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Student Involvement As A Mediator Of The Relationship Of Peer Leaders In First-Year Seminars To Academic Achievement And Persistence

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STUDENT INVOLVEMENT AS A MEDIATOR OF THE RELATIONSHIP OF PEER LEADERS IN FIRST-YEAR SEMINARS TO ACADEMIC ACHIEVEMENT AND PERSISTENCE

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DEDICATION

This dissertation is dedicated with the deepest love from my heart to my dearest grandparents, Mr. Shuisheng Zhang and Mrs. Xiulian Zheng for their love and blessing from heaven. I hope I have made you proud.

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ABSTRACT

Peer leaders as a component of First-Year Seminars (FYS) are designed to assist in the adjustment, satisfaction and persistence of first-year college students. Although previous studies have consistently found the positive and direct impact of peer leaders on first-year students' academic achievement and persistence, there is still a lack of clear understanding on why peer leaders have this positive relationship with students' academic achievement and persistence. Thus, drawing on Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993), this short term longitudinal study examined the process through which peer leaders resulted in improving students' academic achievement and persistence. Specifically, this study tested a mediational model of the relationship among FYS peer leaders, student involvement, end-of-first-year GPA and second-year persistence. This study also compared the effects of different peer leader types (i.e., undergraduate peer leaders, graduate peer leaders, or no peer leaders) on FYS student outcomes. Results from structural equation modeling to test mediation showed that the relationship between graduate peer leaders and FYS students' end-of-first-year GPAs was mediated by students' study hours, a behavioral form of academic involvement. In addition, students' study hours and end-of-first-year GPAs co-mediated the relationship between graduate peer leaders and students' second-year persistence. In other words, having a graduate peer leader in the FYS was positively related to students' study hours, which was in turn positively related to students' end-of-first-year GPAs, and then led to a higher probability

of students' second-year persistence. The indirect effects on students' end-of-first-year GPA and second-year persistence did not differ significantly between undergraduate peer leaders and no peer leaders. The significance, limitations, and implications of this study for future research and practice on how peer leaders in FYSs can more effectively promote first-year students' academic achievement and persistence were also discussed.

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CHAPTER 1

INTRODUCTION

Postsecondary enrollment is rising at an unprecedented rate in the United States (Klatt & Ray, 2014). According to the National Center for Education Statistics (2015a), enrollment in degree-granting institutions increased by 15 percent between 1992 and 2002; and between 2002 and 2012, enrollment increased 24 percent, from 16.6 million to 20.6 million. However, large numbers of students arrive at college unprepared for the academic rigor and psychosocial challenge in higher education (e.g., Côté & Allahar, 2007; Hickinbottom-Brawn & Burns, 2015; Rutschow, Cullinan, & Welbeck, 2012; What Works Clearinghouse [WWC], 2016). Specifically, many first-year college students have inadequate academic skills to read, write, speak, and think logically in order to be successful in postsecondary education, as well as little motivation to face challenges with sustained effort and persistence (Côté & Allahar, 2007; Hickinbottom-Brawn & Burns, 2015).

The low readiness for and motivation in college lead to high attrition and low graduation rates among undergraduates (Jenkins-Guarnieri, Horne, Wallis, Rings, & Vaughan, 2015; Keup, 2006). For example, approximately 30 percent of students who start college do not return the next year (Schneider, 2010). The six-year graduation rate among college students is only 65 percent at private non-profit institutions, 58 percent at public institutions and 32 percent at private for-profit institutions (National Center for Education Statistics, 2015b). The high attrition rates and low graduation rates represent

enormous financial costs for educational institutions, lost time, future earnings for students, and dashed hopes of a college degree for students and families (Day & Newburger, 2002; Permzadian & Credé, 2016; Schneider, 2010). The gap in lifetime earnings between those who have a college degree and those who start but do not complete college is more than $750,000 (Tinto, 2012). Between 2003 and 2008, states paid almost $6.2 billion to colleges and universities to help fund the education of students who did not return for a second year. In addition, states gave over $1.4 billion and the Federal government over $1.5 billion in grants to students who did not return for a second year (Schneider, 2010). The United States "continue[s] to spend far too much money on students who don't even finish the first lap, let alone fail to cross the finish line" (Schneider, 2010, p.1). Hence, high attrition and low graduation rates of undergraduate students have been a major concern for college and university campuses across the country (Barefoot, 2004).

To address the low academic skills and motivation among students in higher education and, thereby, increase persistence, a variety of programs have been designed and used in colleges and universities. These programs include, for example, First-Year Seminars (FYSs), academic learning communities, writing-intensive courses, active and collaborative learning, undergraduate research, study abroad, service learning, internships, and senior capstone experience. These educational programs are named as ten ''high-impact'' programs by the Association of American Colleges and Universities (AAC&U) based on research suggesting that these produce positive outcomes for students, and FYSs are one of the most widely utilized programs among them (Kilgo, Sheets, & Pascarella, 2015).

1.1 FIRST-YEAR SEMINARS (FYS)

FYSs are specifically designed to increase academic performance and persistence through equipping new students with the knowledge, skills, and abilities that are necessary to successfully meet the different transitional, academic and developmental challenges in the first year of college (e.g., Goodman & Pascarella, 2006; Hickinbottom-Brawn & Burns, 2015; Jenkins-Guarnieri, Horne, Wallis, Rings, & Vaughan, 2015; Keup, 2006; Klatt & Ray, 2014; Miller & Lesik, 2014; Permzadian & Credé, 2016; Sidle & McReynolds, 2009; Young & Hopp, 2014). Historically, the concept of First-Year Seminar (FYS) has existed in the colleges and universities in the United States for over 100 years. The first FYS was created in 1882 at Lee College in Kentucky, and the first "for-credit" seminar was offered at Reed College in 1911. After almost disappearing in the 1960s, the contemporary FYS was reborn at the University of South Carolina in 1972 in response to 1970 student riots against the Vietnam War and other campus issues ("University 101 programs," n.d.).

Over the past decades, FYSs have grown into a major national trend (Miller & Lesik, 2014). Based on the survey results from the 2012-13 National Survey of First-Year Seminars, almost 90% of American colleges and universities offer some form of FYS (Young & Keup, 2014). Across campuses, FYSs are provided in four different forms, which include first-year orientation seminars, academic seminars, discipline-based seminars and remedial seminars. First-year orientation seminars focus on topics exploring orientation to college, life transitions, and academic skills. Academic seminars concentrate on a selected academic theme other than college transition. Discipline-based seminars are offered as an introduction to a major or academic department. Remedial

seminars are used to promote basic study skills. Some institutions also integrate several features of different FYSs into one seminar (Barefoot 1992; Swing, 2002). Among all, first-year orientation seminars are the most commonly-used form of FYSs (Swing, 2002), and the use of peer leaders as an important component in FYSs has also become common. According to the 2012-13 National Survey of First-Year Seminars, nearly 4 in 10 campuses use peer leaders in FYSs (Young & Keup, 2014).

1.2 PEER LEADERS

Peer leaders are "students who have been selected and trained to offer educational services to their peers. These services are intentionally designed to assist in the adjustment, satisfaction, and persistence of students toward attainment of their educational goals" (Ender & Kay, 2001, p.1). Other descriptors for peer leaders include "peer educator," "peer mentor," "peer helper," "student paraprofessional," and "student assistant" (Hamid, 2001). Although the use of students in leadership roles to assist their peers has long existed in different campus organizations such as residence halls or tutoring programs, FYS peer leaders are unique because they are more than tutors or teaching assistants. Rather, peer leaders are co-instructors in FYSs. Specifically, peer leaders participate in the planning of syllabi, activities and assignments, as well as facilitate class discussions and activities (Latino & Ashcraft, 2011; "University 101 programs," n.d.). FYS peer leaders are also role models, motivators, learning coaches, and trusted friends for first-year students. In addition, peer leaders serve as the connecting link between students, teachers and the university (Black & Voelker, 2008; Colvin & Ashman, 2010; Kenedy & Skipper, 2012; Long, 1997).

The selection of peer leaders in FYSs varies across institutions. Generally, peer leaders are selected through an application and interview process based on their academic success (e.g., having a minimum 3.0 GPA) and involvement in campus organizations. Both graduate and undergraduate students can serve as FYS peer leaders. Selected students are required to attend formal training before and ongoing training while they are peer leaders. Peer leaders also have regular meetings with their FYS co-instructors. Other requirements for peer leaders include attending all FYS classes, participating in team-building workshops with co-instructors, and enrolling in educational leadership classes that cover topics such as teaching techniques, classroom management strategies, student development theories and lesson plan development ("University 101 programs," n.d.). The majority of peer leaders serve as volunteers in FYSs, but some institutions offer peer leaders incentives such as stipends or course credit (Keup, 2014; Latino & Unite, 2012).

Despite the common use of peer leaders in FYSs, the research regarding the effectiveness of peer leaders in helping first-year students' transition, academic achievement, and persistence is still limited. In 2007, to document the effectiveness of peer leaders in FYSs and other support programs, the National Resource Center for the First-Year Experience and Students in Transition issued a call for institutional reports on peer leader programs; however, only a limited number of institutions responded. Those reports usually have limitations in their generalizability due to issues such as small sample sizes and non-randomized study design (Kenedy & Skipper, 2012). Although previous studies have demonstrated that there is a positive relationship between peer leaders and FYS students' academic achievement and persistence (e.g., Black & Voelker, 2008; Hamid, 2001; Latino & Unite, 2012), existing research does not explain why peer

leaders are related to academic achievement and persistence (Kenedy & Skipper, 2012; Nora & Crisp, 2007). That is, previous research has not examined the mechanisms through which peer leaders in FYSs result in improving students' academic achievement and persistence. Additionally, most studies regarding the effects of peer leaders are descriptive in nature (e.g., Baldwin, 1975; Dawson, 1973; Edmonson, Fisher, & Christensen 2003; Levine, 1990; Meyer, 1972; Rabiecki & Brabeck, 1985; Schwitzer & Thomas, 1998; Twomey, 1991; Wepner, 1985). Thus, more rigorous research is needed to investigate what is inside the "black box" of peer leadership in FYSs (Nora & Crisp, 2007, p.340). My dissertation study seeks to address this gap through examining the relationship between peer leaders, end-of-first-year GPA and second-year persistence for FYS students, as well as to test potential mediators of this relationship.

1.3 THEORETICAL FRAMEWORK

Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993) provide a theoretical framework for my study. According to Astin (1984), the success of any school programs or policies directly depends on the degree of student involvement that the program can promote. In other words, student involvement serves as a mediator between the effectiveness of any educational programs and student outcomes. According to Astin (1993, 1996), the three most powerful forms of involvement are academic involvement, involvement with faculty, and involvement with peers. Tinto (1993) supports the significant role of student involvement in students' achievement and development, and further specifies that students' academic and social involvement with peers and faculty directly impact learning and persistence. The more students learn, the more likely they will persist in

college. Thus, drawing on both Astin's theory of student involvement for higher education (1984, 1993, 1996) and Tinto's interactive theory of departure (1993), the purpose of my study was to test how FYS students' academic and social involvement mediate the relationship among peer leaders, end-of-first-year academic achievement, and second-year persistence. Specifically, the research questions of my study are: (1) Does having a peer leader directly and positively relate to FYS students' end-of-first-year GPAs and second-year persistence? (2) Is the relationship between effects of peer leaders and end-of-first-year GPA mediated by student involvement? (3) Is the relationship between peer leaders and second-year persistence co-mediated by student involvement and end-of-first GPA?

1.4 SIGNIFICANCE OF THE STUDY

My study aims to extend previous research in several ways. First, many previous research has mainly relied on examining students' self-reports of how peer leaders impact their GPAs and whether or not they intend to return to the college or university. I use data that includes students' actual end-of-first-year GPAs and second-year persistence. Second, my study tests a mediational model of the longitudinal relationship among peer leaders, student involvement, end-of-first-year GPA and second-year persistence. Previous research has suggested direct relationships between peer leaders and involvement, or direct associations among peer leaders, achievement and persistence, but a mediational model has never been tested in a study. Third, my study is theoretically grounded in Astin's theory of student involvement for higher education (1984, 1993, 1996) and Tinto's interactive theory of departure (1993). No previous study has integrated both theories to test the mediational relationship among peer leaders, student

involvement, GPA and persistence of FYS students. Fourth, my dissertation study seeks to provide FYS students, instructors, peer leaders, and administrators with a more complete understanding of the underlying process of benefits of peer leaders in FYSs; help guide FYS administrators in their policy making; and better modify existing peer leader practices to promote first-year students' academic achievement and persistence.

CHAPTER 2

LITERATURE REVIEW

The first year of college is critical for student persistence. The largest proportion of students depart from college in the first year and before the beginning of the second year (Schneider, 2010; Permzadian & Credé, 2016; Tinto, 1993, 2012). Students' experiences in and their interactions with academic and social systems in the first year, can significantly shape college persistence (Tinto, 1993). FYSs provide services to students during this critical year and aim to support the transition, academic achievement, and persistence of first-year students. Given the significant impact of peers on the learning and development of college students, it is reasonable that peer leaders are also used increasingly in FYSs to assist the promotion of program goals (e.g., Astin, 1996; Ender & Kay, 2001; Latino & Ashcraft, 2011). This chapter provides a more in-depth review of previous findings and gaps in the research on FYSs and peer leaders as well as discusses the theoretical framework of my dissertation.

2.1 RESEARCH ON FIRST-YEAR SEMINARS (FYS)

With the rapid growth of FYSs in recent decades, interest has grown in knowing its effectiveness, especially when considering FYSs are costly and are one of the primary strategies to promote student persistence nationwide (Noel-Levitz, 2013; Padgett & Keup, 2011; Permzadian & Credé, 2016). As emphasized by Miller and Lesik (2014), "too much is at stake to not fully explore the efficacy of this intervention which has

grown into a major national trend" (p.388). Thus, extensive research has been conducted to test the effectiveness of FYS. In 1986, the National Resource Center for the First-Year Experience and Students in Transition was also established to document, advance and support efforts to improve student learning and transitions into and through higher education ("The National Resource Center for the First-Year Experience and Students in Transition," n.d.).

Existing research findings regarding the effectiveness of FYSs are largely positive. For example, Jenkins-Guarnieri, Horne, Wallis, Rings, and Vaughan (2015) conducted a quantitative evaluation on a FYS at a public, four-year university. Results from logistic regression models suggested that participation in the FYS positively related to increases in academic achievement and the odds of persisting in college, after controlling for relevant background characteristics. Using a quasi-experimental design and multivariate analysis of variance (MANOVA), Klatt and Ray (2014) compared seven cohorts of students who participated in a FYS at a college of agriculture and life sciences, to their peers, who did not participate the seminar on several academic outcomes. They found that students who participated the FYS had higher first-semester GPAs, higher retention, and were put on academic probation less often than their peers who did not complete the FYS. Vaughan, Parra, and Lalonde (2014) collected data from 266 first-generation students in a FYS and investigated the effect of their participation in the FYS on first-year academic achievement and persistence to the second semester. Using hierarchical propensity score matching techniques, the findings indicated that the FYS had significant positive causal effects on academic achievement and persistence of first-generation students compared to matched controls who did not participate in the FYS.

Finally, Permzadian and Credé (2016) conducted a meta-analysis on the effectiveness of FYSs in terms of first-year grades and first-year retention rate. Results from their analyses showed that although FYSs have a small average effect on both first-year grades and retention, these small effects can result in a 15.4% reduction of student dropout before the second year of college. Specifically, for a university with 3,000 first-year students, this reduction represents added persistence of 150 students to the second year, and savings of $417,750 at a public institution and $694,650 at a private institution (Levitz, Noel, & Richter, 1999).

Despite the solid evidence on the positive effects of FYSs, the understanding of the aspects of FYSs that, in particular, how peer leaders contribute to academic achievement and persistence has not been fully addressed yet. To deepen our understanding, it has been recommended that FYS studies employ more rigorous and sophisticated research methods, and explore the characteristics and structures of proven education practices that contribute to positive student outcomes in FYSs (Kinzie, 2013). My dissertation study follows these recommendations by exploring how the use of peer leaders in FYSs contributes to the promotion of student academic achievement and persistence.

2.2 RESEARCH ON PEER LEADERS

Researchers have consistently recognized the benefit of using peer leaders in higher education. As early as 1968, the Committee on the Student in Higher Education reported that peers are the most effective teachers on a college campus (Latino & Ashcraft, 2011). Over the past 50 years, researchers have continued to support the positive roles of peer leaders in various campus settings such as new student orientation,

residence halls, health education, campus clubs, activities, counseling, tutor centers, and academic departments (Hamid, 2001). For example, after evaluating a student-counselor assistant program initiated at Los Angeles City College in California, Ware and Gold (1971) reported that students who received peer leader assistance persist at a significantly higher rate than students who did not receive peer leader assistance. Brown (1971) examined the student-to-student academic adjustment counseling program initiated at Southwest Texas State University, and suggested that peer assistance is economical in financial and personnel costs, acceptable to both students and faculty, and effective in improving both positive study behaviors and grade point average. Forristall-Brown and Brown (1984) investigated a learning assistance program designed to improve study skills and decrease attrition among college students through the use of peer leaders at Lamar University of Texas. Results from the study showed that peer leaders significantly improve students' academic performance and reduce college dropouts. More recently, Farrell (2007) reported a five-percent increase of retention rate among students who were offered personal peer assistance at the Our Lady of the Lake located in San Antonio, Texas. Rodger and Tremblay (2003) used a random assignment design to examine the effects of a full-year peer leader program on 983 first-year students' academic achievement and persistence. The authors found that first-year students who had peer leaders had significantly higher final grades than students in the control group. At the University of Hartford, first-year students with peer leaders also reported significantly greater engagement than first-year students without peer leaders (Black & Voelker, 2008).

Peer leaders are also effective in promoting academic achievement and persistence of minority students and students who are at risk (Nora & Crisp, 2007). For example, after qualitatively investigating African American students' perceptions of the importance of peer leaders, Freeman (1999) concluded that peer leaders are important to the social and academic adjustment of both high-achieving and at-risk African American students. Ross-Thomas and Bryant (1994) conducted a case study of the Mentoring in Higher Education program at the Southern University at Baton Rouge, Louisiana from 1990 to 1992. Results from their study revealed that peer leaders promote the retention and academic achievement of first-year African American students and probationary students. Pagan and Edwards-Wilson (2002) examined the effectiveness of a peer leader program for academically at-risk students who were eligible for probation or warning guidelines. The study found that peer leaders had positive effects on retention and grade point averages of the at-risk students.

The positive findings regarding the effectiveness of peer leaders in various support programs have encouraged administrators to promote student learning and development through the use of peer leaders in FYSs (Barefoot, 2002; Kenedy & Skipper, 2012). Researchers examining the effectiveness of FYS peer leaders generally agree that first-year students in FYSs benefit from the leadership of peer leaders (Kenedy & Skipper, 2012). For example, Sanchez, Bauer and Paronto (2006) utilized a four-year longitudinal design with random assignment of first-year students to a peer leader program within a FYS. Results from hierarchical regression analysis showed that having peer leaders was associated with higher satisfaction with their university. Using *t*-test statistics, Schwitzer and Thomas (1998) studied African-American first-year college

students at a predominantly white university who participated in a freshman peer leader program and revealed that, with the assistance of peer leaders, participants with peer leaders reported progresses in problem solving and higher two-year retention rates than non-participants.

Despite the positive effects of peer leaders in FYSs, one should note that currently, there is only a small number of studies that specifically examines the effectiveness of peer leaders in the context of FYSs (Latino & Ashcraft, 2011; Nora & Crisp, 2007), and much of what exists is still descriptive in nature. Many books, chapters and papers have mainly focused on reviewing findings from other peer leader programs rather than findings about peer leaders within FYSs, described institutional experiences on the implementation of peer leader programs in FYSs, or provided guidance on the recruitment, selection and training of peer leaders (e.g., Hamid, 2001; Latino & Ashcraft, 2011; Latino & Unite, 2012; Shook & Keup, 2012; Wasburn, 2008). Studies utilizing longitudinal data and an experimental design with random assignment of subjects to investigate the effectiveness of peer leaders in FYSs, such as the one conducted by Sanchez, Bauer and Paronto (2006), are still extremely rare. Thus, extant research has not been able to provide solid empirical evidence for the effectiveness of peer leaders in FYSs. Instead, the effectiveness of peer leaders in FYSs is commonly and simply explained by the understanding that "the most effective teachers on a college campus are usually other students, a fact that drives the success of many peer educator programs" (Ender & Kay, 2001, p. 2). Thus, questions still persist regarding which aspects of peer leadership seem to contribute to positive outcomes and why. FYS peer leader literature strongly calls for research that is longitudinal in nature, rigorous in study design, and

theoretically grounded (Jacobi, 1991; Nora & Crisp, 2007). Therefore, my dissertation study aims to answer those research calls by using longitudinal data to test a mediational process through which peer leaders result in improving students' academic achievement and persistence, as guided by Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993).

2.3 THEORY OF STUDENT INVOLVEMENT FOR HIGHER EDUCATION

Astin's theory of student involvement for higher education is rooted in a longitudinal study of college dropouts examining environmental factors that significantly impact students' persistence in college (Astin, 1975, 1984, 1993, 1996). This theory explains most of the findings about environmental influences on student development from the past decades. This theory also provides guidance to researchers, college administrators and faculty in their investigation of student development, and the design of more effective learning environments (Astin, 1984). Importantly, Astin's theory of involvement (1984) shifts educators' attention away from subject matter, curriculum and teaching techniques, and towards the importance of students' motivation and active involvement.

Astin defines student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (1984, p.518). Highly involved students spend time and energy on their studies, actively participate in school organizations and activities, and closely connect with peers and faculty (Astin, 1984). The concept of involvement is similar to terms such as "time-on-task" and "effort" (Astin, 1984). Astin specifically emphasizes that involvement should be behavioral, and

that "it is not so much what the individual thinks or feels, but what the individual does, how he or she behaves, that defines and identifies involvement" (Astin, 1984, p.519).

Student involvement can be demonstrated along a continuum. For example, different students can invest different levels of involvement in the same course, and the same student may demonstrate different levels of involvement at different times. A student's decision to drop out is a form of non-involvement and can be viewed as at the lowest point of the involvement continuum. Involvement can be examined both quantitatively and qualitatively. For example, the level of involvement in a course can be measured by both study hours and study quality in terms of how well a student masters the learning materials (Astin, 1984).

Student involvement as a mediator. According to Astin (1984), the success of any school program or policy directly depends on the degree of student involvement that the program can promote. In other words, student involvement serves as a "mediating mechanism that explains how these educational programs and policies are translated into student achievement and development" (p.520). Simply exposing students to a course or program without students' active involvement will not bring about intended learning and development. This theory of student involvement focuses on explaining the behavioral mechanism that facilitates student learning and development. Accordingly, my dissertation aims to explain the effectiveness of peer leaders in a FYS by testing the mediational role of student involvement in the relationship among peer leaders, academic achievement and persistence.

Three most powerful forms of student involvement. Astin (1996) highlights that the three most powerful forms of involvement are academic involvement,

involvement with faculty, and involvement with peers. Academic involvement refers to a complex of student traits and behaviors such as the number of hours students spend studying, doing homework, attending classes or labs; the number of courses taken; the participation in academically related activities or programs such as remedial programs, internships, and study abroad; and having pedagogical experiences such as working on independent research projects and receiving tutoring (Astin 1984, 1993). Among all these different forms of academic involvement, Astin (1984) explicitly emphasizes that student time is "the most precious institutional resource" (Astin, 1984, P.523). Students' study time and effort positively relate to academic achievement, persistence, graduating with honors, enrollment in graduate school and self-reported increases in cognitive and affective skills (Astin, 1993).

Involvement with faculty includes measures such as time communicating with instructors outside of classes, working on a professor's research project and assisting faculty in teaching a class. Involvement with faculty has significant and positive relationships with numerous academic outcome such as GPA, degree attainment, graduating with honors and enrollment in graduate school (Astin, 1984, 1993). Involvement with peers includes measures such as discussing course content with other students, working on group projects for classes, and hours per week spent socializing with peers on campus and tutoring other students. Involvement with peers is positively associated with degree aspiration, GPA, and graduating with honors (Astin, 1993). Astin (1999) emphasizes that students' involvement with peers is the "strongest single source of influence on cognitive and affective development" (p. 590).

Research has demonstrated that FYS peer leaders have the capacity to promote students' academic involvement, involvement with faculty and involvement with peers (e.g., Black & Voelker, 2008; Fingerson & Culley, 2001; Kenedy & Skipper, 2012; Latino & Ashcraft, 2011; Levine,1990; Rodriguez-Sabater, 2005; Schwitzer & Thomas,1998; Twomey, 1991; Wepner, 1985). Peer leaders can increase first-year students' involvement effectively because they are not perceived as intimidating authority figures such as instructors. First-year students are more willing to be open to communicate challenges and concerns with peer leaders than with instructors (Cuseo, 1991; Hamid, 2001; Latino & Unite, 2012).

Peer leaders and academic involvement. Academically, peer leaders can serve as tutors, help students with projects or assignment preparation, make learning materials more relevant to students through sharing personal experiences, and persuade students to take learning more seriously (Latino & Ashcraft, 2011). Peer leaders can introduce campus academic services and resources, such as writing centers and tutoring centers, to FYS students. Peer leaders can also enhance FYS students' learning through contributing to the design of course syllabus by providing FYS instructors with suggestions for topics, presentations, sequencing, and course assignments (Latino & Ashcraft, 2011). .

Peer leaders can assist instructors in building learning community within the classroom, facilitating class discussions, encouraging reflection and growth through journaling, and leading meaningful and engaging class activities that involve the development of active learning strategies ("University 101 programs," n.d.). In addition, peer leaders and FYS students can meet outside of classes regularly to set and review progress on academic goals (Latino & Unite, 2012). First-year students can see peer

leaders as role models in their academic achievement, and for learning how to balance between academics and other campus activities. First-year students can also follow peer leaders' choices of academic services, activities, and positive academic behaviors such as regularly attending class, actively participating in class activities and discussion, and spending time and effort studying outside of classes (Black & Voelker, 2008; Latino & Unite, 2012; "University 101 programs," n.d.).

Peer leaders and campus involvement. Peer leaders promote students' campus involvement. Peer leaders are more experienced students who have more knowledge about campus policies, resources, opportunities and activities. They can help connect first-year students to campus through actions such as giving first-year students campus tours, and presenting relevant campus activities, organizations, services and resource information to first-year students. Peer leaders can also encourage first-year students to participate in school activities, and send reminders to first-year students about important campus deadlines (Latino & Ashcraft, 2011; Latino & Unite, 2012). These actions are important because students who are involved on campus activities are more likely to stay and graduate from college (Astin, 1975, 1984; Tinto, 1993, 2012).

Peer leaders and peer involvement. Peer leaders play an important role in promoting the first-year students' involvement with peers. Research has consistently shown the influential role of peers in college students' educational experiences, decision making, and commitment of effort to succeed to in college (e.g., Astin, 1996; Hamid, 2001; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Pascarella, 1995; Tinto, 1993). Peer leaders, who are close to the same age as first-year-students, can be particularly influential, and sometimes even have a greater impact than faculty (Hamid, 2001). Peer

leaders facilitate connections among peers through practices such as creating digital connections in social media (e.g., Facebook, Twitter), leading icebreaker activities, encouraging students to get to know each other, and meeting with students as a group outside of classes (Latino & Ashcraft, 2011). Promoting students' involvement with peers is important because, as described earlier, peer involvement is found to be "the strongest single source of influence" on students' learning and development (Astin, 1996, p.590).

Peer leaders and faculty involvement. Peer leaders promote first-year students' involvement with faculty. One of the FYS peer leaders' main responsibilities is to keep the instructor informed of students' learning needs, and help FYS students be aware of issues such as grading standards and preparation for class (Black & Voelker, 2008; Latino & Ashcraft, 2011; "University 101 programs," n.d.). Through peer leaders, instructors can have a better understanding of FYS students' learning and transitional needs to success, and then to provide students with support accordingly. Promoting student-faculty involvement is critical because previous research has consistently reported the significant and positive relationship between students' involvement with faculty and college persistence (e.g., Astin, 1996; Milem & Berger,1997; Pascarella & Terenzini, 1980; Tinto, 1993, 2012).

Although Astin's theory provides my dissertation study with a clear framework for the mediating role of student involvement between peer leaders and student outcomes such as GPA and persistence, there are limitations. First, Astin's theory (1984) mainly focuses on the behavioral aspects of student involvement, paying little attention to the perceptual aspects of student involvement, although students' perceptions of their involvement on campus have also been shown to play a significant role in students'

academic achievement and persistence (e.g., Berger & Milem, 1999; Milem & Berger, 1997). Second, Astin's theory (1984) does not explore the critical linkage between students' GPAs and persistence over time. Therefore, another theory, Tinto's interactive model of student departure (1993), is integrated into my dissertation study for a more complete theoretical framework.

2.4 INTERACTIVE MODEL OF STUDENT DEPARTURE

Tinto's interactive model of student departure (1993) explains the longitudinal process of students departing from institutions of higher education. The theory argues that the process of student departure from colleges is a longitudinal process of interactions among students' personal attributes, prior educational experiences, and the academic and social systems that students experience in college. The level of students' academic and social integration, similar to Astin's concepts of academic and social involvement, constantly modifies student's intention and commitments to persist in college. The likelihood of persistence is thus directly related to students' academic and social involvement at different points in times in college. Tinto (1993) suggests that social involvement is particularly important during the first several weeks of the first year of college. As students progress in college, they demonstrate a greater need for academic involvement once their social membership has been achieved.

Behavioral and perceived involvement. In contrast to Astin (1984, 1993, 1996), Tinto (1975, 1993) believes that both behavioral and perceptual aspects of involvement are important when explaining students' learning outcomes and their decisions to depart from institutions of higher education. This belief is also supported by extant research (e.g., Berger & Milem, 1999; Milem & Berger, 1997). For example, Milem and Berger

integrated Astin's theory of student involvement for higher education (1984) and Tinto's (1993) theory of student departure together, and empirically tested a conceptual model of student persistence that incorporated both behavioral and perceived measures of student involvement (1997, 1999). Using data collected from a longitudinal study of first-year persistence and employing structural equation modeling technique, Milem and Berger (1997) concluded that students' perceptions of institutional and peer support have a significant effect on students' commitment to persisting in college. They argued that students' decision to persist in college is a result of the interactional process between students' perceived involvement and behavioral involvement. In Berger and Milem's follow-up study that sought to further understand the interactional process of perceived and behavioral involvement (1999), they confirmed the necessity of integrating both perceived and behavioral components to examine the relationship between involvement and persistence for first-year students. Other research on student persistence has also utilized measures of perceived involvement in their analyses (e.g., Halpin, 1990; Pascarella & Terenzini, 1980). Accordingly, my dissertation study tests whether student involvement, both perceptually and behaviorally, mediates the effects of peer leaders on academic achievement and persistence of first-year students.

Linking academic achievement to persistence. Tinto's (1993) theory does more than support the significant role of student involvement in shaping student learning, especially with peers and faculty, both inside and outside the classroom. He also argues that there is a temporal linkage between learning and persistence. The more students learn, the higher their academic achievement, the more likely they will be to continue learning. Extant studies have also consistently support the predictive role of students'

academic achievement in their persistence in college. For example, when examining factors influencing college persistence for first-year students, Stewart, Lim, and Kim (2015) found that first-semester college GPA is a significant predictor to persistence in college. Gershenfeld, Ward Hood, and Zhan (2016) revealed that underrepresented students with low first-semester GPAs are significantly related to the failure to graduate from college within six years. Students' GPAs also significantly predict persistence in completion of a STEM major (Mau, 2016). For every point increase in student GPA, the odds are more than twice as much that the student would be retained in a STEM major (Rohr, 2012). Thus, my dissertation study also seeks to test the significance of the direct linkage between FYS students' end-of-first-year GPAs and second-year persistence.

2.5 HYPOTHESIZED PROCESS MODEL

Integrating both Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993), my study specifically tests how FYS students' perceived and behavioral involvement—especially the three most potent forms of student involvement, academic, peer and faculty involvement—mediate the relationship between the peer leaders, end-of first-year GPA, and second-year persistence. My study examines whether or not the impact of peer leaders on students' persistence is co-mediated by student involvement and end-of-first-year GPA. My study also compares the effects of different peer leader types (i.e., undergraduate peer leaders, graduate peer leaders, or no peer leaders) on student outcomes. Figure 2.1 presents a graphic depiction of the hypothesized process model guiding my study. The process model suggests several mediational pathways. That is, it suggests that:

(1) student involvement mediates the relationship between the effects of peer leaders and end-of-first-year GPA;

(2) student involvement mediates the relationship between the effects of peer leaders and second-year persistence; and

(3) student involvement and end-of-first-year GPA co-mediate the relationship between the effects of peer leaders and second-year persistence.

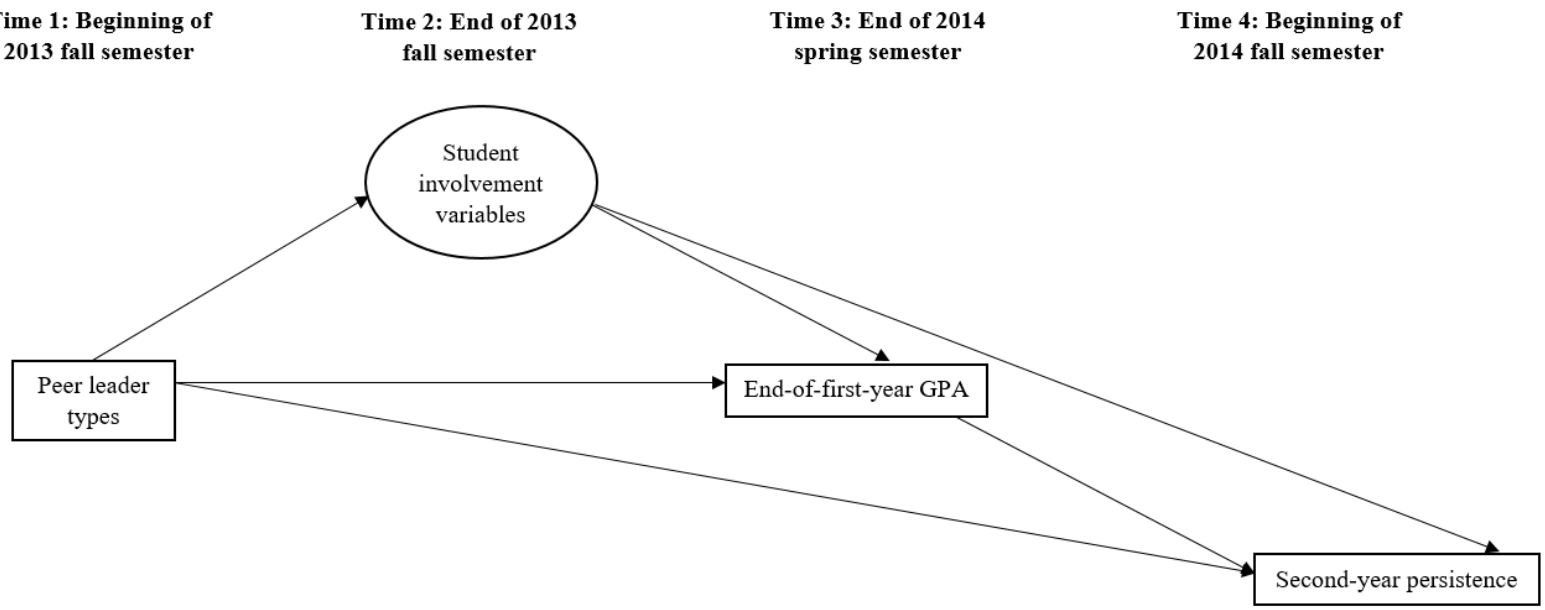

Figure *2.1* Hypothesized process model.

CHAPTER 3

METHOD

3.1 PARTICIPANTS

Data for my dissertation study was provided by a FYS consisting of 3,849 students at a large university located in the southeastern region of the U.S. The FYS followed an extended orientation model that consisted of general first-year orientation seminars, program-based seminars, and major-based seminars. Data of the FYS was collected at four points in time: as the seminar was formed at the beginning of the 2013 fall semester (Time 1), at the end of the 2013 fall semester (time 2), at the end of the 2014 spring semester (time 3), and at the beginning (i.e., October) of the 2014 fall semester (time 4). At the beginning of the 2013 fall semester, students registered to one of the FYS classes with or without a peer leader in the class. At the end of the 2013 fall semester, students completed the First-Year Seminar Assessment survey to rate their perceptions of FYS experiences and effectiveness (i.e., time 2). This survey was developed by the Educational Benchmarking, Inc. (EBI), to assess the effectiveness of first-year seminars on improving students' transition to college. The survey was sent to students via email on November 18, 2013 and students had until December 16, 2013 to complete the survey. A total of 2,489 out of 3,849 FYS students responded to the survey during this period of time, yielding a response rate of 64.7%. Students also reported their demographic characteristics (e.g., gender, race, pre-college SAT/ACT scores, parent education, study hours, etc.) in the survey. Of all the 2,489 students, 51.6% participated

in general first-year orientation seminars, 23.3% in program-based seminars, 18.4% in major-based seminars and 6.7% in other types of seminars. At the end of 2014 spring semester, FYS students' official end-of-first-year GPAs on a four-point scale were collected (i.e., time 3). FYS students' persistence (i.e., returning to college or not) were collected in October of 2014, the beginning of the second year in college (i.e., time 4). Both GPA and persistence were collected by the University Department of Enrollment Management, Office of Institutional Assessment and Compliance. FYS students' First-Year Seminar Assessment survey responses, end-of-first-year GPAs, and second-year persistence were then linked through student email addresses with the assistance of the University Department of Enrollment Management and Educational Benchmarking, Inc. (EBI). The final linked dataset contained 2,407 first-year students dispersed across 213 FYS classes. The number of students who responded to the survey in each FYS class ranged from one to 21, with an average of eleven responses per class. Approximately 63% of the FYS students had instructors who were female, 74% of the students had instructors who were classified staff, and 79% of the students had instructors who held a master's degree.

Peer leaders. Peer leaders in this sampled FYS were selected through an application and interview process based on their academic success, campus involvement, and knowledge of the university. For duties, peer leaders were required to attend all FYS classes, have regular meetings with co-instructors, complete orientation and training workshop prior to service and enroll in a three-credit peer leadership course. Peer leaders served as co-instructors in the FYS classes and took the roles of a mentor, resource and facilitator for learning for first-year students. Of all the 2,407 FYS students in my sample,

1,698 students had an undergraduate peer leader (i.e., 70.5%), 478 students had a graduate peer leader (i.e., 19.9%), and 231 students did not have either undergraduate peer leaders or graduate peer leaders (i.e., 9.6%) in their FYS classes.

Sample characteristics. Students in my sample were primarily female (i.e., 64.4%), Caucasian (i.e., 83.6%), lived on campus (i.e., 96.3%), had medium scores on pre-college SAT/ACT tests (i.e., 64%, SAT 961-1290/ACT 20-27), and had parents with a college education (i.e., 84.6%). The majority of the FYS students did not spend time working at a paid job (i.e., 83.4%), and 70% of the students received scholarships or grants as the major source of financial aid. Students' average end-of-first-year GPA was 3.49 and 91% of the students returned to the university at the beginning of the second year in college. Descriptive statistics for variables are reported in Table 3.1.

3.2 MEASURES

Student involvement. Students' responses to the First-Year Seminar Assessment survey were used in my study as measures of FYS students' academic, faculty, and peer involvement. A subset of 34 items reflecting FYS students' academic, faculty, and peer involvement was selected from the First-Year Seminar Assessment survey for analysis (Table 3.2). Following Astin's (1984) emphasis on the importance of behavioral involvement (e.g., number of study hours), FYS students' self-reported study hours outside of classes were included as a behavioral measure of academic involvement (one item). This item asked students to report the number of hours they spent on out-of-class school work (e.g. homework, practice time, lab time, studying) on an interval scale ranging from zero to five, with zero indicating none and five indicating more than 30 hours of study time.

Based on Tinto's (1993) notion on the importance of students' perceived involvement, students' perceived improvement on knowledge of academic services (three items), academic skills (three items), time management (three items), stress management (four items), and study strategies (seven items) as a result of FYS experiences were also included in the analysis to measure students' perceived academic involvement. On those items, students rated their perceived improvement of academic involvement on a seven-point Likert scale, ranging from one ("not at all") to seven ("significantly"). For example, item 42 asked students to rate "as a result of this course/experience, I better understand study strategies that work best for me." The response of one on the scale represented no improvement at all, and seven represented a significant improvement. Students were also asked to rate their perceived level of effort in FYS classes (one item) on a scale of one to seven, with one indicating very little effort, and seven indicating considerable level of effort. This item was also used to measure students' perceived academic involvement.

Items reflecting students' perceived improvement of their connection with faculty as a result of FYS experiences were selected to measure faculty involvement (two items). Students' perceived improvement of their connection with peers (four items), engagement in student activities (three items), as well as items reflecting students' self-rated social integration (three items) were selected to measure peer involvement.

To more accurately identify factors underlying items that were used to measure students' perceived involvement, factor analyses were conducted in Mplus statistical software (version 7). It should be noted that the item rating students' perceived effort in FYS as a measure of perceived academic involvement was not included in the factor analyses due to the differences in its scale notions from other items of perceived

involvement. Thus, factor analyses were run based on 32 items, excluding items on students' study hours, and perceived effort in FYS.

Before factor analyses, the full sample (n= 2,407) was randomly split into two subsamples. Exploratory factor analysis (EFA) was conducted using one subsample (n = 1,204), then confirmatory factor analysis (CFA) was conducted on the second subsample (n = 1,203). For exploratory factor analysis, factor solution was evaluated based on four main criteria (DiStefano, & Dombrowski, 2006; O'Connor; 2000). First, percentage of variance explained by the overall set of factors as well as by each individual factor was assessed. Second, simple structure was considered, where each item should associate strongly with only one factor (Gorsuch, 1983). Items were considered as markers of a factor if their loading value is at least .30. Third, the residual matrix was examined to determine if there were additional factors that should be extracted. Fourth, factor usefulness was considered based on its interpretability and match to theory.

In confirmatory factor analysis, multiple indices were used to evaluate the goodness of fit, as recommended by Kline (2016). First, a small chi-square value and an insignificant *p*-value were used to test the magnitude of discrepancy between the sample covariance matrix and the covariance matrix implied by the model (Bollen, 1989). However, due to the sensitivity of a chi-square value to sample size, other fit indices were also examined to better decide model-data fit (Gerbing & Anderson, 1993). Second, a Comparative Fit Index (CFI) higher than 0.95 was used to test the relative improvement of a model over that of the independence model as a baseline (Hu & Bentler, 1999). Third, a Tucker-Lewis Index (TLI) higher than 0.95 was used to test the relative improvement of fit per degree of freedom of the proposed model over the independence

model (Hu & Bentler, 1999). Fourth, a Root Mean Square Error of Approximation (RMSEA) less than .05 was used to demonstrate close fit of the model (Browne & Cudeck, 1993). Fifth, a Standardized Root Mean residual (SRMR) was used to indicate the average standardized residuals between the specified and obtained variance-covariance matrices (Bollen, 1989). An SRMR value approximates or less than .08 was indicative a good fit (Hu & Bentler, 1999).

Dependent variables. School official records of FYS students' end-of-first-year GPAs on a four-point scale and their second-year persistence (i.e., returning to college or not) gathered by the University Department of Enrollment Management, Office of Institutional Assessment and Compliance, were included in the analysis as dependent variables.

Covariates. To more accurately estimate the effects of peer leaders, FYS student- and class- level characteristics were also included in the analysis as covariates (Kilgo, Sheets, & Pascarella, 2015; Miller & Lesik, 2014). Student race/ethnicity, gender, pre-college SAT/ACT score, residence (i.e., on campus or off campus living), parent education, financial aid status and the number of work hours were selected from the First-Year Seminar Assessment survey as student-level covariates. On the class level, FYS program records of teacher gender, education level, and classification (i.e., classified staff, unclassified administrators, faculty or others) were included as covariates. APPENDIX A presents the descriptions of variables and factors included in my study.

3.3 ANALYTIC APPROACH

Structural equation modeling (SEM) was used in my dissertation study to estimate relationships among variables. Structural equation modeling (SEM) technique was

appropriate for my analysis based on three reasons. First, because students' perceived involvement was assessed with latent constructs that were imperfectly measured by manifest survey items, SEM can adjust for measurement errors arising from such situations. Second, because my study simultaneously estimated dependent variables of end-of-first-year GPA and second-year persistence in one model, SEM can be used to estimate more than one dependent variable at the same time. Third, my study tested a mediational process model of the relationship among peer leaders, student involvement, end-of-first-year GPA and second-year persistence. SEM was ideal because an important element of SEM is examining mediating relationships among constructs or variables (Kline, 2016).

The SEM analysis in my study was guided by Anderson and Gerbing's (1988) two-step approach. First, a measurement model grounded in theory was specified and estimated through confirmatory factor analysis. Fit was then examined to assess the goodness of fit. Second, path analysis was incorporated into the measurement model to test the significance of structural paths. Mediation analysis was conducted during this second stage. In mediation analysis, indirect effects are the products of two variables, which do not follow a normal distribution. Therefore, bootstrapping as a resampling technique is used to account for the non-normal distribution of indirect effects (Preacher & Hayes, 2008). Bootstrapping takes a large number of samples from the original sample size and computes the indirect effect based on the re-sampling. A confidence interval is then derived from the re-sampled distribution. For example, when bootstrapping 1,000 samples, the point estimate of the indirect effect is the mean of the two variables computed over 1,000 samples. A 95% confidence interval is calculated by taking the 25th

score and 976th score from a vector of 1,000 estimates that are sorted from low to high in the re-sampled distribution (Preacher & Hayes, 2004).

Missing data in my study were adjusted with full-information maximum likelihood (FIML) estimation when estimating the measurement model of my study in Mplus. FIML uses all the available information to provide a maximum likelihood estimation for model parameters (Enders, 2001; Muthén & Muthén,1998-2015), and is considered as one of the best missing-data coping approaches that is available currently (Acock, 2005). When estimating the structural model, because the dependent variables of my study contained a continuous variable (i.e., end-of-first-year GPA) and a categorical variable (i.e., second-year persistence), WLSMV, a robust weighted least squares estimator using a diagonal weight matrix, was used to estimate both of the dependent variables at the same model (Finney & DiStefano, 2013; Muthén & Muthén,1998-2015). With WLSMV, Mplus uses pairwise present to handle the missing data (Muthén & Muthén,1998-2015).

Due to the nested nature of the analytic data in my study (i.e., students are nested within FYS classes), Mplus analysis setting was specified as TYPE=COMPLEX in order to adjust the standard errors in the model to account for non-independence of observations (Muthén & Muthén, 1998-2015). Research without the adjustment for dependency of observations analyzes data at the individual level only and ignores the nesting of individuals within organizational units. This can inflate Type I error and negatively bias the estimates of standard errors, and thus may lead to erroneous decisions regarding which variables are significant (Raudenbush & Bryk, 2002). Taken together, the rigorous structural equation modeling analysis with the adjustment of dependency of

data in my study offered the capabilities to more accurately estimate standard errors, take into account measurement errors, and make the estimation of causal relationships possible through mediational testing (Hox, 2013; Kline, 2016; Rabe-Hesketh, Skrondal, & Zheng, 2007). Therefore, findings of my dissertation study would allow FYS policy makers to make decisions with more accurate and reliable evidence.

Table 3.1
Descriptive Statistics for Variables

Variable	Sample Size	Mean	Standard Error
Student-level variables			
Persistence	2407	0.91	0.08
GPA	2403	3.49	0.31
No peer leader	2407	0.10	0.09
Undergraduate peer leader	2407	0.71	0.21
Graduate peer leader	2407	0.20	0.16
Study hours	2385	2.05	0.78
Perceived effort in FYS	2248	5.15	2.24
Male	2387	0.35	0.23
Race: Caucasian	2405	0.84	0.14
Work hours	2390	0.26	0.43
On-campus living	2392	0.97	0.03
Parent education	2395	0.15	0.13
SAT/ACT scores:			
Low	2330	0.01	0.01
Medium	2330	0.64	0.23
High	2330	0.35	0.23
Financial aid:			
No aid	2355	0.12	0.11
Student loans	2355	0.18	0.15
Scholarship/grants	2355	0.70	0.21
Class-level variables			
Teacher gender: Male	2407	0.37	0.23
Teacher educational degree:			
Doctorate	2407	0.17	0.14
Master's	2407	0.79	0.17
Other degrees	2407	0.04	0.04
Teacher classification:			
Classified staff	2393	0.74	0.19
Faculty	2393	0.12	0.11
Unclassified administrators	2393	0.07	0.06
Others	2393	0.08	0.07

Table 3.2
Survey Items Selected from the First-Year Seminar Assessment Survey

Variable names	Selected survey items
Academic involvement	
Study hours	A continuous variable
Perceived effort in FYS	A continuous variable
Academic services	As a result of this course/experience, I better understand: How to obtain academic assistance. (Item 58) How academic advising works. (Item 60) Available library resources. (Item 61)
Study strategies	As a result of this course/experience, I better understand: Study strategies that work best for me. (Item 42) The importance of using study time effectively. (Item 43) As a result of this course/experience, I am more likely to: Taking effecting notes in class. (Item 78) Keep up with class readings in my courses. (Item 79) Participate in classroom discussions. (Item 80) Use study groups to prepare for tests. (Item 82) Use my time effectively when studying for tests. (Item 84)
Academic skills	As a result of this course/experience, the following have improved: Reading skills. (Item 66) Writing skills. (Item 67) Oral presentation skills. (Item 68)
Stress management	As a result of this course/experience, I am more likely to: Manage my stress. (Item 72) Identify issues that cause me anxiety. (Item 73) Make decisions that alleviate stress. (Item 74) Cope with test anxiety. (Item 83)
Time management	As a result of this course/experience, I am more likely to: Set priorities to accomplish what is most important. (Item 69) Establish an effective study schedule. (Item 70) Complete tasks on time (e.g., assignments, homework). (Item 71)
Faculty involvement	As a result of this course/experience, I am more likely to: Communicate with my instructors outside of class. (Item 85) Seek feedback on my academic performance form my instructors. (Item 86)
Peer involvement	
Peer connection	As a result of this course/experience, I am more likely to:

	Get to know other students at my institutions. (Item 87) Meet new people who share my interests. (Item 88) Establish friendships with peers. (Item 89) Accept people who are different from me. (Item 93)
Engagement with student activities	As a result of this course/experience, I am more likely to: Participate in student organizations. (Item 90) Participate in student activities. (Item 91) Participate in service-learning/ civic-engagement activities. (Item 92)
Social integration	To what degree: Are you accepted by students at this college/university. (Item 96) Is it easy for you to make new friends at this college/university. (Item 97) Are you able to identify other students with similar interests. (Item 98)

CHAPTER 4

RESULTS

4.1 MEASUREMENT MODEL

Exploratory factor analysis (EFA). Before the analysis of factors, item-level normality in the data was examined, and no substantial violation of normality was found. The average skewness and kurtosis of the items were -1.16 and 1.02, respectively. EFA using maximum likelihood extraction and oblimin rotation revealed that five factors were sufficient to explain variance in the selected 32 items measuring students' perceived involvement. Other factor solutions (i.e., four-, six-, seven- and eight- factor solutions) were also tested and compared. The five-factor solution was chosen because of its advantage in interpretability compared to other solutions. Total variance explained by the five-factor solution was 58%.

The five factors extracted were named as perceived self-regulation skills, perceived academic skills, perceived participation in school activities, perceived connection with peers, and perceived social integration. The factor of perceived self-regulation skills included items such as item 70 (i.e., as a result of this course/experience, I am more likely to establish an effective study schedule). Perceived academic skills included items such as item 66 (i.e., as a result of this course/experience, [my] reading skills have improved). Perceived participation in school activities included items such as item 90 (i.e., as a result of this course/experience, I am more likely to participate in

student organizations). Perceived connection with peers included items such as item 87 (i.e., as a result of this course/experience, I am more likely to get to know other students at my institutions). For the factor of perceived social integration, items such item 96 (i.e., to what degree, are you accepted by students at this college/university). It should be noted that the two items reflecting students' interactions with faculty (i.e., item 85: As a result of this course/experience, I am more likely to communicate with my instructors outside of class; item 86: As a result of this course/experience, I am more likely to seek feedback on my academic performance from my instructors) did not hold as a separate factor to measure students' perceived involvement with faculty. Instead, these two items loaded on the factor of perceived self-regulation skills. Thus, perceived self-regulation skills and perceived academic skills were used as factors to measure students' perceived academic involvement. Students' perceived participation in school activities, perceived connection with peers and perceived social integration were used to measure students' perceived social involvement. Table 4.1 and 4.2 displays factor loadings of items on the five distinct factors of student involvement and the inter-correlation between factors, respectively.

Confirmatory factor analysis (CFA). To test the factor structure validity, a higher order confirmatory factor analysis with maximum likelihood estimator was conducted on the second half of the randomly split sample. Perceived academic involvement was the higher order factor that comprised two sub-factors of perceived self-regulation skills and perceived academic skills. Perceived social involvement served as the other higher order factor that consisted of three sub-factors of perceived participation in school activities, perceived connection with peers, and perceived social integration.

CFA results of the higher order model indicated acceptable, but not ideal, model fit, χ^2 (454) = 4453.436, $p < 0.001$, CFI = 0.913, TLI = 0.905, RMSEA = 0.088, SRMR = 0.045. Given the high correlation ($r = .97$) between the higher order factors of perceived academic involvement and perceived social involvement, students' perceived academic involvement and perceived social involvement were combined as a single higher order factor to include all the five individual factors as sub-factors. This new higher order factor was named as "perceived involvement." Results from the higher order model with one higher order factor, again, yielded acceptable levels of model fit, χ^2 (459) = 4655.991, $p < 0.001$, CFI = 0.909, TLI = 0.902, RMSEA = 0.089, SRMR = 0.054). Fitting the model to the full sample resulted in similarly acceptable model fit, as evidenced by the fit indices, χ^2 (459) = 8541.634, $p < 0.001$, CFI = 0.912, TLI = 0.905, RMSEA = 0.087, SRMR = 0.052.

4.2 STRUCTURAL MODEL

Built on the measurement model, structural model incorporated path analysis among variables and constructs. Specifically, paths included in the analysis were paths from peer leader types to different forms of student involvement, paths from different forms of student involvement to end-of-first-year GPA and second-year persistence, and a path from end-of-first-year GPA to second-year persistence. Indirect effects were specified, and covariates from both student and class levels were also included in the analysis. All variables and factors were correlated with one another except for the correlations between peer leader types. The hybrid model with both a measurement model and a structural model (Kline, 2016) yielded good model fit before bootstrapping was used to adjust for confidence intervals of indirect effects, χ^2 (1,144) = 2099.938, $p <$

0.001, CFI = 0.953, TLI = 0.947, RMSEA = 0.019. With the use of bootstrapping in the model, the model had a good fit as well, as evidenced by an RMSEA of 0.02. To note, chi-square and other fit indices are not available in Mplus when bootstrapping is employed together with the adjustment of class-level variance under the function of TYPE = COMPLEX (Muthén & Muthén,1998-2015).

Covariates, dependent variables and predictors. Descriptive statistics demonstrated that FYS students' average end-of-first-year GPAs was 3.49, and 91% of the FYS students returned to the university at the beginning of second year (Table 3.1). Table 4.3 presents the regression coefficients of the relationships between covariates and dependent variables, as well as the relationships between covariates and predictors. For end-of-first-year GPA, results showed that, on the students' level, FYS students who had high SAT/ACT scores (i.e., SAT 1291/ACT 28 or above) had higher GPAs than students who had medium SAT/ACT scores (i.e., SAT 961-1290/ACT 20-27) (b = 0.08, se = 0.03, $p < 0.05$). Male students in the FYS had lower GPAs than female students (b = -0.05, se = 0.02, $p < 0.05$). Students who received student loans as the major source of financial aid had lower GPAs than students who received scholarships/grants as the major source of financial aid (b = -0.09, se = 0.03, $p < 0.001$). None of the class level characteristics (i.e., teacher gender, educational degree, teacher classification) significantly related to FYS students' end-of-first-year GPAs.

For students' second-year persistence, covariates of my study did not show direct impact on it. In other words, FYS students' personal characteristics of gender, race/ethnicity, parent education, work hours, prior SAT/ACT scores, residence, and sources of financial aid were not significantly and directly related to second-year

persistence. Teacher characteristics of gender, educational degree and teacher classification were not predictive to FYS students' persistence either.

For students' perceived involvement as a result of FYS experiences, on the student level, male students (b = -0.19, se = 0.06, $p < 0.01$), students who had high SAT/ACT scores (b = -0.29, se = 0.07, $p < 0.001$), and students who lived on campus (b = -0.29, se = 0.15, $p < 0.05$) reported a lower level of perceived involvement as a result of FYS experiences than female students, students who had medium SAT/ACT scores, and students who lived off campus, respectively. On the class level, students who had male teachers in the FYS reported lower perceived involvement than students who had female teachers in the seminar (b = -0.18, se = 0.08, $p < 0.05$).

For students' study hours, on the student level, students who had high SAT/ACT scores reported more study hours than students who had medium SAT/ACT scores (b = 0.12, se = 0.04, $p < 0.01$). The number of study hours reported by FYS male students were less than female students (b = -0.14, se = 0.03, $p < 0.001$). On the class level, FYS students who were taught by faculty members reported more study hours than students who were taught by classified staff (b = 0.14, se = 0.07, $p < 0.05$). FYS students who had teachers holding other degrees (i.e., Educational Specialist degrees, Juris Doctor degrees, and Medicine Doctor degrees) reported less study hours than students who had teachers holding a Master's degree (b = -0.29, se = 0.12, $p < 0.05$).

For students' perceived effort in FYS classes, on the student level, male students (b = 0.15, se = 0.06, $p < 0.05$) and non-Caucasian students (b = 0.21, se = 0.08, $p < 0.01$) reported a higher level of perceived effort in FYS classes than female students and Caucasian students, respectively. On the class level, students who had teachers who were

Ph.D. students and teachers who were classified as either faculty or unclassified administrators, reported a lower level of perceived effort in FYS classes than students who had teachers who were classified staff (b = -0.29, se = 0.13, $p < 0.05$).

Analyses of structural paths. Estimates for the structural paths are presented in Figure 2. Results demonstrated that peer leader types (i.e., undergraduate peer leaders, graduate peer leaders, or no peer leaders) did not have significantly direct effects on students' perceived involvement as a result of FYS experiences, perceived effort in FYS classes, study hours, end-of-first year GPAs, and second-year persistence. Results also showed that students' study hours had a significantly positive relationship with end-of-first year GPAs, such that the more hours students spent studying, the higher the GPAs (b = 0.03, se = 0.01, $p < 0.05$). FYS students' end-of-first-year GPAs was the only significant predictor to their second-year persistence (b = 0.64, se = 0.04, $p < 0.001$).

Regarding the proportion of variance explained by the model, R^2 values were also examined to evaluate the effect sizes. Approximately 13.9% of the variance in FYS students' second-year persistence was accounted for by the model (R^2 = 0.139). About 2.2% of the variance in end-of-first year GPA (R^2 = 0.022), 2.6% of the variance in students' study hours (R^2 = 0.026), 3.2% of the variance in students' perceived involvement as a result of the FYS (R^2 = 0.032), and 1.2% of the variance in students' perceived effort in the FYS were explained by the model (R^2 = 0.012).

Mediation analyses. Table 4.4 demonstrates the direct, indirect, and total effects for the relationships between FYS leader types and student outcomes. Estimates of the indirect effects with the adjustment of bootstrapping revealed that, compared to undergraduate peer leaders, graduate peer leaders had significantly higher indirect effects

on students' end-of-first GPAs that were mediated by students' study hours, a behavioral form of academic involvement (b = 0.005, 95% C.I. = 0.000 to 0.075). Specifically, having a graduate peer leader was positively related to students' study hours, which was in turn positively associated with end-of-first-year GPAs. Another statistically significant indirect effect was from having a graduate peer leader, to study hours, to end-of-first-year GPA, and eventually to second-year persistence (b = 0.003, 95% C.I. = 0.000 to 0.046). To be more specific, having a graduate leader in the FYS was positively related to study hours, which was in turn positively associated with end-of-first-year GPA that was in turn positively related to a higher probability of second-year persistence. However, the indirect effects on end-of-first-year GPA and second-year persistence did not differ significantly between undergraduate peer leaders and no peer leaders.

It should be noted that although graduate peer leaders did not show a significantly direct relationship with students' study hours under the traditional significance test where p-value was computed based on t-statistics (i.e., regression coefficient/standard error) (b = 0.15, se = 0.44, p = 0.729), graduate peer leaders did show a significant effect on study hours when examining the confidence intervals calculated through bootstrapping (b = 0.152, 95% C.I. = 0.011 to 1.875). To further determine whether the detected mediation was a partial or a full mediational relationship, the direct relationship between peer leaders and dependent variables were tested without introducing mediators into the model. To establish that students' study hours completely mediate the relationship between peer leaders and student outcomes, peer leaders should have a direct effect on dependent variables before mediators were included in the model. Once mediators were included, the effect of peer leaders on dependent variables should be zero. Full mediation

indicates that the effects of an independent variable can be completely transmitted by mediators onto a dependent variable, whereas partial mediation indicates that it cannot (Baron & Kenny, 1986).

Results of the test in my study showed that there was not a significantly direct relationship between peer leaders and dependent variables of GPA and persistence before mediators were included in the analysis. According to Baron and Kenny (1986), this finding was an indicator that the mediation relationship between peer leaders and student outcomes did not exist and the mediation analysis should not be continued; however, contemporary mediation researchers, Rucker, Preacher, Tormala and Petty (2011) argued that the requirement for a significant relationship between independent and dependent variables prior to examining indirect effects is outdated and should be abandoned. This argument was also supported by Hayes (2009) and MacKinnon, Krull and Lockwood (2000). The claims of full mediation can unnecessarily hinder theory development because there might be additional mediating paths (Rucker et al., 2011), and to claim full mediation, researchers would also have to perfectly measure mediators without errors, which is rare in social science (Hoyle & Kenny, 1999). Therefore, Rucker and colleagues (2011) emphasized that mediation analysis should be guided by theory regardless of whether or not it meets the standard criteria for full mediation, and attention should be placed on whether there is evidence for a significantly indirect effect and the size of that indirect effect. As exemplified in my dissertation study, the mediation relationship was guided by Astin's theory of student involvement for higher education (1984), and results from the indirect effect testing confirmed the mediation relationship, despite the fact that there was not a significantly direct relationship between independent

and dependent variables prior to examining indirect effects as required by Baron and Kenny (1986).

Table 4.1
EFA Rotated Factor Loadings of the Five-Factor Solution

	Factor 1 Perceived self-regulation skills	Factor 2 Perceived academic skills	Factor 3 Perceived connection with peers	Factor 4 Perceived social integration	Factor 5 Perceived participation in school activities
Factor 1					
item 74	0.97				
item 72	0.94				
item 73	0.94				
item 70	0.87				
item 79	0.85				
item 78	0.82				
item 84	0.81				
item 71	0.79				
item 69	0.77				
item 43	0.74				
item 83	0.66				
item 42	0.65				
item 86	0.64				
item 80	0.61				
item 61	0.56				
item 58	0.54				
item 82	0.53				
item 85	0.52				
item 60	0.50				
Factor 2					
item 66		0.92			
item 67		0.97			
item 68		0.56			
Factor 3					
item 87			0.68		
item 88			0.80		
item 89			0.77		
item 93			0.35		
Factor 4					
item 96				0.85	
item 97				0.94	
item 98				0.90	
Factor 5					0.72

item 90					0.68
item 91					0.72
item 92					
Eigen value	10.35	2.10	1.83	2.42	1.50
% of variance	32%	7%	6%	8%	5%

Note. Total variance explained is 58%.

Table 4.2
Factor Inter-Correlation Matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1: Perceived Self-regulation skills	-				
Factor 2: Perceived participation in school activities	0.88	-			
Factor 3: Perceived social integration	0.47	0.47	-		
Factor 4: Perceived connection with peers	0.89	0.89	0.50	-	
Factor 5: Perceived academic skills	0.65	0.66	0.35	0.66	-

Table 4.3
Relationships between Covariates, Dependent Variables, and Predictors

Covariates	Estimate	S.E.	Est./S.E.	*p*-value
GPA on:				
Student-level				
Male	-0.05	0.02	-2.19	0.03
Non-Caucasian	0.04	0.03	1.55	0.12
Parents without a college degree	-0.02	0.03	-0.49	0.62
Work hours	-0.01	0.02	-0.34	0.73
On-campus living	0.06	0.06	0.95	0.34
SAT/ACT				
(Reference group: Medium SAT/ACT)				
Low SAT/ACT	-0.11	0.14	-0.81	0.42
High SAT/ACT	0.08	0.03	2.60	0.01
Financial aid				
(Reference group: scholarship/grants)				
No aid	-0.04	0.03	-1.11	0.27
Student loans	-0.09	0.03	-3.03	0.00
Class-level				
Teacher gender: Male	-0.02	0.03	-0.55	0.58
Teacher educational degree				
(Reference group: Master's)				
Doctorate	0.03	0.04	0.87	0.38
Other degrees (i.e., Ed.S., J.D., M.D.)	-0.07	0.05	-1.43	0.15
Teacher classification				
(Reference group: classified staff)				
Faculty	0.03	0.04	0.70	0.48
Unclassified administrators	-0.01	0.06	-0.22	0.83
Others (i.e., Ph.D. students, other classification)	0.01	0.05	0.20	0.84
Persistence on:				
Student-level				
Male	-0.03	0.07	-0.37	0.71
Non-Caucasian	-0.12	0.09	-1.28	0.20
Parents without a college degree	0.06	0.10	0.59	0.56
Work hours	-0.04	0.06	-0.72	0.47
On-campus living	-0.34	0.25	-1.34	0.18
SAT/ACT				
(Reference group: Medium SAT/ACT)				
Low SAT/ACT	0.01	1.10	0.00	1.00
High SAT/ACT	0.03	0.08	0.44	0.66
Financial aid				
(Reference group: scholarship/grants)				

No aid	-0.05	0.11	-0.43	0.67
Student loans	-0.07	0.09	-0.74	0.46
Class-level				
Teacher gender: Male	0.01	0.07	0.08	0.94
Teacher educational degree (Reference group: Master's)				
Doctorate	-0.12	0.08	-1.55	0.12
Other degrees (i.e., Ed.S., J.D., M.D.)	0.03	0.46	0.07	0.94
Teacher classification (Reference group: classified staff)				
Faculty	0.01	0.09	0.11	0.91
Unclassified administrators	0.10	0.19	0.54	0.59
Others (i.e., Ph.D. students, other classification)	0.15	0.12	1.20	0.23
Perceived involvement on:				
Student-level				
Male	-0.19	0.06	-3.14	0.00
Non-Caucasian	0.01	0.07	0.13	0.90
Parents without a college degree	0.03	0.08	0.37	0.71
Work hours	-0.06	0.05	-1.21	0.23
On-campus living	-0.29	0.15	-1.97	0.05
SAT/ACT (Reference group: Medium SAT/ACT)				
Low SAT/ACT	-0.40	0.26	-1.52	0.13
High SAT/ACT	-0.29	0.07	-4.10	0.00
Financial aid (Reference group: scholarship/grants)				
No aid	-0.11	0.09	-1.17	0.24
Student loans	0.02	0.06	0.27	0.79
Class-level				
Teacher gender: Male	-0.18	0.08	-2.14	0.03
Teacher educational degree (Reference group: Master's)				
Doctorate	-0.01	0.10	-0.10	0.92
Other degrees (i.e., Ed.S., J.D., M.D.)	-0.30	0.25	-1.23	0.22
Teacher classification (Reference group: classified staff)				
Faculty	0.05	0.11	0.46	0.64
Unclassified administrators	-0.04	0.21	-0.18	0.86
Others (i.e., Ph.D. students, other classification)	0.12	0.14	0.84	0.40

Study hours on:				
Student-level				
Male	-0.14	0.03	-4.11	0.00
Non-Caucasian	-0.03	0.06	-0.54	0.59
Parents without a college degree	-0.08	0.06	-1.35	0.18
Work hours	-0.01	0.02	-0.60	0.55
On-campus living	-0.15	0.11	-1.34	0.18
SAT/ACT				
(Reference group: Medium SAT/ACT)				
Low SAT/ACT	-0.22	0.19	-1.13	0.26
High SAT/ACT	0.12	0.04	2.75	0.01
Financial aid				
(Reference group: scholarship/grants)				
No aid	-0.05	0.05	-1.05	0.29
Student loans	-0.05	0.04	-1.07	0.29
Class-level				
Teacher gender: Male	-0.04	0.04	-1.03	0.31
Teacher educational degree				
(Reference group: Master's)				
Doctorate	0.00	0.05	-0.02	0.99
Other degrees (i.e., Ed.S., J.D., M.D.)	-0.29	0.12	-2.51	0.01
Teacher classification				
(Reference group: classified staff)				
Faculty	0.14	0.07	1.98	0.05
Unclassified administrators	0.05	0.07	0.62	0.54
Others (i.e., Ph.D. students, other classification)	0.13	0.07	1.78	0.08
Perceived effort on:				
Student-level				
Male	0.15	0.06	2.51	0.01
Non-Caucasian	0.21	0.08	2.80	0.01
Parents without a college degree	0.03	0.08	0.31	0.75
Work hours	0.01	0.05	0.14	0.89
On-campus living	0.06	0.14	0.43	0.66
SAT/ACT				
(Reference group: Medium SAT/ACT)				
Low SAT/ACT	0.03	0.30	0.11	0.92
High SAT/ACT	-0.02	0.07	-0.34	0.73
Financial aid				
(Reference group: scholarship/grants)				
No aid	0.14	0.10	1.36	0.18
Student loans	0.12	0.08	1.53	0.13
Class-level				

Teacher gender: Male	0.01	0.07	0.12	0.91
Teacher educational degree (Reference group: Master's)				
Doctorate	0.11	0.09	1.17	0.24
Other degrees (i.e., Ed.S., J.D., M.D.)	-0.11	0.27	-0.39	0.70
Teacher classification (Reference group: classified staff)				
Faculty	0.04	0.11	0.41	0.68
Unclassified administrators	-0.01	0.15	-0.05	0.96
Others (i.e., Ph.D. students, other classification)	-0.29	0.13	-2.26	0.02

Table 4.4
Relationships between Peer Leader Types and Dependent Variables Using Involvement as a Mediator: Direct, Indirect, and Total Effects

Path	Direct effect	Indirect effect (95% C.I.)	Total effect
GPA Perceived involvement No leader	-0.055	0.002 (-0.002 to 0.042)	-0.057
GPA Study hours No leader	-0.055	-0.002 (-0.021 to 0.005)	-0.076
GPA Perceived effort No leader	-0.055	0.000 (-0.004 to 0.003)	-0.059
GPA Perceived involvement Graduate leader	-0.035	-0.001 (-0.008 to 0.003)	-0.043
GPA Study hours Graduate leader	-0.035	0.005 (0.000 to 0.075)	-0.035
GPA Perceived effort Graduate leader	-0.035	0.000 (-0.003 to 0.007)	-0.038
Persistence Perceived involvement No leader	-0.136	0.000 (-0.024 to 0.027)	-0.16
Persistence Study hours No leader	-0.136	0.001 (-0.008 to 0.039)	-0.144
Persistence Perceived effort No leader	-0.136	0.001 (-0.009 to 0.016)	-0.145
Persistence GPA Perceived involvement			

No leader	-0.136	0.002 (-0.001 to 0.027)	-0.137
Persistence GPA Perceived effort No leader	-0.136	0.000 (-0.003 to 0.002)	-0.139
Persistence GPA Study hours No leader	-0.136	-0.001 (-0.014 to 0.003)	-0.15
Persistence Perceived involvement Graduate leader	0.075	0.000 (-0.017 to 0.019)	0.058
Persistence Study hours Graduate leader	0.075	-0.002 (-0.068 to 0.016)	0.007
Persistence Perceived effort Graduate leader	0.075	-0.001 (-0.015 to 0.007)	0.06
Persistence GPA Perceived involvement Graduate leader	0.075	-0.001 (-0.006 to 0.002)	0.069
Persistence GPA Perceived effort Graduate leader	0.075	0.000 (-0.002 to 0.004)	0.073
Persistence GPA Study hours Graduate leader	0.075	0.003 (0.000 to 0.046)	0.075

Note. All estimates are unstandardized, and the 95% confidence interval for the indirect effect was obtained using the bootstrapping function in Mplus.

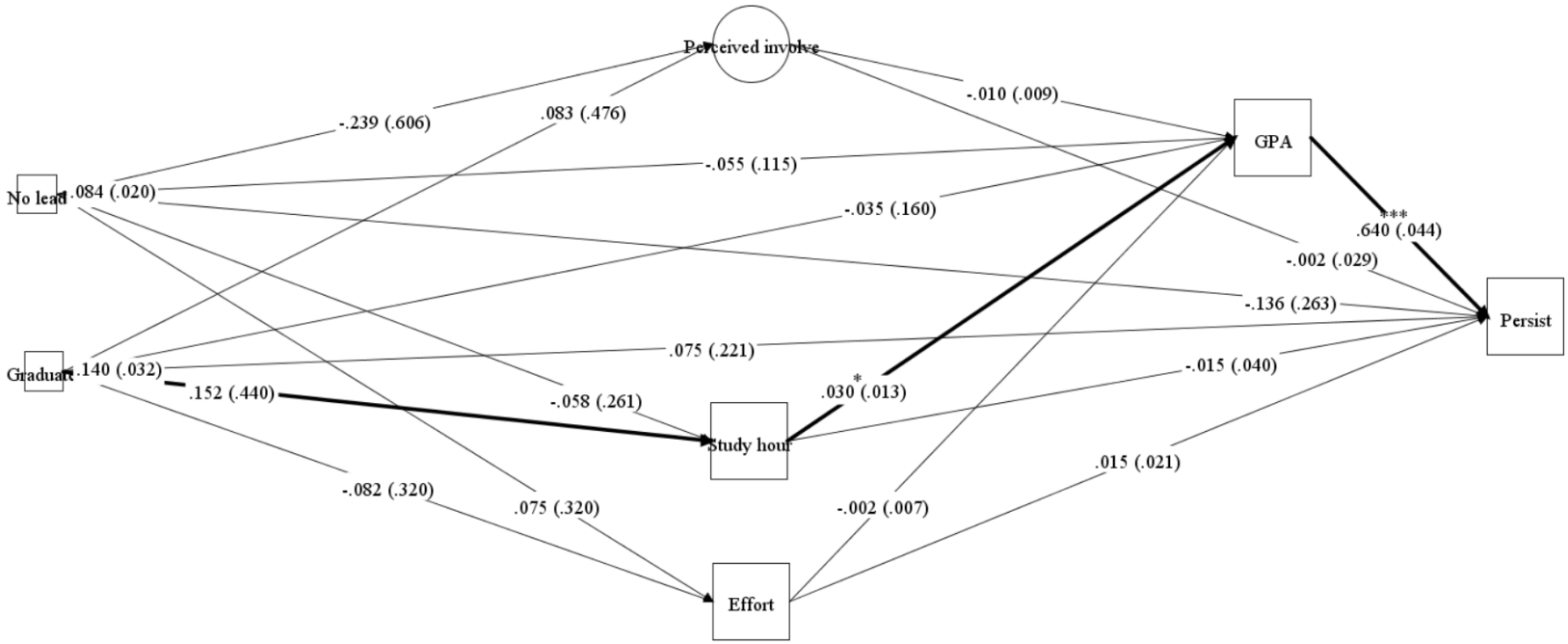

Figure 4.1 Structural model with estimates. Standard errors are in parentheses. "No lead" denotes "no peer leaders," "Graduate" denotes "graduate peer leaders," "Perceived involve" denotes "Perceived involvement as a result of FYS" and "Effort" denotes "Perceived effort in FYS." The paths in bold indicate significant indirect effects. Covariates are not shown here for space and clarity. Information regarding the relationships between covariates and latent constructs, covariates and dependent variables can be found in Table 4.3. * $p < .05$. ** $p < .01$. *** $p < .001$

CHAPTER 5

DISCUSSION

Using Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993), this short-term longitudinal study examined the process through which peer leaders improved FYS students' GPAs and persistence. Specifically, my study tested a mediational model of the relationships among FYS peer leader type, student involvement, end-of-first-year GPA and second-year persistence. I then compared the effects of different peer leader types (i.e., undergraduate peer leaders, graduate peer leaders, or no peer leaders) on student outcomes. Results from structural equation modeling yielded six main findings. First, numerous student- and class-level characteristics were significantly related to FYS students' perceived involvement, perceived effort in the FYS, study hours, and end-of-first-year GPAs. None of the student- and class- level characteristics showed significant direct relationships with FYS students' second-year persistence in my study. Second, peer leaders did not directly relate to FYS students' end-of-first-year GPAs and second-year persistence. Third, students' study hours, a behavioral form of academic involvement, had a significantly positive and direct relationship with end-of-first-year GPAs. Fourth, end-of-first-year GPA was the only significant predictor of second-year persistence.

Fifth, mediational analyses revealed that, compared to undergraduate peer leaders, graduate peer leaders had significantly higher indirect effects on students'

end-of-first-year GPAs and second-year persistence. The indirect effects on end-of-first-year GPA and second-year persistence did not differ significantly between undergraduate peer leaders and no peer leaders. Findings of my study showed that students' study hours significantly mediated the relationship between graduate peer leaders and FYS students' end-of-first-year GPAs, such that having a graduate peer leader was positively related to students' study hours, which was in turn positively associated with FYS students' end-of-first-year GPAs. Sixth, mediation analyses also revealed that students' study hours and end-of-first-year GPAs co-mediated the relationship between graduate peer leaders and students' second-year persistence. In other words, having a graduate peer leader in the FYS was positively related to students' study hours, which was in turn positively related to end-of-first-year GPAs, which was in turn related to a higher probability of the second-year persistence. This chapter discusses each of these findings, along with implications of the results, limitations and suggestions for future research.

5.1 STUDENT CHARACTERISTICS, CLASS CHARACTERISTICS AND STUDENT OUTCOMES

GPA. Consistent with previous research examining the relationships between student-level characteristics and GPA (DeBerard, Spielmans, & Julka, 2004; Harackiewicz, Barron, Tauer, & Elliot, 2002; Jenkins-Guarnieri, Horne, Wallis, Rings, & Vaughan, 2015; Miller & Lesik, 2014; Porter & Swing, 2006), results of my study showed that female students had higher GPAs than male students. First-year students who had high pre-college SAT/ACT scores (i.e., SAT 1291/ACT 28 or above) had higher end-of-first year GPAs than students who had medium SAT/ACT scores (i.e., SAT 961-1290/ACT 20-27). These findings supported the long extant understanding that students'

pre-college characteristics matter to their academic achievement in college (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

My study revealed that there was a significant relationship between students' major sources of financial aid and their end-of-first-year GPAs. Specifically, students who received student loans as the major source of financial aid had lower GPA than students who received scholarships/grants as the major source of financial aid. This finding was congruent with previous research that suggests the negative effects of student loans on the academic outcomes of students (Dowd & Coury, 2006; Kim, 2007; Tinto, 1993). Higher student loans in the first year of college are found to be associated with lower levels of persistence and lower probabilities of degree completion, especially among low-income and African-American students (Kim, 2007). As suggested by Tinto (1993), students' major sources of financial aid can have significant effects on students' academic outcomes. For example, sources of financial aid can impact students in terms of whether to attend college in the first place and the educational goals they pursue. Consideration of financial aid, especially student loans, may lead students to work part-time while in college (Ehrenberg & Sherman, 1987; Tinto, 1993). By doing so, students have to reduce their time with peers and faculty on campus and spend less time studying outside of class, which Astin (1984) believes would negatively affect students' academic outcomes. However, it should also be noted that the relationship between financial aid and academic outcomes is complex. The interactions among types of financial aid, students' personal characteristics such as SES, race, and institutional characteristics such as institution types (i.e., private or public), need to be further examined to determine the

effects of financial aid on the academic outcomes of FYS students (Dowd & Coury, 2006).

On the class level, teacher gender, educational degree (i.e., Doctorate, Master's, or other degrees), and teacher classification (i.e., staff, faculty, unclassified administrators, or others) were not significantly related to end-of-first-year GPAs of FYS students. These results were inconsistent with previous research that suggested the significant effects of teacher characteristics on first-year GPA (e.g., Permzadian & Credé, 2016). However, despite the inconsistency of findings between my study and previous ones, it is encouraging and motivating to note that students' GPAs were not directly determined by the uncontrollable and external variables such as teacher characteristics in my study (Weiner, 1972). The insignificant relationship between various FYS teacher characteristics and student GPA may also be an indicator of the relatively equal teaching qualities across FYS classes in my sample. As suggested by Sandoval-Hernandez, Jaschlnskl, Fraser, and Ikoma's (2015), there are no simple, universal relationships between teacher characteristics and student achievement. When determining the relationships between teacher characteristics and student outcomes, other characteristics of education systems should also be taken into account. Thus, more studies are still needed to test and explain the relationships between teacher characteristics and student achievement.

Perceived involvement. On the student level, male students reported a lower level of perceived involvement as a result of the FYS than did female students. This finding was consistent with Berger and Milem's (1999) findings that female students are more involved with peers and have higher levels of perceived institutional support in

comparison to male students. Results of my study also showed that FYS students who had high SAT/ACT scores (i.e., SAT 1291/ACT 28 or above) reported a lower level of perceived involvement as a result of the FYS compared to students with medium SAT/ACT scores (i.e., SAT 961-1290/ACT 20-27), which was consistent with Kuh, Cruce, Shoup, Kinzi and Gonyea's (2008) conclusion. One possible explanation for the differences of perceived involvement as a result of the FYS between students with different levels of pre-college achievement could be that, at the university where the sample was collected, 64% of the FYS students had medium level of SAT/ACT scores prior to the entry to the university, whereas only 35% of FYS students had high SAT/ACT scores. With the majority of students having medium levels of prior achievement, most FYS classes, activities or assignments may have been designed more to accommodate the needs of students with medium pre-college achievement. However, those activities and assignments may seem less challenging to students with high pre-college achievement. In addition, students with high pre-college achievement may already have a good mastery of the social and academic skills taught by the FYS. Therefore, it is not surprising that students with high SAT/ACT scores reported a lower level of perceived involvement as a result of the FYS, compared to students with medium prior achievement, who were also the majority students on campus in my study.

Another finding worth noting is that FYS students who lived on campus reported a lower level of perceived involvement as a result of the FYS than students who lived off campus. Although this finding contrasted the extant conclusion of on-campus living being a positive factor to student involvement (e.g., Astin, 1984; Thibodeaux, Deutsch, Kitsantas, & Winsler, 2017), it made sense when considering that students who live on

campus have more opportunities to get involved on campus with peers and faculty, and the participation of FYS may just be one of the numerous programs that on-campus-living students get involved with. By contrast, FYSs may have been the only source of involvement that students who live off campus experience. This may explain why students who lived off campus rated a higher level of perceived involvement as a result of the FYS compared to students who lived on campus in my study. Thus, FYSs as a major source of involvement might be especially beneficial for students who live off campus (Permzadian & Credé, 2016).

Study hours. Study hours referred to the number of hours students spent studying outside of classes in my study. As a behavioral form of academic involvement, students' time spent studying, doing homework, and attending classes or labs is regarded as one of the strongest predictors of positive academic outcomes such as GPA and persistence (Astin, 1993; Tinto, 1993). For students in my sample, 43% of the female students reported that they spent six to ten hours studying outside of classes weekly, 29% spent more than eleven hours studying, and 28% spent one to five hours studying. For male students, 43% reported that they spent six to ten hours studying outside of classes weekly, 32% spent one to five hours, and 28% spent more than eleven hours studying.

My study revealed that, on the student level, study hours reported by male students were significantly fewer than the hours reported by female students. This may be one of the important reasons why male students had lower GPAs than female students, as shown earlier. It was also found that the number of study hours reported by students who had high SAT/ACT scores were significantly higher than the hours reported by students who had medium SAT/ACT scores. Students with high SAT/ACT scores also, however,

perceived themselves as less involved as a result of the FYS compared to students with medium SAT/ACT scores. This may be because students with high prior achievement are more likely to have good self-regulation skills, study habits and an awareness of the importance of effort and study time to their academic achievement. Also, students with higher prior achievement may already have a good mastery of the social and academic knowledge and skills prior to their participation of FYS, as has been discussed earlier. Therefore, despite the perceived low involvement as a result of the FYS in my study, students with high SAT/ACT were still able to spend time and effort outside of classes that were needed to reach their achievement goals.

On the class level, FYS students who were taught by faculty members reported more study hours than students who were taught by classified staff. This finding made sense when considering that faculty members are likely to have more extensive experience in using various teaching pedagogies and motivating strategies to encourage students to spend more time studying outside of their classes (Permzadian & Credé, 2016). My study also demonstrated that FYS students who had teachers holding other degrees (e.g., Educational Specialist degrees, Juris Doctor degrees, Medicine Doctor degrees) reported less study hours than students who had teachers holding a Master's degree. This finding should be interpreted with caution due to the fact that the category "other degrees" in my study was a combination of Educational Specialist degrees, Juris Doctor degrees and Medicine Doctor degrees. In my sample, approximately 79% of the students had instructors held a Master's degree (n=1,904), but only 2.8% of the students in total had instructors who held Educational Specialist degrees (n=59), Juris Doctor degrees (n=16) and Medicine Doctor degrees (n=15). Also, when considering the

relationship between teachers' educational degrees and student outcomes, other characteristics such as teacher classification are also important to take into account. For example, it is interesting to note that while FYS students who were taught by faculty members reported more study hours than students who were taught by classified staff in my study, there was no significant difference in the hours spent studying between students who were taught by instructors who held a Doctorate degree (n=413, 17.2%) and instructors who had a Master's degree, although the majority of faculty members in the university are believed to have a Doctorate degree. Future studies should further investigate how teachers' educational degrees and classification interact to impact student outcomes.

Perceived effort in FYS. In my study, students' perceived effort in FYS being included as a measure of students' perceived academic involvement was based on the assumption that the perceptual aspects of student involvement are significant predictors of students' learning outcomes (e.g., Berger & Milem, 1999; Milem & Berger, 1997; Tinto, 1975,1993). Results of my study showed that, on the student level, non-Caucasian students reported a higher level of perceived effort in the FYS than did Caucasian students. Male students rated a higher level of perceived effort in the FYS than female students, although male students also reported that they spent less hours studying than female students. This gender difference on perceived and actual effort was in line with Bembenutty's (2007) finding that female students, especially minority female students, have significantly higher effort regulation than minority male students. Minority female students were found to have a higher level of willingness to delay gratification than their Caucasian male peers, and tend to believe that the more effort they invest in learning,

they more positive outcomes they would receive. Bembenutty (2007) believed these differences can be explained by the gender socialization process in which females are expected to display a higher level of effort regulation than males. Bembenutty's (2007) also clarified that findings concerning gender and race differences on students' academic perceptions and behaviors should not be interpreted as the inherent differences between genders or races that naturally lead students to perceive or behave in certain ways.

The incongruence between male students' perceived and actual effort in my study was also consistent with the previous study conclusion that college students often lack an accurate understanding of how much time they should spend on studies (Thibodeaux, Deutsch, Kitsantas, & Winsler, 2017). For example, after an investigation of student habits in mathematics courses, Cerrito and Levi (1999) found that 25% of the students in their study believed that 1.5 hours of study for every hour in class are unreasonably high and 75% believed that 3 hours are unreasonably high. Students ended up not spending enough time studying and found it unreasonable to be expected to, despite the fact that they had a substantial amount of time that could have been used to study. In my study, the discrepancy between FYS male students' high perceived effort in the FYS and low behavioral effort as indicated by fewer study hours may also contribute to the understanding of why male students had lower GPAs compared to their female FYS peers. Therefore, FYS male students' belief in the amount of effort that they should invest in studies should be further examined. Interventions should also be designed to help reframe students' unreasonable belief about the expected amount of effort needed for academic success.

On the class level, my study found that students who had teachers who were Ph.D. students, and teachers who were classified as "Others", reported a lower level of perceived effort in the FYS than students who had teachers who were classified staff. As suggested by Permzadian and Credé's (2016), FYSs are more effective when instructors are selected from faculty and administrative staff than selected from graduate students. However, the relationships between teacher classification and student outcomes should be further tested in future studies. In my analysis, instructors who were Ph.D. students and instructors who were classified as "Others" were combined into one measuring category. This was because only 0.4% of the students (i.e., n=9) in my sample had instructors who were Ph.D. students, and 7.3% of the students had instructors who were classified as "Others." Therefore, in future studies, sample size should be increased for each type of teacher classification to more accurately identify the relationship between teacher classification and first-year student outcomes such as perceived effort.

5.2 STUDY HOURS AND END-OF-FIRST-YEAR GPA

My study showed that students' study hours outside of classes, a basic behavioral form of academic involvement, had a significantly positive relationship with FYS students' end-of-first-year GPAs. The direct effect of study hours on GPA confirmed previous research findings (e.g., Astin, 1984, 1993; Latino & Ashcraft, 2011; Thibodeaux, Deutsch, Kitsantas, & Winsler, 2017; Tinto, 1993; Zuriff, 2003). For example, after examining 589 first-year college students' time use, Thibodeaux, Deutsch, Kitsantas and Winsler (2017) found that students' academic time use was positively associated with higher self-regulated learning and GPA. Students who spent less time

studying and more time in leisure and off-campus work had lower GPAs (Nonis, Philhours, & Hudson, 2006).

As has been emphasized by Astin (1984, 1993), study hour as the most basic behavioral form of academic involvement has "stronger effects than almost any other involvement measure or environmental measure" on students' academic achievement (Astin, 1993, p.376). According to Astin (1984), student time is the most precious and powerful resource for an institution. The level of student achievement is a direct effect of the time and effort that students devote to academic activities. The more time students spend on the academic activities, the higher their academic achievement. Astin (1984) also suggests that student time is finite; therefore, the time students spend on family, friends, and other non-academic activities leads to the reduction of time that students have to invest in academic activities. Administrators and faculty members can directly impact the time and amount of effort students invest in academic studies through the design of assignments and class schedules, on-campus employment opportunities and types of co-curricular activities offered to students. Therefore, FYS administrators and instructors should aim to effectively promote students' academic time use during the process of program design, given the significantly direct effect of students' study hours on their academic achievement.

5.3 END-OF-FIRST-YEAR GPA AND SECOND-YEAR PERSISTENCE

Results from my study showed that FYS students' end-of-first-year GPAs was the only significant predictor of their second-year persistence. As indicated by the *R* square detected in my study, approximately 13.9% of the variance in FYS students' second-year persistence was accounted for by the model, and the end-of-first-year GPA contributed to

the largest proportion of the variance as it was the only significant predictor to second-year persistence. The predictive role of first-year students' GPAs to persistence was in line with previous research (e.g., DeBerard, Spielmans, & Julka, 2004; Gershenfeld, Ward Hood, & Zhan, 2016; Kim, 2007; Mau, 2016; Rohr, 2012; Sæle, Sørlie, Nergård-Nilssen, Ottosen, Goll, & Friborg, 2016). The significant role of end-of-first-year GPA detected in my study also confirmed Tinto's (1993) notion that there is a temporal linkage between learning outcome (i.e., GPA) and persistence, a relationship that is not specified in Astin's (1984) theory of student involvement for higher education.

My study revealed that none of the student-level characteristics (i.e., gender, race, parent education, work hours, prior SAT/ACT scores, on-campus living, and sources of financial aid) and class-level characteristics (i.e., teacher gender, educational degree and teacher classification) were directly related to FYS students' second-year persistence. Students' perceived involvement as a result of the FYS, perceived effort in the FYS, and study hours did not have direct effects on students' second-year persistence either. These findings disagreed with the extant research that suggests the direct effects of various predictors to persistence. Those direct and significant predictors include the level of student involvement (Astin, 1984), degree-level goals (Terkla, 1984), pre-college SAT/ACT scores, on-campus living, off-campus working (Janes,1997; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008), and financial aid (Dowd & Coury, 2006; Janes,1997; Kim, 2007; Terkla, 1984).

From a different perspective, the insignificant direct effects of student- and class-level characteristics on student persistence can be interpreted as a hopeful finding for FYS students, peer leaders, instructors and administrators. Understanding that students'

persistence is not solely and directly determined by any of the uncontrollable variables such as student gender, race, parent education, teacher gender, and teacher educational degree, can leave more room for the effects of controllable variables (e.g., student effort) to take place (Weiner, 1972). It is motivating to find that GPA, a controllable variable that can be achieved through student effort and the increase of study hours, has such a direct and powerful effect on second-year persistence. However, it should be noted that because my sample was collected from a relatively homogeneous population from a large research-based university. Students in the sample were primarily female (i.e., 64.4%), Caucasian (i.e., 83.6%), lived on campus (i.e., 96.3%), had medium scores on pre-college SAT/ACT tests (i.e., 64%), and had parents with a college education (i.e., 84.6%). Future studies with more diverse FYS samples are still needed to better validate and explain the relationship between student- and class-level characteristics and FYS students' second-year persistence.

5.4 PEER LEADER TYPES AND STUDENT OUTCOMES

Turning attention to the different effects among FYS peer leader types (i.e., undergraduate peer leader, graduate peer leader, or no peer leaders) on student outcomes, results from my study revealed that peer leaders did not have significantly direct effects on students' end-of-first-year GPAs and second-year persistence. In other words, having a peer leader of any types does not guarantee a higher GPA or a greater likelihood to persist in college. This finding was consistent with Astin's (1984) postulate that the implementation of any educational program does not directly lead to positive student outcomes.

The insignificantly direct effects of peer leaders on students' end-of-first-year GPAs and second-year persistence also disconfirmed findings from numerous previous research that suggests the direct relationship between peer leaders and positive student outcomes (e.g., Brown, 1971; Farrell, 2007; Forristall-Brown & Brown, 1984; Freeman, 1999; Pagan & Edwards-Wilson, 2002; Ross-Thomas & Bryant; 1994; Schwitzer & Thomas, 1998; Rodger & Tremblay, 2003; Ware & Gold, 1971). This perhaps was a result of the lack of power in my sample given that more than 90 percent of FYS students had a peer leaders in their classes and less than ten percent of students did not have a peer leader. Another reason that contributed to the strong discrepancy of findings between my study and numerous previous ones may lie in the differences of study designs. The use of structural equation modeling in Mplus statistical software allowed my study to adjust for measurement errors, data non-independence, and to yield more accurate and reliable estimations of relationships among variables (Hox, 2013; Kline, 2016). In contrast, study designs of the previous studies that support the direct associations between peer leader programs and positive outcomes are mostly descriptive, or using traditional OLS regression that is not able to accommodate the violation of sample dependency (e.g., Black & Voelker, 2008; Brown, 1971; Brown & Myers, 1975; Edmonson, Fisher, & Christensen, 2003; Forristall-Brown & Brown, 1984; Freeman, 1999; Levine, 1990; Rabiecki & Brabeck, 1985; Ross-Thomas & Bryant; 1994; Schwitzer & Thomas, 1998; Rodger & Tremblay, 2003; Twomey, 1991; Ware & Gold, 1971; Wepner, 1985). As described earlier, traditional OLS regression analyzes data at the individual level only and ignores the dependence of individuals within the same contexts, which can negatively bias the estimates of standard errors that in turn can lead to erroneous

decisions regarding which variables are significant (Raudenbush & Bryk, 2002). Therefore, the differences of study designs should also be taken into account when comparing and evaluating the reliability of study results.

Of note, one finding that has been consistently demonstrated by previous studies is that peer leaders have direct effects on first-year students' transition and adjustment (e.g., Black & Voelker, 2008; Rabiecki & Brabeck; 1985). Peer leaders are found to have greater effects on first-year students who are transitioning to the college environment. The guidance of peer leaders can serve as an effective buffer against first-year transitioning issues (Schwitzer & Thomas, 1998). However, in current FYS peer leader literature, there seems to be a missing link between first-year students' transitional adjustments and their academic outcomes such as the promotion of GPA and persistence. A good transition to college may not lead to an increase in GPA and persistence. Therefore, it would be interesting for future studies to include first-year students' transitional adjustment as an outcome variable of peer leadership, and to examine the direct and indirect relationships among first-year students' transition, GPA and persistence.

5.5 PEER LEADER TYPES, STUDY HOURS, END-OF-FIRST-YEAR GPA AND SECOND-YEAR PERSISTENCE

Drawing on Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993), one of the purposes of my study was to examine the functioning mechanism of peer leaders through testing the indirect effects of various peer leader types on students' end-of-first-year GPAs and second-year persistence. Although my study did not show significantly direct

relationships between peer leaders and student outcomes, as has been discussed in the previous section, mediation analyses of this study suggested that peer leaders did have significantly indirect effects on student outcomes. First, students' study hours significantly mediated the relationship between graduate peer leaders and students' end-of-first-year GPAs, such that having a graduate peer leader was positively related to higher study hours, which was in turn positively associated with FYS students' end-of-first year GPAs. This finding supported Astin's (1984) assumption regarding the mediating role of student involvement to the relationship between educational programs and academic achievement. Astin (1984) clearly states that the effectiveness of any educational program depends on the quality and quantity of student involvement that an educational program can elicit from students. In other words, student involvement mediates the effects of any educational program on student outcomes in higher education. The confirmation of Astin's (1984) mediation postulate in my study is a unique contribution to FYS peer leader literature because to this author's best knowledge, no previous studies have tested the indirect effects of FYS peer leaders on student outcomes.

Second, the finding regarding the significance of study hours as a behavioral form of academic involvement supported Astin's (1984) emphasis on the importance of behavioral aspects of involvement. My study did not find students' perceived involvement and perceived effort in the FYS as significant mediators between peer leaders and student outcomes. Astin (1984) suggests that for student involvement to be a mediator, it should reflect students' behavioral aspects of involvement rather than students' perceived involvement. In my study, students' behavioral involvement in academics was measured quantitatively by the number of hours students spent studying

outside of classes. Hence, study hours being the only significant behavioral mediator confirmed Astin's (1984) argument, and disconfirmed the notion that perceived involvement has significant effects on student GPA and persistence as suggested by Tinto (1975, 1993) as well as Berger and Milem (1997, 1999).

Third, another significant finding of the mediation analyses was that students' study hours and end-of-first-year GPAs co-mediated the relationship between graduate peer leaders and students' second-year persistence. Specifically, having a graduate peer leader in the FYS was positively related to students' study hours, which was in turn positively associated with students' end-of-first-year GPAs, that was in turn positively related to a higher probability of students' second-year persistence. This finding was important because Astin (1984) did not specify the relationship between students' academic achievement and persistence. Astin's theory (1984) implies that the indirect relationships between educational programs and academic achievement, and the indirect relationships between educational programs and persistence, are the same. However, this proposition did not stand in my study. Results from my study showed that academic involvement, as measured by study hours alone did not significantly mediate the relationship between having a graduate peer leader and students' second-year persistence. End-of-first-year GPA as another significant mediator should also be taken into account when explaining the relationship between the effects of graduate peer leaders and second-year persistence. Because of the lack of consideration of the longitudinal relationships among students' learning outcomes (e.g., end-of-first year GPA and second-year persistence) in Astin's (1984) theory of student involvement for higher education, findings of my study filled in this missing link, and helped portray a more complete

framework on the longitudinal relationships among educational programs, student involvement, GPA and persistence.

Fourth, turning attention to the different effects of peer leader types (i.e., undergraduate peer leaders, graduate peer leaders, or no peer leaders), mediational analyses in my study revealed that, compared to undergraduate peer leaders, graduate peer leaders had significantly higher indirect effects on students' end-of-first GPAs and second-year persistence. The indirect effects on students' end-of-first-year GPAs and second-year persistence did not differ significantly between undergraduate peer leaders and no peer leaders. These findings were important because little attention has been given to the effects of different peer leader types on student outcomes (Brown, 2016)

In my study, FYS students who had graduate peer leaders in their FYS classes devoted more hours to study outside of classes, which in turn led to higher GPAs and persistence in the second-year of college. As supported by Brown (2016), compared to undergraduate peer leaders, graduate peer leaders are not only as accessible and approachable as undergraduate peer leaders to FYS students, they also possess a number of attributes that undergraduate peer leaders do not have. For example, FYS students may be more likely to perceive graduate peer leaders as competent, experienced and successful role models to whom first-year students can inquire information about their following years in college and future career planning. Graduate peer leaders may be more likely to have higher academic expectations for FYS students, and to pass onto first-year students their belief and experience regarding the importance of self-motivation and effort in college success. For FYS students who wish to pursue graduate studies themselves, graduate peer leaders can also provide advice about the application process,

and about the importance of effort and academic achievement in order to be accepted by graduate schools (Latino & Unite, 2012; Leslie, Lingard, & Whyte, 2005). Also, it should be noted that graduate peer leaders in my sample were all in the University Higher Education and Student Affairs program. Students of the program were trained to prepare for successful administrative careers in higher education contexts. Hence, their advanced study on areas such as educational leadership and student affairs may have also contributed to the relative effectiveness of graduate peer leaders in my study.

Lastly, it should be noted that my results did not support Astin's (1999) finding regarding peer involvement as the "strongest single source of influence on cognitive and affective development" (p. 590). This could be because of the way peer involvement was measured in my study. Involvement with peers was only measured with items reflecting students' perceptions about their interactions with peers (e.g., As a result of this course/experience, I am more likely to get to know other students at my institutions, to meet new people who share my interests, to establish friendships with peers, and to accept people who are different from me), rather than students' actual behavioral involvement with peers as has been strongly suggested by Astin (1984). Therefore, future studies with behavioral measurements of peer involvement should be conducted to test the mediating role of behavioral peer involvement.

5.6 IMPLICATIONS FOR FUTURE POLICY AND PRACTICE

My study made unique contributions to the current understanding of the longitudinal relationships between peer leaders, student involvement, GPA and persistence. Results from the mediation analyses of my study supported the extant conclusion that peer leaders are effective, especially graduate peer leaders, although not

in a direct way. Students' actual time and effort spent on studying were the key to mediate the effects of graduate peer leaders on students' end-of-first-year GPAs and second-year persistence. These findings had significant implications for administrators, instructors, peer leaders and students in FYSs.

Promoting understanding. First, FYSs should educate administrators, instructors, peer leaders and students regarding the significant role of student effort and study time in GPA and persistence, and that students' pre-college characteristics (e.g., gender, race, parent education, SAT/ACT scores) and class characteristics (e.g., FYS instructor gender, classification, educational degree) may not have direct effects on student persistence. The understanding of these findings can help administrators, instructors, peer leaders and students more actively focus on the controllable variables such as the promotion of academic involvement. Second, it is important for FYS administrators, instructors, peer leaders and students to be aware that having a peer leader does not guarantee academic success in college. First-year students' effort and time are crucial for peer leaders to reach their maximum effectiveness in FYSs. Also, it is especially important for peer leaders to communicate and model their effort in academics when assisting first-year students on a daily basis.

The use of graduate peer leaders. Based on the findings that graduate peer leaders had significantly higher indirect effects on students' end-of-first GPAs and second-year persistence than undergraduate peer leaders, FYSs should first consider expanding the use of graduate peer leaders. Currently, the majority of peer leaders in FYSs are undergraduate peer leaders. As shown by my study sample, 70.5% of the FYS students had an undergraduate peer leader and only 19.9% of the students had a graduate

peer leader in their classes. Second, FYSs should further identify what specific practices that graduate peer leaders have been using to increase first-year students' study time outside of classes that in turn have the potential to increase students' end-of-first-year GPAs, and then lead to higher chance of second-year persistence. Third, FYSs should promote communication and experience sharing between graduate peer leaders and undergraduate peer leaders, so that undergraduate peer leaders can have more opportunities to learn from the experiences of graduate peer leaders.

FYS curriculum design. FYSs should integrate the goal of promoting first-year students' behavioral academic involvement into the design of program curricula. As demonstrated by my study, students' behavioral academic involvement (i.e., study hours) was the only significant predictor that mediated the effects of peer leaders on FYS students' end-of-first-year GPAs and second-year persistence. Therefore, it is critical to specifically incorporate the goal of promoting students' academic involvement into the design of FYS instruction, classroom activities and assignments. Practices such as establishing learning communities among FYS students have been shown to be effective in promoting both academic and social involvement for students (e.g., Tinto, 2002; Zhao & Kuh, 2004). The basic idea of a learning community is for FYS students who register for the same courses to form a study group and study together for an entire semester. Peer leaders can play the role of facilitators in a learning community. Practices such as learning communities not only work to promote academic involvement, but also peer involvement that is believed to be the "strongest single source of influence" on student development (Astin, 1984, p. 590).

Study hours. My study found that some FYS students, especially male students, may have unreasonable beliefs about the amount of time that they should spend studying. Male students in my study rated a higher level of perceived effort in the FYS than female students, although they also reported less study hours than female students. As suggested by previous research (e.g., Cerrito & Levi, 1999; Thibodeaux, Deutsch, Kitsantas, & Winsler, 2017), it is not uncommon for college students to lack an accurate understanding of how much time they should spend studying. Given the significant direct and indirect effects of students' study hours on end-of-first year GPAs and second-year persistence in my study, it is important for FYSs to investigate students' beliefs in the amount of time and effort that they should invest in studies, and if necessary, to also design interventions that target to reframe first-year students' unreasonable beliefs on study time. Also, based on the finding that FYS students who were taught by faculty members reported more study hours than students who were taught by classified staff, FYSs should also create more opportunities for communication and experience sharing among different types of FYS instructors.

Promote perceived involvement. Results from my study showed that male students reported a lower level of perceived involvement as a result of the FYS, academically and socially, than female students. FYS students who had high SAT/ACT scores also reported a lower level of perceived academic and social involvement compared to students with medium SAT/ACT scores. Therefore, FYSs should pay more attention to these two groups of students. Instructions, activities and assignments need to be better designed to meet the involvement needs of these students. For students who have high pre-college academic achievement, FYS instructors and peer leaders should

ensure that FYS coursework and assignments meet the intellectual needs of those students to prevent disengagement and boredom. This is particularly important for institutions with the majority of students having medium level of prior achievement, as it was in my study sample.

Another finding worth attention is that FYS students who lived off campus reported a higher level of perceived academic and social involvement as a result of the FYS. Thus, the effects of FYSs may be greater for students who have fewer opportunities to be involved academically and socially on campus. FYSs should continue to identify students who have less access to campus resources and who are more at risk of un-involvement, such as historically underrepresented students in higher institutions, so as to better provide services and support for them.

5.7 LIMITATIONS AND FUTURE RESEARCH

Of note are some limitations of my study that warrant discussion. First, my study examined only FYS students' persistence from the first to second year of college. Therefore, it did not account for later re-enrollments nor dropouts during the second year or subsequent years of college. Future research should include data across more years to have a more complete picture of the longitudinal relationships among peer leaders, student involvement, academic achievement and persistence. Second, in my study it was not clear whether students who did not persist at the beginning of the second year dropped out of college permanently or they just transferred to another college. The direct or indirect effects of peer leaders might be different for students who drop out and for students who transfer (Tinto, 1993). Therefore, future studies should also take these differences into account.

Third, as shown in the preliminary stage of data analysis in my study, the original factors from the First-Year Seminar Assessment survey did not fit the data of my study appropriately. This suggests the need for future studies to test the validity and reliability of the First-Year Seminar Assessment survey, a survey that has been broadly used to assess first-year students' perceptions of FYS experiences across institutions. Fourth, because factors of students' perceived social and academic involvement were highly correlated (r = .97), students' perceived social and academic involvement were combined as one factor in my study. However, according to Tinto (2012), academic and social involvement are two conceptually distinct constructs. Hence, future studies need to further test the validity of one-factor structure of students' perceived involvement in comparison to two-factor structure in the literature. Fifth, the majority of items used to measure FYS students' involvement in my study were students' perceptions about their current involvement, or their anticipated involvement as a result of FYS experiences (e.g., as a result of FYS, I am more likely to participate in student activities). Study hour is the only behavioral measure in my study. Therefore, more behavioral measures of academic, peer and faculty involvement should be included in the future analysis to better test the mediating roles of different forms of student involvement, as suggested by Astin (1984).

Sixth, there was only one variable used in my study to provide peer leader information (i.e., peer leader type). In future studies, more variables about peer leaders (e.g., personal characteristics of peer leaders, peer leader experiences, specific peer leading practices, etc.) should be included in the analysis to better understand the within group differences of peer leaders, and how specific peer leader characteristics relate to

student outcomes. Qualitative studies should also be conducted to have a deeper understanding of the effects of different types of peer leaders in FYSs. Seventh, in addition to student GPA and persistence, future studies should also include other dependent variables (e.g., transitioning to college, sense of belonging to college, etc.) to more comprehensively investigate the direct and indirect effects of peer leaders.

Eighth, in terms of generalizability, my sample was collected from a relatively homogeneous population who were primarily female (i.e., 64.4%), Caucasian (i.e., 83.6%), lived on campus (i.e., 96.3%), had medium scores on pre-college SAT/ACT tests (i.e., 64%), and had parents with a college education (i.e., 84.6%); and the sampled FYS as an extended orientation model was specifically consisted of general first-year orientation seminars, program-based seminars and major-based seminars. Therefore, findings should be interpreted with caution when generalizing to other populations and FYS types. Ninth, in my study, students were not randomly assigned to FYS classes with undergraduate peer leaders, classes with graduate peer leaders, or classes without peer leaders. Therefore, causal relationships should not be drawn from my study, although the mediation analysis utilized in my study has the capacity to infer causal relationships. Future studies with randomization of subjects to various peer leader types should be conducted to more accurately understand the causal relationships among peer leaders, student involvement, GPA and persistence. Tenth, findings in my study regarding the insignificant effects of student- and teacher-level characteristics on dependent variables should be interpreted with caution. Future studies with different FYS samples should be conducted to validate those findings.

Eleventh, other research methods should be used to refine the research findings of my study. For example, moderated mediation analysis can be conducted to examine how the interactions among student characteristics, class characteristics, FYS types and peer leader types, are mediated by student involvement to have an impact on student outcomes, as has also been suggested by Kilgo, Sheets, and Pascarella (2015) as well as Klatt and Ray (2014). In addition, multilevel structural equation modeling can also be conducted to more specifically explore how class-level characteristics relate to student involvement, and how much variance in students' GPAs and persistence can be explained by class-level characteristics.

Finally, the effect sizes detected by my study were relatively small. For example, my study only explained 2.2% of the variance in end-of-first year GPA. This might be a result of limited power from the homogeneous sample in my sample. Therefore, FYS samples with more variability and statistical power are desired. More theoretical-guided variables and relationships should also be included in the analysis to better account for the complex variance of student outcomes.

5.8 CONCLUSIONS

With the tremendous increase of FYSs across campuses in the U.S., the use of peer leaders as an effective component of FYSs have also been rising. However, little was known about the functioning mechanism of peer leaders in FYSs. The purpose of my study was to fill in this research gap by testing a mediating model with student involvement as the mediator between the effects of peer leaders and student outcomes, as guided by Astin's theory of student involvement for higher education (1984, 1993, 1996), and Tinto's interactive theory of departure (1993). Findings of my study disagreed with

the previous findings regarding the direct effects of peer leaders on student outcomes, and emphasized that having a peer leader in FYS classes did not guarantee the increase of students' end-of-first-year GPAs and second-year persistence. My study further suggested that the relationships between peer leaders and student outcomes were indirect, and the effectiveness of peer leaders on end-of-first-year GPA was mediated by the number of hours students spent studying outside of classes, a behavioral form of academic involvement. My study also revealed that the effects of peer leaders on first-year students' second-year persistence was co-mediated by both study hours and end-of-first-year GPAs.

Findings from my study made unique contributions to the growing understanding of the longitudinal relationships among peer leaders, student involvement, and student outcomes, and provided a more accurate and complete picture of how peer leaders function to promote first-year students' end-of-first-year GPAs and second-year persistence. These findings were significant because to the best of my knowledge, my study was the first in the FYS peer leader literature to test the indirect effects of peer leaders. Findings from my study also provided FYS stakeholders with clear directions on how to better promote the effectiveness of FYS peer leaders in the future.

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APPENDIX A – VARIABLES AND DESCRIPTIONS

Variable Name	Description
Dependent variables	
End-of-first-year GPA	A continuous variable
Second-year persistence	A categorical variable (students did not return; students returned to college)
Predictors	
Peer leader type	A categorical variable (did not have a peer leader; had an undergraduate peer leader; had a graduate peer leader)
Study hours	A continuous variable
Perceived effort in FYS	A continuous variable
Perceived involvement	A higher order factor consisted of five sub-factors
Covariates	
Student-level	
Gender	A categorical variable (male; female)
Race	A categorical variable (Caucasian; non-Caucasian)
Parent education	A categorical variable (neither of students' parents/guardians graduated from college; one of students' parents/guardians graduated from college)
Residence	A categorical variable (on-campus living; off-campus living)
Financial aid	A categorical variable (scholarships/grants; student loans; no financial aid)
SAT/ACT score	A categorical variable (low-SAT 960/ACT 19 or below; medium-SAT 961-1290/ACT 20-27; high-SAT 1291/ACT 28 or above)
Work hours	A continuous variable
Class-level	
Teacher gender	A categorical variable (male, female)
Teacher education levels	A categorical variable (doctorate, masters, others-Ed.S., J.D., M.D.)
Teacher classification	A categorical variable (classified staff, faculty, unclassified administrators, others-Ph.D. students, other classification).