be just
> fine, and then at the end you were going to make a lot of money. But as everyone
> knows, engineering, or any STEM major, is really hard. You have to work hard.
> You have to keep going. You have to choose, to be on top of what you are doing.
> So, this guy found out that it was too much for him, and he dropped out. He
> changed his major to [a non-STEM field].

Similarly, according to Camaguey, many students choose their STEM majors for the

wrong reasons, such as money, thinking that it would be easy. They then realize they are

not ready to be a STEM major.

Chapter Summary

The major themes in this data were (a) the importance of STEM, (b) mentoring

means support, (c) career matching between mentors and mentees, (d) the need for

required number of meetings and events, (e) the importance of peer-mentoring

experience, (f) the importance of family support, (g) gender and ethnicity, and (h)

successful Mentoring Programs.

From these themes emerged seven findings: (1) For the participants, a formal mentoring programs offers various forms of academic support, but they found interpersonal support with informal mentors; (2) For the participants, in a formal mentoring program a career match between mentor and mentee is essential; (3) For the participants, the required number of meetings in a formal mentoring program was burdensome, but other required activities were important; (4) For the participants, the peer mentoring experience was important and self-fulfilling; (5) For the participants, the gender or race of the mentor was insignificant, but some believed that sharing the same cultural background made them feel more connected with their majors; and (6) For the participants, encouragement and emotional support from their families was important, but only those with college-educated parents received the academic and financial support necessary important to succeed in college; (7) For the participants, a mentoring program will be successful if there are opportunities for building community among students and faculty, but ultimately, what matters for success are the personal characteristics of students. Chapter 5 discusses these findings in detail, it explains their implications and offers recommendations for practice and future research.

CHAPTER V

FINDINGS AND IMPLICATIONS

This Chapter summarizes briefly the reasons for my qualitative study of 11 South

Florida Latino students in a STEM 2-year Mentoring Program at MDC, as well as the

research design. It then discusses the findings. It ends with a discussion of the

implications and recommendations for both practice and research. It concludes with some

final thoughts.

Summary of the Study

Many studies have identified factors influencing STEM students' success in

colleges and universities (Astin 1993, 1999; Crisp et al., 2009; Excelencia, 2011;

Hagedorn & Purnamasari, 2012; Hagedorn & Lester, 2015; Milem & Berger, 1997; Page

2013; Spady, 1970; Terenzini & Pascarella 1980; Terenzini, Springer, Yaeger, Pascarella,

& Nora 1996; Tinto 1975, 1982, 2006). Qualitative research on STEM mentoring

programs focusing on Latino students, however, was limited. Although various studies

have focused on factors influencing STEM students' persistence at colleges and

universities, there were few studies on Latino students in STEM or on Hispanic Serving

Institutions (HSIs). Furthermore, past studies focusing on mentoring programs focused on

institutional success but not necessarily on the students' perceptions. This study was

conducted in order for administrators and faculty to assist STEM students' progress to

graduation.

The main purpose of this study was to understand the perceptions of Latino

students in a STEM Mentoring Program at MDC. This research examined how the

participants made meaning of their mentoring experiences, and what they understood as

factors that supported success in mentoring programs. The context of this study was a STEM Mentoring Program at MDC's Wolfson campus. Eleven second-year students in the Program were selected to participate in interviews for this study, accounting for differences relating to gender, ethnic background, and STEM field. The following research questions guided this study: (a) How do STEM students make meaning of mentorship? (b) How do STEM students construct their experiences in the Program? (c) To what extent do gender and ethnicity play a role in how students make meaning of their mentoring experiences? (d) What do students identify as important for succeeding in a mentorship program? The primary method of data collection was two semi-structured interviews with each participant. During these interviews participants were asked questions intended to get them to describe their experiences with their mentors, to explain their personal beliefs about their academic experiences, and to reflect on their experiences in the Program. My intent was to gain a deeper understanding of how mentorship made a difference to the students. The interviews were audio-recorded. Pseudonyms were used to protect the participants' identities. The interviews took place in my office on the MDC Wolfson campus from February to May 2017. The major themes of the study (a) the importance of STEM, (b) mentoring means support, (c) career matching between mentors and mentees, (d) required number of meetings and events, (e) importance of peer-mentoring experience, (f) importance of family support, (g) gender and ethnicity, and (h) successful mentoring programs.

From these themes, 7 findings emerged. The findings were: (1) For the participants, a formal mentoring programs offers various forms of academic support, but they found interpersonal support with informal mentors; (2) For the participants, in a

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formal mentoring program a career match between mentor and mentee is essential; (3)

For the participants, the required number of meetings in a formal mentoring program was

burdensome, but other required activities were important; (4) For the participants, the

peer mentoring experience was important and self-fulfilling; (5) For the participants, the

gender or race of the mentor was insignificant, but some believed that sharing the same

cultural background made them feel more connected with their majors; and (6) For the

participants, encouragement and emotional support from their families was important, but

only those with college-educated parents received the academic and financial support

necessary important to succeed in college; (7) For the participants, a mentoring program

will be successful if there are opportunities for building community among students and

faculty, but ultimately, what matters for success are the personal characteristics of

students. I will discuss next the finding by answering my research questions. Each

question is rephrased as a heading for grouping the findings. I then address the

implications and related recommendations in the rest of this chapter.

What Mentoring Means for STEM Students

For the participants, a formal mentoring program offers various forms of academic support, but they found interpersonal support with informal mentors.

Most of the participants expressed that the Mentoring Program offered them

various kinds of academic support. The most important kind of academic support was

reinforcement they received from their faculty mentors, which helped them stay in their

STEM majors. The faculty mentors did this not only via explicit advising and

encouragement but also simply by serving as role models and inspirations for the

participants. The reinforcement the participants received from their mentors confirms

what Astin (1999) said is most important in helping students persist in college. Having faculty work one-on-one with students gives them a unique position to monitor the involvement of the students in the academic environment and to find ways to increase their involvement in college life.

The participants also received more conventional kinds of academic support, ones in which faculty mentors helped them navigate their programs more smoothly. The faculty mentors helped the students with particular classes and assignments, course scheduling, time-management skills, balancing work and school, and, even more important for the participants, the transfer process. Career development was also an important form of academic support the participants received from the Mentoring Program. The faculty mentors helped them decide if they were in the right majors for them, they helped them participate in research activities, and the Program itself offered them opportunities for networking with those in the scientific community. Access to MDC's STEM Center was also very important to them in terms of academic support. This finding confirms much of that the literature say is important in mentoring programs. Hence, successful programs are those than integrate learning communities, interactive groups, enhance student diversity, and improve institutional commitment (Seidman 2005; Zalaquett, 2005).

But academic support was not the only meaningful aspect of mentoring for the participants; interpersonal support was important to them as well. Such support took the form of building friendships, helping the participants with personal struggles, anxieties, introversion, and so on. While a few of the participants found such support with their faculty mentors, most looked to informal mentors for this. Much of the reason for this

had to do with the fact that the participants' mentors who shared similar backgrounds with them, sometimes cultural backgrounds but more important for the participants was the need for mentors in shared their STEM fields. These findings confirm what Schulze (2010) found; Schulze indicated that a good match between a mentor and mentee improves happiness, communication, work habits, research interests, personal value, and career aspirations.

For the participants, encouragement and emotional support from their families was important, but only those with college-educated parents received the academic and financial support necessary important to succeed in college.

The participants expressed deep gratitude and appreciation for their families' support of them. They all felt they received encouragement to pursue their degrees and careers, as well as strong emotional support. But two of the participants, Nicaragua and Salvadora, did not have family members who were college-educated. So, for these students, academic and financial support from their families was lacking. This confirms much of the research about first-generation college students. Family support is often lacking for these students (Paulsen & Smart, 2001). The other participants not only had college-educated parents, but they also had strong family role models in similar careers as the ones they chose. These students were expected to complete their studies and to transfer to a 4-year institution, and they could offer the academic and financial support necessary for making this happen.

The support that Latinos students need to find from their families, friends, communities, and school personnel is crucial to their success (Evans, Forney, Guido, Patton, & Renn, 2010; Tinto, 2006). The research indicates that one of the reasons the graduation rates among Hispanics are lower than that of other racial or ethnic groups is

that many Hispanic do not see the long-term benefits of earning a degree and the steps

necessary to achieve that goal (Santiago 2010; Seidman, 2005). This was not the case for

most of the participants interviewed, obviously. The participants all expressed how

encouraging their families were of their pursuing a STEM degree. Still, most of the

participants had the support of families with college-educated and professional parents.

For the first-generation college students in the study, their only form of support was

encouragement, but not the academic or financial support they might need to accomplish

all their goals.

Tinto (1975) has argued that individuals enter institutions of higher education

with a diverse set of attributes, precollege experiences, and family backgrounds. These

measures have direct and indirect impacts on students' commitment to the institution and

ultimately to college completion (Astin, 1993; Tinto, 1975). As two of the participants in

my study indicated, their non-college-educated families do not see benefits of letting their

children to attend an out-of-state institution because they concerned with incurring

financial debt. This finding has implications, which I will discuss later, for what

institutions such as MDC can do, given how many of its students are first-generation

college students.

STEM Students Experiences in the Mentoring Program

For the participants, in a formal mentoring program a career match between mentor and mentee is essential.

Most of the participants believed that their formal mentoring experience would

have been more effective had they been assigned mentors who were in their fields. Often

the students got paired with a mentor from another field. This was a problem for the

participants, particularly, in terms of selecting courses in order to complete their studies. Some felt that they should have been given the chance to choose their mentors themselves. This finding aligns with that of Zalaquett's (2005) study, which found that the most important barriers for Latinos' access to higher education were misinformation about their chosen field or coursework needed to complete their degrees. This problem might have been the reason that many students looked to informal mentors for support. For the participants, the required number of meetings in a formal mentoring program was burdensome, but other required activities were important.

For the participants, the required number of meetings in a formal mentoring program was burdensome, but other required activities were important

The participants for the most part found inconvenient the requirement that they meet with their faculty mentors and first-year mentees on a monthly basis. This requirement was problematic to them because of conflicting schedules, and was time consuming, given their other obligations. The requirement entailed face-to-face meeting, but some believed that electronic forms of communication (e.g., Messenger, Facetime, or Skype) could be used instead. This finding does not confirm what Astin (1999) indicated, which is that students who do not interact frequently with their faculty are less likely to express satisfaction with the institutional experience. However, it is important to note that most mentees said they appreciated that their mentors had an "open door" policy. The concern for the students was less about having to meet with their mentors than being required to do so in a structured basis.

The participants, however, generally found the required events sponsored by the Mentoring Program to be beneficial. The symposia, science fairs, or field trips not only

helped them learn more about their fields and provided opportunities for networking, but they also built a sense of community. The participants indicated that these events created stronger bonds with their faculty mentors, peers, and first-year mentees. This supports what Agosto, Gasson, and Atwood (2008) found, which is that mentorship is not just about helping students learn but also about learning using hands-on practices.

For the participants, the peer mentoring experience was important and self-fulfilling.

While the participants believed that the logistics of meeting with their first-year mentees were problematic, most found the peer mentoring experience to be rewarding. The participants not only gained leadership skills, but they felt good about themselves in being roles and in developing a sense of responsibility toward others. They also enjoyed the social interactions with their mentees, although the fact that some participants were as young as their mentees created some role conflicts. These social interactions, however, are important. Robinson and Reio (2012) research, while not about higher education, showed a strong relationship between organizational commitment and the social interactions gained through mentoring.

According to participants, institutional support other than just mentorship was a factor that helped them progress in the Mentoring Program. Some participants said the relationships formed amongst all students helped to form a sense of community, where participants collaborated with one another toward their overall growth. Examples of the institutional supports discussed by the participants were tutoring, getting to work in teams, and attending forums which gave them opportunities to network for academic and comradeship purposes. Some participants saw the Mentoring Program as an opportunity

to become part of a group. Many of them saw the STEM tutoring center as the site where

the members of the Mentoring Program can come together to help each other study and

share ideas to form a "strong bond." Participants pointed out that the Mentoring Program

provided an opportunity to connect and help the first-year students to become aware of

the available resources and benefits they could get out of the Mentoring Program. From

their comments, STEM program students' interaction within the activities and the overall

Mentoring Program seems to be influential in their pathway's progress. This supports

Tinto's (2006) study, which stated that urban students experience college involvement

more from within a classroom than with traditional aspects of college life such as

fraternities or sororities.

The Role of Gender and Ethnicity in Mentorship

For the participants, the gender or race of the mentor was insignificant, but some believed that sharing the same cultural background made them feel more connected with their majors

For all of the participants, the gender or race of the mentor was not important,

although two of the women suggested that having a male mentor made them feel they

were able to complete their degrees, helping them overcome negative stereotypes about

women in STEM. More important to the participants was the knowledge, experience,

career background, and commitment of the mentors. Most of the participants felt the

same way about the ethnic background of the mentors, but some felt that having a Latino

mentor, especially from the same country as the participants, mattered. These participants

believed that only Latino mentors understood the struggles Latinos face. Studies by

Robinson and Reio (2012) and Agosto et al. (2008), also indicate that matching mentors

and mentees by ethnicity, race, and gender could have positive effects; while, Price

(2010), and much of the data in this study, indicate otherwise about this same matter.

Factors for Success in a Mentoring Program

For the participants, a mentoring program will be successful if there are opportunities for building community among students and faculty, but ultimately, what matters for success are the personal characteristics of students.

For the participants, a successful mentoring program has institutional practices

that allow the students to build community. They believed the MDC Mentoring Program

did that, but they also believed it should be accessible to all students and be better

promoted throughout the institution. Milem and Berger (1997) found that social

integration was a significant indicator of student persistence, but institutional support did

not have an effect on academic integration. My findings do not confirm this statement.

The participants found the Mentoring Program important and even felt it should be more

widely available to all students. Milem & Berger (1997) did argue that more research on

the role mentorship programs (especially within HSIs) appears necessary.

But more interesting was that the participants' beliefs that success in a mentoring

program is the result, primarily, of a student's individual characteristics. They indicated

that no matter what a mentoring program does, if students are not ready for college, lack

maturity, are unable to handle stress, or lack ambition or self-motivation, they will not

succeed in college.

Implications and Recommendations for Practice

The findings of the study have implications for practice and future research. The

findings of this study related to academic, interpersonal, and family support, to career

matching, to required meetings and events, to ethnicity, to building community, and to the individual characteristics of students. I will discuss each of these in turn.

Academic, Interpersonal, and Family Support

Formal mentoring programs must emphasize as many forms of academic support as possible in order to ensure that students adequately progress toward graduation. For community colleges, the most important forms of support are those that reinforce to students that they can graduate and transfer to a 4-year institution. This includes not only good advising relating to completing coursework, the transfer process, and career development, but also, more important, committed faculty who encourage students to finish their studies. In addition, students in STEM fields need activities that help them feel that they are part of a larger STEM community, not only because this motivates students to succeed but also gives them chances to network and make important contacts for future schooling and job opportunities. Obviously, this study's findings, while focusing on STEM majors also have implications for students in any major. Good mentoring practices are not restricted to STEM students.

The participants in this study also needed interpersonal support from their mentors, but most of them found such support in informal mentors. One recommendation for institutional practice to make the mentor-mentee selection process more effective is to give students some say in the selection of a mentor. Given the important of mentoring, whether in a formal program or not, the key implication of this study is that institutions need to foster as many opportunities as possible to students to interact with faculty members. The literature is certain on this point: mentoring offers students career or psychological development (Reio & Robinson, 2012; Zalaquett & Lopez, 2006). So a

formal mentoring program has to offer students many events, forums, research opportunities, and so on. Furthermore, while institutions cannot guarantee that students will seek formal mentors for all kinds of support, they can try to align, to the extent possible, students with formal mentors who have similar career field and life experiences.

Family support is crucial, as this study found. Institutions, however, cannot mandate this or do much to provide it when it is lacking at home. Still, mentoring programs can work only in contexts. That is, in contexts in which first-generation students are present, any mentoring program has to account for the likelihood that such students will not have the kind of family support that other students have. One recommendation for practice, therefore, is to align students with mentors who understand the needs of first-generation students and are trained in helping them get the support they need.

Career Matching

The often-expressed concern by the participants about the Mentoring Program at MDC was the fact that their mentors often did not share their same career field. This was more important for students than even sharing the same cultural background. Formal mentoring programs will not be completely effective if there is little career match between the mentor and mentee. Schulze (2010) found that a good match between a minority mentor and mentee improves happiness, communication, work habits, research interests, personal values, and career aspirations. So, an important recommendation for practice is that to the extent possible institutions match students with mentors in the same STEM field. This will not only lead to better advising, but if my participants are like

many students, they will also feel more connected and engaged with a mentor who knows how to succeed in the students' chosen field.

Of course, it is not always possible to always achieve complete career match in a mentoring program, but all efforts should be made to have such a match. One way to do this is cluster students and mentors by related career fields, or, at the very least, to provide training to the faculty mentors to support all students assigned to them.

Required Meetings and Events

The Mentoring Program in this study required students to meet with their faculty mentors and first-year mentees on a regular basis. This seems at first sight a laudable goal, given what the literature indicates is the importance of frequent faculty-student interactions (Astin, 1984), but the participants found this requirement burdensome and unnecessary. Mentoring programs may not be successful if participants are forced to do things they find unnecessary (Bower, Diehr, Morzinski, & Simpson, 1998; Elcigil & Yildirim, 2006; Ghosh et al., 2012; Reio & Robinson, 2012). This may be especially the case in 2-year colleges, in which many of the students also work outside of class. So more important for institutions is less need for forced meetings, and more opportunities for students to engage in various events in which they can interact with their mentors, such as forums, conferences, fairs, and so on. The participants found these other required events fulfilling in helping them with their academic and career goals, but also in building community.

Nevertheless, faculty-student contact is important, so institutions should require contact meetings. But instead of monthly-required ones like the program in this study, there should be a mandatory meeting in the beginning of the term, a second to go over the

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student's progress report at the midpoint of the term, and a final meeting at the end of the semester to evaluate if the student has met program expectations. Furthermore, given college students today, and especially those who have obligations outside their academics, electronic forms of communication should also be encouraged.

Peer Mentoring

The participants in this study found the peer mentoring experience rewarding, not only because of the leaderships skills they gained, but also because they found rewarding being role models for their mentees and benefitted from interactions with other students in their fields. This aligns with the literature, which states that peers are the single most powerful influence in the college experience (Astin, 1993). Mentoring programs follow usually a pattern in which faculty mentor students, but the importance of the Mentoring Program in this study is the opportunity it gave to students to learn from other students. Involving peers in the learning process in general has been supported by many studies. For example, Baxter and Rideout (2006) studies on second year nurses indicated that mentees relied on important decisions not only from their clinical instructors but, most important, on their peer tutors. Mentoring programs should incorporate some aspect of peer mentoring.

Gender and Ethnicity

As indicated, some students wanted mentors who shared their ethnic background, mostly because they believed such mentors understood Latino experiences. So, the implication here is that institutions need to match students with mentors who understand their struggles, career goals, and personal needs. For the participants, the race, ethnicity, or gender of the mentors was not relevant; what was relevant was that their mentors

understood them and their needs. Mentors should be selected for a mentoring program either because they understand the students they will mentor, or after extensive training about the needs of the students who are such a program.

Building Community

A most important factor in creating a successful mentoring program for the participants in this study was the need to build a community of STEM majors. This has implications for all majors. A sense of community is necessary for all students. Indeed, the participants in this study felt that the mentoring program should be available to all students, not just STEM students. As illustrated by this study, the Mentoring Program offered students numerous opportunities to engage with faculty, other students, and the scientific community. According to the 2012 report, *Excelencia in Education*: *What Works for Latino Student Success in Higher Education*, successful programs collect data and conduct evaluations, view Latino students as a community, remove pathway barriers, use research-based strategies, have clear goals, invest in long-term viability, improve institutional commitment, and allocate sufficient resources. Moreover, successful programs integrate mentoring, learning communities, interactive groups, and scholarships; thereby, achieving student diversity (Seidman, 2005; Zalaquett, 2005). All mentoring programs should similarly include opportunities for such engagement and commitment.

Individual Characteristics of Students

According to participants in this study, more important than any institutional practice, successful mentoring starts with students who are ready for college, have maturity, can handle stress, and are self-motivated and active. The participants seemed to

think these characteristics are innate, but they need not be. Institutions can do much to foster college-readiness, enhance stress-management skills, and motivate students. For example, some students might have a lack of confidence, but mentors could help mentees overcome that barrier and guide the students in developing good problem-solving skills (Baxter & Rideout 2006).

Future Research

Given the implications of this study's findings, I offer the following recommendations for future research. Previous studies of mentoring have focused on the student experience, as has mine; however, there is little research on faculty mentors, their backgrounds, commitments, and training. Further research should be conducted on what effects of being mentor, and on how mentoring programs might train faculty to be effective mentors for Latino students.

Furthermore, other local and national mentoring programs should be studied to determine what factors are making a difference for STEM success for Latino students. Further study on formal and informal mentorship should also be pursued, as well as how institutions can take advantage of both kinds of mentoring. Moreover, the participants, being a peer mentor was important and self-fulfilling. Further research should be conducted at 2- and 4-year institutions, especially HSIs, on the role of peer mentoring for Latino STEM students (or any student).

This study defined persistence as staying in the STEM mentoring program for the second academic year. Further studies on the impact of mentoring on other measures of success for Latino students, such as academic achievement, graduation rates, and continuing to the 4-year degree. More studies like mine, focusing on 2-year programs,

should be conducted, and especially of South Florida Latinos, given the Latino population of South Florida is more diverse compared to that of other states (Florida STEM Report Card, 2016). Furthermore, South Florida Latinos are represented politically both in senate and congress by Hispanic politicians, which is often not the case in other states. We need more studies like this inform such politicians how their higher-education policies might be affecting the lives of students who come from the same communities as their representatives.

Statistics show that students attending 4-year institutions have better academic preparedness and have a higher probability of succeeding compared to those attending 2-year colleges (Astin, 1999; Malcolm, 2010; Nora, Cabrera, Hagedorn, & Pascarella, 1996). Although it is difficult to track MDC students after they graduate, it is important to conduct follow-up studies with them after the leave the College. The reason for this is that it is important to understand whether the Mentoring Program at MDC makes a difference in students' completion of a 4-year degree.

Final Thoughts and Concluding Remarks

Studies on mentoring programs are focused on institutional success, but not on how students make meaning of their journey, specifically Latino students in the STEM fields (Crisp et al., 2009; Excelencia, 2011; Excelencia, 2012; Hagedorn & Purnamasari, 2012). Furthermore, in order for Hispanics to persist in college, researchers should foster conversations among state legislators, public officials, education stakeholders, and college/university leaders to determine how best to serve Latino STEM students. Henceforth, changes or improvement in STEM mentoring programs could translate into

the improvement of Latino students' college degree attainment, access to programs, and acquisition of merit-based financial aid (Excelencia, 2012; Zalaquett, 2005).

I hope this study contributes to institutional practices that help students succeed in college by accounting for what the students themselves say is important to them. The findings presented in this study will hopefully be used to determine whether they are applicable to other programs and useful at MDC to support the revisions of current mentoring programs.

At times, the participants made contradictory statements about the Mentoring Program and its value to them. Some of the participants expressed initially that the Mentoring Program was not a determinant factor in their staying in their STEM career path. To them, their self-motivation, studying habits, and family support were more important keys to their success. However, as my conversations with them progressed, the participants indicated that their faculty mentors gave them a sense of security, helped them build character, and served as role models for them, and that the Program's required activities made them feel a sense of community. Mentoring programs do have the potential to make students' lives better by helping them achieve goals.

REFERENCES

Agosto, D., Gasson, S., & Atwood, M. (2008). Changing mental models of the IT professions: A theoretical framework. *Journal of Information Technology Education*, *7*, 205-221.

Allen, T. D., & Poteet, M. L. (1999). Developing effective mentoring relationships: Strategies from the mentor's viewpoint. *The Career Development Quarterly*, *48*, 59-73.

Astin, A. (1984). Student involvement: A development theory for higher education. *Journal of College Student Personnel*, *25*, 297-308.

Astin, A. (1993). *What matters in college? Four critical years revisited*. San Francisco, CA: Jossey-Bass.

Astin, A. (1999). Involvement in learning revisited: Lessons we have learned. *Journal of College Student Development*, *40*, 587–598.

Astin, A. (2012). *Assessment for excellence.* Plymouth, UK: Rowman & Littlefield.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: study design and implementation for novice researchers. *The Qualitative Report*, *13*, 544-559.

Baxter, P., & Rideout, L. (2006). Decision making of 2nd year baccalaureate nursing students. *Journal of Nursing Education, 45,* 121-128.

Blake-Beard, S., Bayne, M., Crosby, F.J., & Muller, C.B. (2011). Matching by race and gender in mentoring relationships: Keeping our eyes on the prize. Journal of Social Issues, 67, 622-643.

Bogdan, R. C., & Biklen, S. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Boston, MA: Pearson.

Boggs, G. R. (2012, February-March). The evolution of the community college in America: Democracy's colleges. *Community College Journal, 36–39.*

Bower, D. J., Diehr, S, Morzinski, J.A., & Simpson, D, E. (1998). Support-challenge-vision: A model for faculty mentoring. *Medical Teacher*, *20*, 595-597.

Chen, R., & DesJardins, S. L. (2010). Investigating the impact of financial aid on student dropout risks: Racial and ethnic differences. *The Journal of Higher Education*, *81*, 179-207.

Center for Community College Student Engagement. (2014). *Characteristics of community college students.* Retrieved from http://www.ccsse.org/center/

Cole, D., & Espinoza, A. (2008). Examining the academic success of Latino students in science, technology, engineering and mathematics (STEM) majors. *Journal of College Student Development, 49*, 285-300. DOI:10.1353/csd.0.0018

Compton-Hall, M. (2002). Mentoring in parallel universes. *Reading Psychology*, *23*, 145-158.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Crisp, G., Amaury, N., & Amanda, T. (2009). Student characteristics, pre-college, college, and environmental factors as predictors of majoring in and earning a stem degree: An analysis of students attending a Hispanic serving institution. *American Educational Research Journal*, *46*, 924-942. DOI: 10.3102/002831209349460

Davies, P., Mangan, J., & Hughes, A. (2009). Participation, financial support and the marginal student. *Higher Education*, *58*, 193-204. DOI: 10.1007/s10734-008-9190-9

Elcigil, A., & Yildirim, S. (2006). Students' opinions about and expectations of effective nursing clinical mentors. *Journal of Nursing Education*, *47*, 118-123.

Erdem, F., & Aytemur, J. O. (2008). Mentoring- a relationship based on trust: Qualitative Research. *Public Personnel Management*, *37*, 55-65.

Evans, N.J., Forney D.S., Guido, F.M., Patton, L.D., & Renn, K. A. (2010). *Student development in college: Theory, research, and practice* (2nd ed.). San Francisco, CA: Jossey-Bass.

Excelencia in Education and the Institute for Higher Education Policy. (2011). Ensuring America's future: Federal policy and Latino college completion. Retrieved from http://edexcelencia.org/sites/default/files/federalpolicyeaf2011edition.pdf

Excelencia in Education. Examples of Excelencia. (2012). What works for Latino student success in higher education? Retrieved from http://edexcelencia.org/sites/default/files/examples2012compendium02_0.pdf

Excelencia in Education. (2014). Latino college completion: United States. Retrieved from http://www.edexcelencia.org/sites/default/files/Exc2014-50StateFS-National.pdf

Florida STEM Report Card. (2016). Retrieved from
https://www.usinnovation.org/state/pdf_cvd/ASTRA-STEM-on-Hill-
Florida2016.pdf

Florida Center for Research in Science, Technology, Engineering, and Mathematics.
(2011). Florida STEM Strategic Plan. An Action Plan for Systemic Reform of
STEM Education and Workforce Guidelines. Retrieved from
http://www.lsi.fsu.edu/centers/fcrstem/resources/documents/floridaSTEM_strateg
ic_plan_dec2011.pdf

GA0-12-108. Report to Congressional Requesters (2012). Science, Technology,
Engineering, and Mathematics. Strategic planning needed to better manage
overlapping programs across multiple agencies. Retrieved from
http://gao.gov/assets/590/587839.pdf

Gentry, B., Lawrence, C., & Richards, E. (2016). The tie that binds: Exploring
community college curriculum design. *PS, Political Science & Politics, 49, 535–
540.* http://doi.org/http://dx.doi.org/10.1017/S1049096516000937

Ghosh, R., Reio, T., & Haynes, R. (2012). Mentoring and organizational citizenship
behavior: Estimating the mediating effects of organization-based self-esteem and
affective commitment. *Human Resources Quarterly*, *23*, 41-63. DOI:
10.1002/hrdq.21121

Gonzalez, H.B., & Kuenzi, J. J. (2012). Science, Technology, Engineering, and
Mathematics (STEM) Education: A Primer. Retrieved from
http://www.stemedcoalition.org/wp-content/uploads/2010/05/STEM-Education-
Primer.pdf

Hagedorn, L.S., & DuBray, D. (2010). Math and science success and nonsuccess:
journeys within the community college. *Journal of Women and Minorities in
Science and Engineering*, *16*, 31-50.

Hagedorn, L.S., & Lester, J. (2006). Hispanic community college students and the
transfer game: strikes, misses, and grand slam experiences. *Community College
Journal of Research and Practice, 30*, 827-853.

Hagedorn, L.S., Lester, J., & Cypers, S. (2010). C problem: Climb or catastrophe.
Community College Journal of Research and Practice, 34, 240-255.

Hagedorn, L.S., & Purnamasari, A. (2012). A realistic look at STEM and the role of
community colleges. *Community College Review, 40*, 145-164.

Heller, D. (1999). The effect of tuition and state financial aid on public college
enrollment. *The Review of Higher Education, 23*, 65-89.

Heppner, P. P., & Heppner, M. J. (2004). *Writing and publishing your thesis, dissertation & research: A guide for students in the helping professions*. Belmont, CA: Brooks/Cole Cengage Learning.

Hu, S., & Hossler, D. (2000). Willingness to pay and preference for private institutions. *Research in Higher Education, 41*, 685-701.

Hurtado, S., & Carter D.F. (1997). Effects of college transition and perceptions of the campus racial climate on Latino college students' sense of belonging. *Sociology of Education, 70*, 324-345.

Irlbeck, E., Adams, S., Akers, C., Burris, S., & Jones, S. (2014). First generation college students: Motivations and support systems. *Journal of Agricultural Education. 55*, 154-166. DOI: 10.5032/jae.2014.02154

Janesick, V. J. (1999). A journal about writing as a qualitative research technique: History, issues, and reflections. *Qualitative Inquiry, 5*, 505-524.

Lederman, D (2007). Lifeline to Low-Income Students. Inside Higher Ed, Retrieved from http://www.insidehighered.com/news/2007/02/20/fafsa

Lincoln, Y. L., & Guba, E. G. (1985*). Naturalistic inquiry*. Newbury Park, CA: Sage.

Malcolm, L. E., & Dowd, A. (2011). The impact of undergraduate debt on graduate school enrollment of STEM baccalaureates. *The Review of Higher Education, 35*, 265-305.

Martin, N., & Meyer, K. (2010). Efforts to improve undergraduate student retention rates at a Hispanic serving institution: Building collaborative relationships for the common good. *College and University, 85*(3), 40-49.

Merriam, S. B. (1998). *Qualitative research and case study applications in education: Revised and expanded from case study research in education*. San Francisco, CA: Jossey-Bass.

Merriam, S.B. (Ed.). (2002). *Qualitative research in practice*: *Examples for discussion and analysis* San Francisco, CA: Jossey-Bass.

Miami Dade College. (2013). Miami Dade College highlights and facts. Retrieved from http://www.mdc.edu/ir/Fact%20Book/MDC%20Highlights%20and%20Facts_Nov2013rvd.pdf

Miami Dade College. (2015). Miami Dade College Institutional Effectiveness. Retrieved from https://www.mdc.edu/ir/

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd. ed.). Newbury Park, CA: Sage.

Milem, J., & Berger, J. (1997). A modified model of college student persistence: Exploring the relationship between Astin's theory of involvement and Tinto's theory of student departure. *Journal of College Student Development, 38*, 387-400.

Nora, A., Cabrera, A.F., Hagedorn, L.S., & Pascarella, E.T. (1996). Differential impacts of academic and social experiences on college-related behavioral outcomes across different ethnic and gender groups at four-year institutions. *Research in Higher Education*, *37*(4), 427-451.

Page, J. (2013). Hispanics: A diverse population of students to influence the landscape of higher education. *Journal of Hispanic Higher Education, 12*, 37-48. DOI: 10.1177/1538192712454133

Pascarella, E.T., & Terenzini, P.T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *The Journal of Higher Education*, *51*(1), 60-75.

Pascarella, E.T., & Terenzini, P.T. (1991). *How college affects students*. San Francisco, CA: Jossey-Bass.

Paulsen, M. B. and Smart, J. C. (2001). *The finance of higher education: Theory, research, policy, & practice.* New York, NY: Agathon Press.

Price, J. (2010). The effect of instructor race and gender on student persistence in STEM fields. *Economics of Education Review*, *29,* 901-910.

Robinson, D., & Reio, T. (2012). Benefits of mentoring African-American men. *Journal of Managerial Psychology*, *27*, 406-421.

Santiago, D. (2010). Florida Policy Options to Accelerate Latino Student Success in Higher Education. Retrieved from http://www.edexcelencia.org/sites/default/files/EdExcelencia_FLPolicyOpts.pdf

Schulze, S. (2010). Mentees' views of a structured mentoring programme at Unisa. *South African Journal of Higher Education, 24*, 782-799. DOI: 1011-3487

Schunk, D. (2012). *Learning theories: An educational perspective* (6th ed.). Boston, MA: Pearson.

Seidman, A. (2005). Minority student retention: Resources for practitioners. *New Directions for Community Colleges*, *125*, 7-24.

Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (4th ed.). New York, NY: Teachers College Press.

Spady, W. (1970, April). Dropout from higher education: An interdisciplinary review and synthesis. *Interchange,* 64-85.

Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.

Terenzini, P.T. & Pascarella, E.T. (1980). Toward the validation of Tinto's model of student attrition: a review of recent studies. *Research in Higher Education*, *12*, 271-282.

Terenzini, P.T., Springer L., Yaeger, P.M., Pascarella, E.T., & Nora, A. (1996). First-generation college students: Characteristics, experiences, and cognitive development. *Research in Higher Education, 37*, 1-22.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*, 189-125.

Tinto, V. (1982). Limits of theory and practice in student attrition. *Journal of Higher Education*, *53*, 687-700.

Tinto, V. (1988). Stages of student departure: Reflection on the longitudinal character of student leaving. *Journal of Higher Education*, *59*, 438-455.

Tinto, V. (2004). *Student retention and graduation: Facing the truth, living with the consequences*. (Occasional Paper by the Pell Institute for the Study of Opportunity in Higher Education). Washington, DC: The Pell Institute.

Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College Student Retention: Research, Theory & Practice*, *8*, 1-19.

U.S. Department of Education, National Center for Education Statistics. (2006). *The Condition of Education 2006 (NCES 2006-071)*. Washington, DC: U.S. Government Printing Office.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Zalaquett, C. P. (2005). Study of successful Latina/o students. *Journal of Higher Education, 5*(1), 35-47.

Zalaquett, C. P., & Lopez, A.D. (2006). Learning from the stories of successful undergraduate Latina/Latino students: The importance of mentoring. *Mentoring & Tutoring*, *14*, 337-353.

Zeidner, T. (2006). Information and access: Modeling the nexus of academic preparation and financial aid. *Peabody Journal of Education*, *81*, 118-138.

APPENDICES

Appendix A

AFFIRMATION OF INTENT

The main purposes of this qualitative case study are to explore how Hispanic mentoring MDC students are experiencing their mentoring program, from their perspectives. The research will involve 10 to 15 students, and they will be interviewed for 60 to 90 minutes about their mentoring experience. This is to say I am conducting this research for educational purposes only, no harm is expected to come to you and this will not affect your grades. All information will be digitally recorded and will be treated with confidentiality and any specific details will be reported **anonymously**. Your data records will be pulled out the Mentoring Program and your personal information will be strictly confidential. The data will be used for my dissertation research only. You or I may withdraw at any time, and you will receive a copy of the full report. You may see the data of the interview questions and anything I write at any time. You may ask questions and do not have to answer any question that makes you uncomfortable. The information on this report will be combined, and reported out together with the information form other faculty and staff members of MDC. My name is Professor Juan Morata and I am the investigator conducting this qualitative research for educational and dissertation purposes. If you have any questions about this study following your interview, you may call me at 305-237-7963, or send me an e-mail at jmorata@mdc.edu. The contact information of Miami Dade College's Institutional Research Board:

IRB@mdc.edu
Rita Menéndez, IRB Chair
(305) 237-7488

Juan Morata   Date

Appendix B

**INFORMED CONSENT TO PARTICIPATE IN AN INTERVIEW FOR A
RESEARCH PROJECT ON MENTORING PROGRAM**

I_____, I am 18 years old or

older, and I agree to participate in this study with _____.

I realize that this information will be used for educational purposes. I understand that my

identity will be confidential and I will be given a pseudonym. I understand that I am

going to be recorded for the interviews, and that I may withdraw from the study at any

time. I understand the intent of the study. I have received a copy of the Affirmation of

Intent form, and consent form.

_____
Name

_____
Signature

Date: _____

Appendix C

ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY

DO MENTORING PROGRAMS MAKE A DIFFERENCE? A QUALITATIVE CASE STUDY ON THE JOURNEY OF LATINO STUDENTS IN A STEM TRACK

PURPOSE OF THE STUDY
You are being asked to be in a research study. The main objectives of this qualitative case study are to explore why MDC students involved in a STEM mentoring program believe they are persisting with their STEM pathway, and to understand students' interpretation of their mentoring experiences as they .

NUMBER OF STUDY PARTICIPANTS
If you decide to be in this study, you will be one of 10 through 15 people in this research study.

DURATION OF THE STUDY
Your participation will require one to two hours.

PROCEDURES
If you agree to be in the study, we will ask you to do the following things:
1. Participate in one or two interviews.
2. I am conducting this study for educational purposes only, no harm is expected to come to you and this will not affect your grades. All information will be digitally recorded and will be treated with confidentiality and any specific details will be report

3. RISKS AND/OR DISCOMFORTS
There are no risks and/or discomforts associated with this study.

BENEFITS
The following benefits may be associated with your participation in this study: It is significant to explore why MDC students involved in a mentoring program believe they are persisting with their STEM pathway, and to understand students' interpretation of their mentoring experiences as they progress to the second STEM academic year.

ALTERNATIVES
There are no known alternatives available to you other than not taking part in this study. However, any significant new findings developed during the course of the research, which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY

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The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report, we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

In order to maintain confidentiality and to help establish trustworthiness, the participants will be given pseudonyms and an informed consent indicating that their comments will be absolutely anonymous .

COMPENSATION & COSTS
You will not receive compensation and will not be responsible for any costs to participate in this study.

RIGHT TO DECLINE OR WITHDRAW
Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you without your consent at such time that they feel it is in the best interest.

RESEARCHER CONTACT INFORMATION
If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Juan Morata at Miami Dade College, 305 237-7963, jmorata@mdc.edu.

IRB CONTACT INFORMATION
If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT
I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I will be given a copy of this form for my records.

_____   _____
Signature of Participant   Date

_____
Printed Name of Participant

_____   _____
Signature of Person Obtaining Consent   Date

Appendix D

INTERVIEW QUESTIONS

1. Tell me about your ethnic and family educational background.

2. Tell me about your family. How do you feel about their support?

3. Tell me about you as a student. What makes you different from other students? As a STEM major?

4. According to your gender or ethnic background; How is this important as far as you identifying with your faculty mentor. Do you feel welcomed?

5. What is your mentor's gender and ethnic background? Does it matter? Tell me how or if it made any effect on your academic outcomes?

6. Tell me about about the last meeting/conversation with your mentor. Take me through the experience.

7. What does your mentor help you with?

8. What keeps you from interacting with your mentor more than you already do?

9. When you are upset or when you have a problem, do you feel that your mentor has been there for you to overcome the barrier? Can you take me through your experience?

10. Explain what value you find in your Mentoring Program. What are you getting out of the program? What did not work for you? What worked for you?

11. What is your experience in the program?

12. How valuable has mentoring been as far as helping you to you remain in the STEM field? Are you going to continue visiting your mentor?

13. Why do you think some STEM student receiving mentoring dropped out of the program? Do you know why they dropped out? Can you give me some examples or guide me towards a student that has left the STEM program?

14. What are your recommendations to improve the program?

VITA

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