THE RELATIONSHIP BETWEEN PARTICIPATION IN CAMPUS RECREATION PROGRAMS AND COLLEGE STUDENT ACADEMIC SUCCESS

By

Jessica E. Kiss

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Kinesiology-Doctor of Philosophy

2017

ABSTRACT

THE RELATIONSHIP BETWEEN PARTICIPATION IN CAMPUS RECREATION PROGRAMS AND COLLEGE STUDENT ACADEMIC SUCCESS

By

Jessica E. Kiss

The academic success of undergraduate students is necessary for degree attainment and fulfilling career goals. Universities recognize factors that affect academic achievement and promote strategies that support satisfactory grades, progression through degree programs, and graduation for students. It is essential to determine predictors of success for all students but also just as important to determine factors that may promote success for those who traditionally struggle academically like first generation students and freshmen. Participation in campus recreation programs may encourage academic accomplishments. The relationship between campus recreation and student success has been studied for decades, although consistent results have not been reported. Therefore, the purpose of this study was to determine the relationship between participation in specific campus recreation programs and college student academic success.

Our sample consisted of male and female undergraduate students who participated in club sports, intramural sports, and group fitness classes at a mid-sized university in the Midwest. A nonparticipant group of students was also created to compare to the participants. Demographic data and academic success variables were populated for participants and nonparticipants (e.g. grade point average, credits completed, and one-year and two-year retention). Propensity score matching was used to match the participants with nonparticipants based on covariate information provided by the Registrar. Grade point average and credits completed were compared between the total sample of participants and nonparticipants, first generation students, and based on the

number of programs participated in by the students. One-year and two-year retention were determined for the freshmen sample. Two-sample tests for proportions (z-tests) were used to compare participants' and nonparticipants' GPA, credits completed, one-year retention, and two-year retention. Effect sizes were calculated to determine the magnitude of effect in significant findings between participation in campus recreation programs and academic outcomes. ANOVA was used to compare amount of participation and GPA and credits completed. Linear trend analyses were conducted to determine significant differences between the groups.

Overall, participants of campus recreation programs completed significantly more credits per year and obtained a significantly higher GPA per year. First generation participants also completed significantly more credits per year compared to first generation nonparticipants. Participants in one campus recreation program per year completed significantly more credits than nonparticipants. Participants in one campus recreation program and participants in two or more campus recreation programs both obtained a significantly higher GPA when compared to nonparticipants. First generation participants in one campus recreation program per year earned a significantly higher GPA when compared with first generation nonparticipants. Freshmen campus recreation participants had a significantly higher one-year retention rate and two-year retention rate. First generation freshmen participants also had a significantly higher one-year retention rate and two-year retention rate.

The findings of this study should be of interest to students, campus recreation professionals, and university higher administration. Participation in campus recreation may possibly influence academic success in all students, including those who are known to struggle academically. Suggesting participation in campus recreation programs may be a helpful strategy to use for undergraduate students seeking academic success.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my advisor, Dr. Jim Pivarnik. I spent more time with you than probably most graduate students and I thank you for your patience and guidance throughout these past six years. You did not have to agree to work with me while I was employed full time, but you did, and I will forever be grateful. I thank Dr. Kim Maier for helping me with statistical analyses that were new to me. I have known you as the "go to" statistician at MSU and I thank you for taking time to help me with my dissertation. I would like to acknowledge Dr. Rick McNeil for meeting with me so early on in my career as a Ph.D. student to chat about campus recreation. I love this field and it has opened up so many opportunities for me. Without you, I may not have found my love for campus recreation research. Dr. Jeremy Knous, you have been a great friend, coworker, and dissertation committee member. All of this started with us putting on hardhats, walking through the Health and Human Services Building (at SVSU) that was under construction during my interview. Thank you for being there for me throughout my career and graduate program. I would like to thank Dr. Nick Wagner (Director of Institutional Research at Saginaw Valley State University) for teaching me all there is to know about Propensity Score Matching and being willing to meet with my committee when we had questions. You spent a great deal of time on this project and I hope you know how grateful I am for your expertise. Finally, I would like to thank my campus recreation friends, Aaron Mowen and Andrea Hamlin for being on board with this project. Thank you for sharing your participation data with me. I hope the results of this dissertation help you and the campus recreation field as much as they have helped me achieve my degree.

To my friends and family in Ohio and Michigan, thank you for always understanding that "I have work to do." You have been supportive throughout this whole process and I couldn't get to where I'm at without you. Deanna Reynolds-Griffin, John Lowry, Andrea Hamlin, and Lyndee Zimpfer: we have the world's best group message. Thank you for bringing laughter to my life on a daily basis. Thank you for bringing me care packages during comps, presenting at professional conferences with me (Three's Company), and being there for me when I just needed a friend. You are the absolute best.

To my furbabies, Maddox and Josie, I love you. You always understand when I need to work and have spent countless hours lying next to me while I write. When you insist you need to go for a run, you give me a reason to take a break and spend some time with you. You are truly a human's best friend.

Finally, I want to acknowledge and thank my husband, Shawn. You have only known "grad school Jess." You have been amazing all of these years taking on a lot more than your fair share of the work just so I could progress through my program. If the only way we could spend time together was you sitting next to me on the couch while I worked, you didn't complain and always saw the positive. I'm convinced you have earned this degree too. I will forever love you for being so patient with me. Thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

The academic success of undergraduate college students is essential for degree attainment and fulfilling career goals. Acceptable grades in coursework lead to the progression through degree programs, persistence from semester to semester, and finally, graduation. To many, degree attainment reflects academic success (Astin & Oseguera, 2012). At a university level, academic success outcomes are crucial in the operation of the institution. In order for universities to accomplish institutional goals and operate most effectively, students must be enrolled in classes continuously, if possible. To this end, universities strive to retain as many students as possible until they graduate. Unfortunately, enrollment and retention at universities across the nation has declined causing concerns for department budgets and a demand for programs thought to improve academic performance, persistence, and graduation rates to increase student retention (Kampf & Teske, 2013). Consequently, many universities have created centers for academic success, offer free tutoring, and provide services in hopes of improving academic student success measures. Furthermore, nonacademic university programs and activities such as faith based student organizations, leadership development programs, and campus recreation programs are available as an indirect means for improving academic success (Stier, Schneider, Kampf, Haines & Wilding, 2005). Involvement in programs such as intramural sports and club sports have been linked with academic success measures like GPA, credits completed, and retention (Becker, Cooper, Atkins & Martin, 2009; McElveen & Rossow, 2014). Vincent Tinto's (1975) student integration model illustrates the value of such programs to the overall success of college students. Tinto (1975) suggests that the more students are integrated into their college communities, the less likely they are to drop out of college. Tinto (1975) states that when

students do not do well or drop out of school, it is often because they have not been involved in the campus community. More recently, Swail (2004) noted that it is essential for students to connect to the campus culture early on in their academic careers by participating in student organizations and engaging in social traditions. By doing so, students may build friendships with peers, gain mentors, and connect with faculty members (Swail, 2004). This type of involvement allows for student integration to the university and may positively influence their institutional commitment and retention (Swail, 2004). To determine the effectiveness of campus programs, many universities compare themselves to their peer institutions by analyzing academic outcomes such as 1^{st}-2^{nd} year retention, retention from freshmen year to graduation, and graduation within six years (Becker et al., 2009). Because of the great emphasis placed on student success at the university level, researchers have sought to determine factors that affect academic achievement.

To predict success, the likelihood students will succeed in relationship to variables such as background, amount of financial aid they are awarded, and if they are first generation (first in their families to attend college) have been studied (Paulsen & St. John, 1997, 2002; Choy, 2001; Ishitani, 2003). Additionally, researchers have also surveyed students regarding the effect that participating in specific on campus programs; like campus recreation programs, has on student outcomes such as enjoyment, sense of belonging, and building friendships (Henchy, 2013; Miller, 2011; Moffitt, 2010). Although these success outcomes are not considered academic outcomes, they may indirectly affect, or modify the effect of other variables on academic outcome measures (Hall, 2006; Miller, 2011). Astin (1984) suggests the importance of extracurricular activities for student success in his Theory of Involvement. Astin (1984) explains that the amount of learning students can gain is proportional to the quality and quantity of their campus involvement with academic as well as nonacademic programs. Involvement in

nonacademic programs like campus recreation programs has been a popular entity on campuses to study due to the magnitude of benefits reported (e.g. stress reduction, holistic wellness, physical strength, and academic performance) (Lower, Turner & Petersen, 2013). Although numerous academic and nonacademic benefits of campus recreation participation are cited, some specific recreation programs have either not been studied sufficiently or have employed different research methods which have created questionable results (Danbert, Pivarnik, McNeil & Washington, 2014). Consequently, the issues suggested by Danbert et al. (2014) have been a particular concern for campus recreation programs and have warranted continued research to confidently suggest the benefits of campus recreation participation (Forrester, 2015; Todd, Czyszczon, Carr, & Pratt, 2009).

CAMPUS RECREATION AND ACADEMIC SUCCESS

Student participation in campus recreation programs and academic success has been studied for several decades dating back to the 1930's (Washke, 1939). Early research by Washke (1939) focused on participation in intramural sports, although since then, countless campus recreation programs have become available and have been successful in drawing student interest (e.g. group exercise classes, aquatics programs, student wellness programs). Considering each program, participation may take on many meanings and could prove difficult to reconcile when attempting to generalize the success of all campus recreation programs. While this issue may play a role in mixed results over time, promising findings encourage continued research on the topic of campus recreation program participation and academic success (Todd et al., 2009; Forrester, 2015). Positive findings are especially important due to budget cuts and campus recreation departments' need to justify their existence. The relationship between participating in campus recreation programs and academic outcomes relates well with university goals and may

rationalize the continuation of campus recreation programs (Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013). Consequently, several researchers have studied the relationships between campus recreation programs and GPA, 1st-2nd year retention, retention from freshmen year to graduation, credits completed, and graduation rates (Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013; Miller, 2011). To determine if fitness center membership at a large sized university in the Midwest United States was related to student academic success outcomes in first time degree seeking freshmen, Danbert et al. (2014) obtained membership data from the university's campus recreation center and academic data from the university Registrar. The researchers were able to obtain high school GPA, cumulative college GPA, college credits completed, one year and two year retention, and class standing. College GPA, college credits completed, one year and two year retention for the members were compared to the same outcomes for nonmembers. Danbert et al. (2014) found that campus recreation members completed more credits and had higher GPAs than nonmembers. After the first year, members were more likely to be retained in school compared to nonmembers. The same was true after the second year. Kampf & Teske (2013) believe the need for more campus recreation research is due to the fact that students are not enrolling in college at the rates they previously did and universities are having trouble retaining the students who are enrolled. Acknowledging this issue with recruitment and retention, the investigators decided to evaluate the engagement-persistence relationship in campus recreation programs at a large, four-year, residential university. Kampf & Teske (2013) obtained club sport, campus recreation student employment, and student recreation center entry count data from the university's Division of Student Affairs Department and demographic data, precollege data, latest term one-year college GPA, and Fall-to-Fall retention status of students from the Office of Institutional Research.

Using a regression model, the researchers found that students participating in club sports were 2.22 times more likely to enroll the following academic year as compared to nonparticipants. Additionally, entry counts into the campus recreation center were correlated with high school GPA and latest one-year college GPA. Students who used the campus recreation center were also more likely to be retained. In addition, the amount that students used the recreation center was also related to retention.

Forrester (2015) noted that previous research has provided the benefits of participating in campus recreation programs, but multi-institutional research is lacking. Therefore, Forrester (2015) investigated the relationship between participating in campus recreation sports and retention using data from a large multi-institutional sample. The 2013 NASPA Assessment and Knowledge Consortium was distributed to students at 38 universities across the United States (n=66,970). Of the total sample who completed the survey (n=33,522), approximately 75% of respondents indicated they used campus recreation sports facilities, programs and services. For students who participated in campus recreation sports programs, 66.6% indicated campus recreation programs and 73.9% indicated campus recreation facilities were important in their decision to stay at their university.

Although campus recreation participation has been found to be a very beneficial exposure for campus communities, most researchers study students at universities that maintain a high percentage of Caucasian students and therefore may miss out on studying minority populations (Washke, 1939; Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013; Miller, 2011). Determining exposures for academic success for these populations is especially important considering academic success measures (e.g. graduation rates, retention, GPA) are obtained at a lower rate as compared to majority populations at predominately White universities (Thayer,

2000; Attinasi, 1989; Rendon, Jalomo, & Nora, 2000; Tierney, 1992; King, 2002; Bowen & Bok, 1998). Lindsey, Sessoms & Willis (2009) suggest that campus recreation research on African American students attending historically black colleges and universities is lacking, so they assessed the impact of campus recreation programs on student recruitment and retention for African American students at a small, private, historically black university in the Southeast United States. Undergraduate students were asked to complete the National Intramural Recreational Sports Association's Quality and Importance of Recreational Services Survey to report on how important recreational sports facilities and programs were to their college experiences. When asked about the importance of recreational sports when choosing a university, 47% reported recreational sports were important/very important. Even more students (50%) reported the availability of recreational sports to be important/very important in deciding to stay at that university.

While numerous benefits of campus recreation participation have been discovered over the past eight decades, not all studies support the link between campus recreation participation and academic success (Hall, 2006; Zizzi, Ayers, Watson, & Keeler, 2004; McElveen & Rossow, 2014). Taking a qualitative approach to determining the relationship between campus recreation participation and retention, Hall (2006) interviewed eight campus recreation participants from a small, private, liberal arts college on the West Coast of the United States. Hall developed seven questions to discuss with each participant. These questions focused on physical activity since childhood, types of programs students participate in at the university, and role the campus recreation programs play in continuing education at the university. Hall (2006) found that the general common themes discussed by participants included friendship, socialization, and being physically active. The central theme was sense of community. When students were asked "What

role, if any, has your participation in the campus recreation program played in continuing your education at the university?" only three out of the eight participants mentioned campus recreation programs had an influence on their persistence. Furthermore, these three participants clarified that they continued at the university only in part due to participation in campus recreation programs. In addition, Zizzi et al. (2004) did not find a positive relationship between campus recreation participation and academic success. The researchers surveyed 655 students from a large, mid-Atlantic university to determine demographics and perceived physical activity rates among student recreation center users and non-users. Although academic success was not a main study purpose, the investigators analyzed and described it in the study results. Student recreation center users were asked to complete a survey that was developed for this research study. Non-users completed a survey that was constructed slightly differently so that they were not being asked campus recreation participation specific questions. To determine academic success measures, students were asked to report their college GPA. Results showed there was not a significant difference in GPA between student campus recreation center users and non-users. McElveen & Rossow (2014) performed a more focused study designed to determine if there was a relationship between intramural sports participation and academic success. The researchers tracked first time in college freshmen to determine if participation in intramural sports had a relationship with GPA and retention at a small, private university located in the Southeast United States. Participation in intramural sports was tracked during the Fall 2010 and Spring 2011 semesters. The researchers also obtained demographic data, GPA for both semesters, and retention from Fall 2010 through Fall 2011. To determine if frequency of participation made a difference in GPA, the researchers divided participants into the following categories: 1) non-users, 2) moderate participation (1-3 sports per semester), or 3) heavy participation (4 or more

sports per semester). Although retention from Fall 2010 to Spring 2011 and Fall 2010 to Fall 2011 was higher in the first time in college students who participated in intramural sports, GPA did not differ significantly among intramural sports participant groups.

It would likely be of benefit to university campus recreation directors to collect participation data for the benefit of their campus recreation programs. Although several researchers have found academic and non-academic benefits of campus recreation programs, university administrators may believe campus recreation's role in student success is ancillary, and some believe campus recreation is a "perk" rather than an entity promoting success (Danbert et al., 2014; Braunsein & McGrath, 1997; Brandon, 2010). Although campus recreation participation has been linked to outcome measures such as sense of belonging, improved self-esteem, group bonding, stress reduction, fun, enjoyment and happiness, improved fitness, ability to build friendships, GPA, retention, credits completed, and higher graduation rates, consistent agreeable findings would be helpful in supporting the causal argument (Lower et al., 2013).

Overall, different sized and types of university campus recreation centers have been studied, specific programs within campus recreation have been tracked, academic success measures have been related to campus recreation participation through survey or by Registrar records, and specific populations of students have been studied to determine the affect campus recreation has on student academic success (Danbert et al., 2014; Lindsey, 2012; McElveen & Rossow, 2014; Lindsey et al., 2009; Kampf & Teske, 2013; Lindsey & Sessoms, 2006; Lower et al., 2013). Suggestions for continued research in campus recreation are plentiful. Broad suggestions include continuing to conduct research in campus recreation to provide justification to campus administrators to fund campus recreation programs. More specifically, analyzing multiple programs within campus recreation centers may provide a great deal of knowledge

about each individual program which may also provide campus recreation directors with justification to maintain programs (Miller, 2011; Lindsey et al., 2009; Moffitt, 2010; Todd et al., 2009). Additionally, longitudinal campus recreation participation data would help researchers study this important exposure variable and outcome measures such as academic performance over time (Henchy, 2013). Finally, it has been suggested that since universities across the United States are diverse, it is necessary to study a variety of student populations to determine whether campus recreation participation has the same relationship to academic success for all (Henchy, 2013; Lindsey & Sessoms, 2006; Lindsey et al., 2009; McElveen & Rossow, 2014). Researchers have previously found the value of studying populations like African American and Latino/Latina students' and their participation in campus recreation (Lindsey & Sessoms, 2006; Lindsey et al., 2009), but first generation student campus recreation participation has been studied less.

FIRST GENERATION STUDENTS

Several subgroups of college students are studied to determine probability of their academic success (Lohfink & Paulsen, 2005; Lindsey et al., 2009). Students from different racial/ethnic backgrounds, with varying financial aid statuses, different high school GPAs and ACTs, and who participate in certain on campus programs are just a few groups studied (Lindsey & Sessoms, 2006; Lindsey et al., 2009; Lohfink & Paulsen, 2005; Thayer, 2000). Another subgroup that may fall under several of the above categories is first generation students. These students may have a more difficult transition into college and lower retention rates compared to students whose family culture includes college graduation (Choy, 2001; London, 1989, 1996; Nunez & Cuccaro-Alamin, 1998; Ishitani, 2003).

Although there is not a standard definition for first generation college students, there are several suggestions as to how a university should define them (Lohfink & Paulsen, 2005). Thayer (2000) suggests a student can be defined a first generation student if neither of his or her parents has earned a Bachelor's degree. Ishitani (2003) agrees with Thayer but adds that first generation students could also include those whose parents started college but never attained a degree. Pascarella, Wolniak, Pierson & Terenzini (2003) suggest that first generation students are students whose parents have never attended college. McConnell (2000) specifies that a first generation student is an undergraduate student whose parents have no college experience. London (1989) narrows the definition of first generation student down to include only students who are the first in their families to go to college. Finally, Inkelas, Daver, Vogt & Leonard (2007) define a first generation student as a college student whose parents have a high school education or less and did not begin a postsecondary degree. Regardless of the precise definition, researchers who study first generation students agree that students who fall into this category are disadvantaged when compared to students whose parents went to college and obtained degrees (Darling & Smith, 2007; Lohfink & Paulsen, 2005; Thayer, 2000).

Terenzini et al. (1996) reports that first generation students they studied were different than traditional students on many levels. For example, when students completed pre-college admissions forms, first generation students differed from traditional students on 14 of the 37 characteristics surveyed. Some questions that were answered differently by first generation students related to race/ethnicity, family income, gender, age, if they had children, and degree aspirations (Terenzini et al., 1996). Pascarella et al. (2004) studied students at multiple universities to obtain results about the differences between first generation and traditional students. They found that first generation students enrolled in and earned fewer credit hours,

worked more hours, more likely lived off campus, participated in less extracurricular activities outside of the classroom, had fewer non-academic interactions with peers, and earned lower grades (Pascarella et al., 2004). Additionally, Choy (2001), Richardson and Skinner (1992), and Terenzini et al. (1996) found that first generation students are less prepared academically, have lower math, reading, and critical thinking skills, and tend to attend high schools with less rigorous curricula. Choy (2001) also found that first generation students were more likely to leave a 4-year institution before their second year when compared to traditional students. Moreover, first generation students are less likely to return to college after early departure when compared with traditional students who drop out (Choy, 2001). Researchers analyzing results of national surveys designed to follow students over time have also found similar results for first generation students. The National Education Longitudinal Study (2000) is a study that tracks cohorts of students from the 8th grade through college. The researchers note that these students are less likely to remain enrolled and graduate compared to traditional students, even when controlling for family income, academic preparation, and support from family and educators.

Studying this population of students is becoming more important due to increased numbers of first generation students enrolling in college (Mitchell, 1997; Padron, 1992; Terenzini et al., 1996). As with any group of students who may be disadvantaged transitioning to college, Inkelas et al. (2006) suggest that student affairs professionals implement approaches to improve student involvement. This involvement may help students build a greater connection with the university they attend, which in return may help retain these students and promote academic achievement. Unfortunately, this population of students has not been studied to determine if participation in campus recreation programs is related to their academic success.

Clearly, it is necessary to determine if many of the reported benefits that have been found due to campus recreation participation in other populations holds true for first generation students.

FRESHMEN STUDENTS

Freshmen students are another subgroup of concern when focusing on college student success outcomes. Although student success outcomes may be defined by GPA or amount of credits completed per academic year, retention is often a concern of university administrators due to the higher attrition rate of freshmen compared to students in other class standings (Kampf & Teske, 2013). Considering that 20-30% of freshmen may not be retained from the first to second year in college, it is imperative to study this subgroup to determine strategies to improve retention (Kampf & Teske, 2013). Mallinckrodt & Sedlacek (1987) suggest that since freshmen attrition rates are higher than any other academic class, universities often offer programs designed to reduce attrition, with particular emphasis on this group. Further, Miller (2011) suggests that students not involved in campus communities early in their college careers are less likely to persist. Therefore, it is necessary to determine programs on campuses that encourage participation and promote retention.

Campus recreation departments offer various programs students may take part in that promote the continuation of enrollment at universities. Miller (2011) suggests campus recreation programs are an important entity in improving retention because they may play a role in improving students' sense of belonging at the university, which may improve persistence and increase overall satisfaction with the university. Campus recreation programs are especially important for freshman retention efforts since the majority of program participants are freshmen and sophomore students (NIRSA, 2010). Although several cross sectional design based studies have been successful in identifying a positive relationship between participation in campus

recreation programs and retention (Danbert et al., 2014; Kampf & Teske, 2013; McElveen & Rossow, 2014), other researchers have not found the same results with freshmen students (Lindsey & Sessoms, 2006). Therefore, it is necessary to continue to study this subgroup to determine the relationship between campus recreation participation in the first year of college and retention.

Danbert et al. (2014) suggest that even small differences in retention can be substantial to a university. The researchers obtained membership data from the university's campus recreation center and academic data from the university Registrar to determine if campus recreation center membership was related to academic success measures. The researchers obtained high school GPA, cumulative college GPA, college credits completed, one year and two year retention, and class standing. After comparing the academic success outcomes of the members and nonmembers, Danbert et al. (2014) found that campus recreation members completed more credits and had higher GPAs than nonmembers. After the first year, members were more likely to be retained compared to nonmembers. The same was found after the second year. Although not statistically significant, campus recreation members were 3.5% more likely to be retained by the second year, compared to nonmembers. While a difference of 3.5% may not seem substantial, it resulted in almost 1600 students being retained at this large, Midwest University. The financial benefit to the university for retaining even a small percentage of students can be great. Kampf & Teske (2013) agree that financial gains for retaining students is important, as is the goal to justify programs on campuses that support retention. Acknowledging attrition rates are highest with freshmen students, Kampf & Teske (2013) studied the relationship between club sports participation, being a campus recreation employee, and student recreation center entry count data and retention among freshmen at a large, four-year, residential university. The

researchers obtained campus recreation participation and employment data from the university's Division of Student Affairs Department and demographic data, precollege data, latest term one-year college GPA, and Fall-to-Fall retention status of students from the Office of Institutional Research. The researchers found that freshmen students participating in club sports were 2.22 times more likely to enroll the following academic year, compared to nonparticipants. Additionally, students who used the campus recreation center were also more likely to be retained. Frequency of recreation center use was also related to retention. McElveen & Rossow (2014) also found encouraging results relating campus recreation participation (intramural sports) to retention in first time college students. Using a cross sectional design, the researchers collected intramural participation data from a sports participation database and retention data from the institutional database through the university's Department of Institutional Research. Retention rates included 1) proportion of students who started in the fall 2010 semester and also enrolled in the spring 2011 semester, 2) proportion of students who enrolled in the spring 2011 semester and also in the fall 2011 semester, 3) proportion of students who enrolled in the fall 2010 semester and also in the fall 2011 semester. After comparing campus recreation participants to nonparticipants, McElveen & Rossow (2014) reported that the retention rate from fall 2010 to spring 2011 was 4.7% greater in participants than nonparticipants. Retention was greater in participants from spring 2011 to fall 2011 at 2.2%. Finally, the retention rate from fall 2010 to fall 2011 was 5.9% greater in participants compared to nonparticipants.

Lindsey & Sessoms (2006) also studied the relationship between campus recreation participation and retention for undergraduate students at a small southeastern university. The researchers distributed the NIRSA Quality and Importance of Recreational Services Survey (QIRS) to students enrolled in Department of Physical Education and Health classes. The survey

provides many sections of questions, although the researchers were most interested in questions focusing on the quality of recreational sports facilities and programs. Furthermore, the researchers were also interested in the effect students believed campus recreation had on retention. After collecting the data, the researchers stratified class standing results to determine if there were any differences in responses about the relationship between campus recreation participation and retention. When comparing juniors and seniors to freshmen and sophomores, there was a significant difference in perceived retention due to campus recreation participation in the junior and senior level students. Although methods of this study were different than those of studies that showed positive relationships between campus recreation participation and retention, it is necessary to note the differences in results.

In summary, freshmen students remain a subgroup of interest as attrition rates continue to be highest in this population as compared with more advanced students (Kampf & Teske, 2013). While the majority of previous research suggests positive relationships between campus recreation participation and retention for freshmen students, this has not been found in all studies. Furthermore, few researchers have studied the relationship between campus recreation participation and retention past the sophomore year (Danbert et al., 2014). While reasons for attrition during or after the second year in college are reportedly different (e.g. students' initial expectations and the school's ability to deliver and meet those expectations, Boivin, Beuthin, & Hauger, 1993; Boivin, Fountain, & Baylis, 2000), this group holds the next highest attrition rate when comparing class-standing attrition (Adelman, 2006) among years in school. Therefore, positive relationships between campus recreation participation and student success outcomes like retention justify the importance of such non-academic entities on campuses. Encouraging results

provide evidence to university administrators for financial support of such departments, although consistent results are necessary for continued support.

RESEARCH AIMS:

Specific Aim 1: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) and the following academic success measures: credits completed per academic year and GPA.

H 1.1. Campus recreation program participants will have more credits completed per academic year and a higher GPA compared to nonparticipants.

Specific Aim 2: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) and the following academic success measures: credits completed per academic year and GPA in first generation students.

H 2.1. First generation campus recreation program participants will have more credits completed per academic year and a higher GPA compared to first generation nonparticipants.

Specific Aim 3: To determine if a relationship exists between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and the following academic success measures: credits completed per academic year and GPA.

H 3.1. Students who participate in more than one campus recreation option will have more credits completed per academic year and higher GPA compared to students participating in only one, or no campus recreation options.

Specific Aim 4: To determine if a relationship exists between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and the following academic success measures: credits completed per academic year and GPA in first generation students.

H 4.1. First generation students who participate in more than one campus recreation option will have more credits completed per academic year and higher GPA compared to students participating in only one, or no campus recreation options.

Specific Aim 5: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) in freshmen students and the following academic success measures: one-year retention and two-year retention.

H 5.1. Freshmen campus recreation program participants will have more favorable one-year retention and two-year retention profiles compared to freshmen nonparticipants.

Specific Aim 6: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) in first generation freshmen students and the following academic success measures: one-year retention and two-year retention.

H 6.1. First generation freshmen campus recreation program participants will have more favorable one-year retention and two-year retention profiles compared to first generation freshmen nonparticipants.

ORGANIZATION OF THE DISSERTATION

This dissertation will be organized into seven chapters. Chapter one includes the introduction and research aims. A review of the literature is covered in chapter two. Chapters three, four, and five include the study methodology for the different aims. Chapter six will include results of the data collected. Finally, chapter seven will include a discussion and summary of results, strengths and weaknesses of the study, and suggestions for future research.

REFERENCES

REFERENCES

Adelman, C. (2006). The toolbox revisited. Paths to degree completion from high school through college. Washington, DC: US Department of Education.

Astin, A. W. (1984). Student involvement: A development theory for higher education. *Journal of College Student Personnel, 25(4),* 297-308.

Attinasi, L. C., Jr. (1989). Getting in: Mexican Americans' perceptions of university attendance and the implications for freshman year persistence. *Journal of Higher Education, 60,* 247–277.

Becker, C., Cooper, N., Atkins, K. & Martin, S. (2009). What helps students thrive? An investigation of student engagement and performance. *Recreational Sports Journal, 33,* 139-149.

Boivin, M., Fountain, G., & Baylis, B. (2000). Meeting the challenges of the sophomore year. in L.A. Schreiner & J. Pattengale. (Eds.), Visible solutions for invisible students: Helping sophomores succeed (Monograph No. 31). (pp. 1-18). Columbia, SC: University of South Carolina, National Resource Center for the First-year Experience and Students in Transition.

Boivin, M. J., Beuthin, T. M., & Hauger, G. (1993). Why Christian students leave Christian colleges: Evaluating the dynamics of adjustment in a Christian community. *Journal of the First-Year Experience & Students in Transition, 5(1)*, 93-125.

Bowen, W. G., & Bok, D. (1998). *The shape of the river: Long-term consequences of considering race in college and university admissions*. Princeton, NJ: Princeton University Press.

Brandon, C. (2010). Five year party. Dallas, TX: Benbella Books Inc.

Choy, S. (2001). Students whose parents did not go to college: Postsecondary access, persistence, and attainment. US Department of Education, National Center for Education Statistics, 2001-126.

Danbert, S. J., Pivarnik, J. M., McNeil, R. N. & Washington, I. J. (2014). Academic success and retention: The role of recreational sports fitness facilities. *Recreational Sports Journal, 38,* 14-22.

Darling, R. A. & Smith, M. S. (2007). First-generation college students: First-year challenges. In M.S. Hunter, B. McCalla-Wriggins & E.R White (Eds.), *Academic Advising: New insights for teaching and learning in the first year:* pp. 203-211. Manhattan, KS: NACADA Monographs.

Forrester, S. (2015). Benefits of collegiate recreational sports participation: Results from the

2013 NASPA assessment and knowledge consortium study. *Recreational Sports Journal 39,* 2-15.

Hall, D. A. (2006). Participation in a campus recreation program and its effect on student retention. *Recreational Sports Journal, 30,* 40-45.

Henchy, A. (2011). The influence of campus recreation beyond the gym. *Recreational Sports Journal, 35,* 174-181.

Henchy, A. (2013). The perceived benefits of participating in campus recreation programs and facilities: A comparison between undergraduate and graduate students. *Recreational Sports Journal, 37,* 97-105.

Inkelas, K. K., Daver, Z. E., Vogt, K. E. & Leonard, J. B. (2007). Living-learning programs and first-generation college students' academic and social transition to college. *Research in Higher Education, 48(4),* 403-434.

Inkelas, K. K., Vogt, K., Longerbeam, S., Owen, J. & Johnson, D. (2006). Measuring outcomes of living-learning programs: Examining college environments and student learning and development. *Journal of General Education, 54(4),* 294-328.

Ishitani, T. T. (2003). A longitudinal approach to assessing attrition behavior among first-generation students: Time-varying effects of pre-college characteristics. *Research in Higher Education, 44,* 433-449.

Kampf, S. & Teske, E. J. (2013). Collegiate recreation participation and retention. *Recreational Sports Journal, 37,* 85-96.

King, J. E. (2002). *Crucial choices: How students' financial decisions affect their academic success*. Washington, DC: American Council on Education.

Lindsey, R. R. (2012). The benefits and satisfaction of participating in campus recreational sports facilities and programs among male and female African American students: A pilot study. *Recreational Sports Journal, 36,* 13-24.

Lindsey, R. & Sessoms, E. (2006). Assessment of a campus recreation program on student recruitment, retention, and frequency of participation across certain demographic variables. *Recreational Sports Journal, 30,* 30-39.

Lindsey, R., Sessoms, E. & Willis, G. (2009). Impact of campus recreational sports facilities and programs on recruitment and retention among African American students: A pilot study. *Recreational Sports Journal, 33,* 25-34.

Lohfink, M. M. & Paulsen, M. B. (2005). Comparing the determinants of persistence for first-generation and continuing-generation students. *Journal of College Student Development, 46(4),* 409-428.

London, H. B. (1989). Breaking away: A study of first-generation college students and their families. *American Journal of Education, 97,* 144-170.

London, H. B. (1996). How college affects first-generation college students. *About Campus, 23,* 9-13.

Lower, L. M., Turner, B. A. & Petersen, J. C. (2013). A comparative analysis of perceived benefits of participation between recreational sport programs. *Recreational Sports Journal, 37,* 66-83.

Mallinckrodt, B. & Sedlacek, W.E. (1987). Student recreation and the use of campus facilities by race. *Journal of Student Affairs Research and Practice, 24,* 28-32.

McConnell, P. J. (2000). What community colleges should do to assist first-generation students. *Community College Review, 28.3,* 75-87.

McElveen, M. & Rossow, A. (2014). Relationship of intramural participation to GPA and retention in first-time-in-college students. *Recreational Sports Journal, 38,* 50-54.

McGrath, M. & Braunstein, A. (1997). The prediction of freshmen attrition: An examination of the importance of certain demographic, academic, financial and social factors. *College Student Journal, 31(3),* 396-408.

Miller, J. J. (2011). Impact of a university recreation center on social belonging and student retention. *Recreational Sports Journal, 35,* 117-129.

Mitchell, K. (1997). Making the grade: Help and hope for the first-generation college student. Educational Resources Information Center.

Moffitt, J. (2010). Recreating retention. *Recreational Sports Journal, 34,* 24-33.

NIRSA/NASPA (2010). NIRSA/NASPA consortium campus recreation impact study-descriptive summary report. Retrieved from http://www.nirsa.org/docs/Discover/Research/Campus_Rec_Impact_Study.PDF

Nunez, A. & Cuccaro-Alamin, S. (1998). First-generation students: Undergraduates whose parents never enrolled in postsecondary education (NCES 98-082). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Padron, E. J. (1992). The challenge of first-generation college students: A Miami-Dade perspective. In: Zwerling, L. S. and London, H. B. (eds.), *First-Generation College Students: Confronting the Cultural Issues* (New Directions for Community Colleges, No. 80, Jossey-Bass, San Francisco, pp. 71-80.

Pascarella, E. T., Pierson, C. T., Wolniak, G. C. & Terenzini, P. T. (2004). First generation

college students: Additional evidence on college experiences and outcomes [Electronic version]. *The Journal of Higher Education, 75,* 249-284.

Pascarella, E. T., Wolniak, G. C., Pierson, C. T. & Terenzini, P. T. (2003). Experiences and outcomes of first-generation students in community colleges. *Journal of College Student Development, 44(3),* 420-429.

Paulsen, M. B. & St. John, E. P. (1997). The financial nexus between college choice and Persistence. In R. A. Voorhees (Ed.), *Researching Student Aid: Creating an action Agenda* (New Directions for Institutional Research No. 95, pp. 65-82). San-Francisco: Jossey-Bass.

Paulsen, M. B. & St. John, E. P. (2002). Social class and college costs. *The Journal of Higher Education, 73(2),* 189-236.

Rendon, L. I., Jalomo, R. E., & Nora, A. (2000). Theoretical considerations in the study of minority student retention in higher education. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 127–156). Nashville: Vanderbilt University Press.

Richardson, R. C. & Skinner, E. F. (1992). Helping first-generation minority students achieve degrees. In Zwerling, L. S., and London, H. B. (eds.), *First-Generation College Students: Confronting the Cultural Issues* (New Directions for Community Colleges, No. 80, Jossey-Bass, San Francisco, pp. 29-43.

Stier, W. F., Schneider, R. C., Kampf, S., Haines, S. G. & Wilding, G. E. (2005). A survey of campus recreation directors at NIRSA institutions: Activities emphasized, student participation patterns, trends and future offerings contemplated. *Kinesiology, Sport Studies and Physical Education Faculty Publications*. Paper 45.

Swail, W. S. (2004). The art of student retention: A handbook for practitioners and administrators. Austin, TX: Educational Policy Institute. Retrieved from: http://www.educationalpolicy.org

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

Thayer, P. B. (2000). Retention of students from first generation and low income backgrounds. *The Journal of the Council for Opportunity in Education,* 1-9.

Tierney, W. (1992). An anthropological analysis of student participation in college. *Journal of Higher Education, 63,* 603–618.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45(1),* 89-125.

Todd, M. K., Czyszczon, G., Carr, J. W. & Pratt, C. (2009). Comparison of health and academic

indices between campus recreation facility users and nonusers. *Recreational Sports Journal, 33,* 43-53.

Washke, P. (1940). A study of intramural sports participation and scholastic attainment. *Research Quarterly, 11(2),* 22-27.

Zizzi, S., Ayers, S. F., Watson, J. C. & Keeler, L. A. (2004). Assessing the impact of new student campus recreation centers. *NASPA Journal, 41(4),* 588-630.

CHAPTER TWO: LITERATURE REVIEW

INTRODUCTION

The relationship between campus recreation participation and student academic success has been studied to determine whether this component of campus life might aid students' efforts to maximize their college experience (Stier, Schneider, Kampf, Haines & Wilding, 2005). While some researchers study campus recreation as a whole entity and analyze participation benefits (Forrester, 2015; Lindsey, Sessoms & Willis, 2009; Hall, 2006; Henchy, 2011; Forrester, 2015; Todd et al., 2009; Henchy, 2013), others study specific programs within campus recreation to determine individual program benefits (McElveen & Rossow, 2014; Danbert et al., 2014; Kampf & Teske, 2013). Furthermore, academic success, may be defined in different ways; therefore, a variety of success outcomes are measured (Baker, 2008; Danbert et al., 2014; Hall, 2006; Kampf & Teske, 2013). Regardless, an understanding of previous studies focusing on campus recreation participation and student academic success is necessary to justify the need for additional research where past research is lacking. Determining appropriate methods to study the relationship between campus recreation and academic success outcomes is necessary to provide a strong argument to university administrators who decide the fate of campus recreation programs (Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013).

THE RELATIONSHIP BETWEEN CAMPUS RECREATION PARTICIPATION AND GRADE POINT AVERAGE (GPA)

Intramural sports participation and student academic success have a long research history dating back to the 1930s and 1940s. An early study by Paul Washke (1940) at the University of Oregon focused on the effect intramural sports had on GPA in male students. Record keeping of

participation in intramural sports in 1940 was organized so that each participant had a record that listed his name, class, organization represented (fraternity), sports participated in and number of activities he participated in throughout the academic year. These records were kept on file within the School of Physical Education and were updated by the athletic manager of each organization whenever a student participated in an intramural sports program. Washke chose to analyze participation in intramural sports from 1931-1936. To define participation in intramural sports year round, students who participated in five to eight intramural sports per year were included in the analysis of the study. Washke (1940) believed that students participating in one or two sports per year had "spasmodic" participation and therefore would not be considered consistent participants. After defining participation, the sample size for the five years of intramural sports participation included 271 students. Variables Washke (1940) controlled for included students' age, class standing, major, rating on psychological entrance exams, and quartile standing in high school. Grades earned at the undergraduate level for each participant were pulled from each record. To compare differences in GPA, a control group (n=271) was developed that included students who did not participate in intramural sports. A third comparison group was also formed. This group consisted of all men enrolled at the University of Oregon. To calculate GPA, participants earned the following points for each credit hour (e.g. A=3 points, B=2 points, C=1 point, D=0 points, F=-1 point). All points per semester were added up and then divided by the total hours taken to determine the GPA. Furthermore, GPA over all five years was calculated as a cumulative value. Intramural sports participants scored a GPA of 6.395 for the five-year period. The non-participant group averaged a 6.273 GPA and the overall male GPA was 6.289. Although this GPA point scheme is different from that which is currently used at most universities, participants in the intramural sports group had a higher GPA than nonparticipants

(+0.122) and the overall male student group (+0.106). When reviewing data per year, the intramural group showed a higher GPA in all years except 1932-1933 when the nonparticipants had a higher GPA. Additionally, the overall male group had a higher GPA than the intramural sports group in three of the five years. Although GPA was higher in the intramural sports group when analyzing the data over a period of five years, it was not always higher than the non-participant and overall male groups for each individual year. These results began the theme of "mixed results" that have occurred in campus recreation research for the past several decades; therefore, Washke suggested the necessity to continue to conduct research since few studies have been conducted prior to 1939.

Baker (2008) found mixed results when studying the relationship between intramural and club sports participation and GPA. He argued it was beneficial to study the relationship between campus recreation programs and academic performance because of the gaps in the research that ignore under-represented college students. Therefore, the purpose of Baker's study was to use survey data from the National Longitudinal Study of Freshmen (NLSF) to determine if there were relationships between extracurricular activities and academic performance; specifically GPA, in a sample of African American and Latino students. The NLSF was distributed to college freshmen at 28 universities across the United States. A total of 3,924 students completed the survey, but since Baker only wanted to focus on under-represented students, he chose to analyze the data of African American and Latino students only. The analytic sample consisted of 1,907 students from 27 universities. The survey was completed by participants at the beginning of their freshmen year and at the end of their remaining years of college. Baker considered participation in recreation sports as involvement in intramural sports and/or club sports. After analysis, the only significant findings between intramural sports and/or club sports participation and GPA

were found with the Latina population in the study. Baker determined that there was a negative effect between participation in intramural or club sports and GPA. Participation in intramural and club sports was not detrimental to GPA for African American men and women and Latino men. He suggested that not finding a significant difference in GPA in most study participants was reassuring in that participation in intramural and club sports is not inimical to GPA for those populations. Although this study is exceptional because of the longitudinal data analyzed, the results are strictly representative of African American and Latino/Latina students attending elite colleges. These results are not generalizable to all students at all universities. Future research should study why Latina students' academic success outcomes were negatively affected by club/intramural sports participation. Overall, this is a unique study focusing on subpopulations of college students who are usually overlooked.

Zizzi, Ayers, Watson II & Keeler (2004) proposed GPA as a success outcome to promote the use of campus recreation programs for recruiting purposes at universities. The researchers believed that if positive relationships could be found between campus recreation participation and student success measures, campus recreation participation benefits could be displayed during recruiting efforts to prospective students. Unfortunately, Zizzi et al. (2004) explained that researchers have not assessed the impact of campus recreation facilities on campus climate and student activity patterns. Therefore, Zizzi et al. (2004) studied the impact of a new student recreation center on campus climate measures at a mid-sized, mid-Atlantic United States university. The researchers distributed surveys to about 23,000 students at the university. Of the 23,000 students, 655 completed the survey. Of this sample, 537 students were campus recreation users and 118 students were nonusers. Campus recreation users were asked to complete one version of the survey while the students who identified as nonusers completed another version of

the survey. For the user's survey, questions about usage patterns, satisfaction with campus recreation, facility climate, exercise knowledge, health behaviors, sociocultural factors, and programming issues were included. In the nonuser's survey, items that did not pertain to the nonusers were removed from the survey. To determine academic success, the researchers evaluated students' GPA. When reviewing self-reported GPA, it was determined that there were no significant differences between the users and nonusers (3.11, 3.19; respectively). Although the researchers found interesting results about motivation patterns, exercise frequency, and comparing new and habitual exercisers, the GPAs between the users and nonusers did not show a significant difference, leading to results that differ from those of past research.

Based on the results of early studies presented above, more research is needed to determine if campus recreation participation and student success are positively related. To this point, Todd, Czyszczon, Carr & Pratt (2009) acknowledged the need for more research due to mixed findings of previous studies. Among other non-academic variables, GPA was the academic outcome of interest Todd et al. (2009) investigated in their study. The purpose of their study was to compare GPA, physical activity, intake of selected nutrients, BMI, smoking status, and the use of electronic media between nonusers, low users, moderate users, and high users of campus recreation facilities. Study participants included undergraduate students enrolled at a particular institution during a spring semester. After recruiting efforts were completed, 1,034 students comprised the sample. Gender ratio was comparable to the ratio of the total population of the university (658 women, 376 men). Participants completed an electronic survey that included the informed consent, demographic data, electronic media use, the International Physical Activity Questionnaire (IPAQ), the National Cancer Institute diet screener, and smoking frequency. A subset of the sample was asked to complete the survey again in paper

format. In addition to these data, GPA was retrieved from the Registrar and campus recreation visitation data were provided via swipe card system by the campus recreation department. After analysis, the researchers found that the campus recreation high user group had the highest GPA, although when grouping the three campus recreation user groups together, GPA was comparable to the nonuser group GPA. To further examine the relationship between campus recreation participation and student success measures, Todd et al. (2009) suggested that each campus recreation program should be evaluated individually to determine its specific benefits. Overall, Todd et al. (2009) showed positive effects of campus recreation participation for individuals who would be considered high users, although as a whole when all user groups were combined, there was not a significant difference in GPA compared with the nonusers. These results add to the inconsistent findings reported in the literature.

SUMMARY

Mixed results tend to be common when studying the relationship between campus recreation participation and GPA. While some researchers find a positive relationship between participating in campus recreation programs and student academic success measures (Paul Washke, 1940), other researchers do not (Baker, 2008; Zizzi et al., 2004; Todd et al., 2009). Furthermore, researchers like Baker (2008) suggest that no difference in GPA is still an important finding suggesting that students who participate in campus recreation programs are able to do so without it affecting their GPA. Regardless, consistent results between campus recreation participation and student academic success are needed to solidify the suggestion of a positive relationship between campus recreation participation and student academic success. Several suggestions are proposed for future research to achieve more consistent results. First, additional research is needed at universities across the nation to improve the ability to generalize

results. Different types of universities and universities with varying student populations are needed to establish results that may be used at other universities. Furthermore, it is necessary to study subpopulations of students to determine if they benefit similarly from campus recreation participation. University undergraduate populations consist of individuals from various backgrounds. Some of these populations have been shown to have a more difficult time with the transition from high school to college (e.g. minority students, first generation) (Choy, 2001; London, 1989; London, 1996; Nunez & Cuccaro-Alamin, 1998). Determining programs that are related to improving academic success is crucial. Finally, it is suggested that not only are campus recreation programs as a whole evaluated in their relationship with academic success, but campus recreation programs should also be analyzed individually to determine the benefits each program has to offer (Miller, 2011; Moffitt, 2010; Todd, et al., 2009). These recommendations are reasonable approaches for future research.

THE RELATIONSHIP BETWEEN CAMPUS RECREATION PARTICIPATION AND RETENTION

Research focusing on campus recreation participation and retention is another essential exposure and outcome dyad worthy of study to help explain the importance of campus recreation (Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013). If a positive relationship between campus recreation and retention is found consistently, it could positively affect future decisions about funding and support.

Hall (2006) indicated that even though there have been research studies conducted since the 1970s focusing on campus recreation and its influence on retention, universities need to build on this research to assess their own campus recreation centers. Since such a large percentage (78%) of all students at Hall's university used at least one component of campus recreation, he

believed it was necessary to interpret the benefits related to campus recreation participation at his university (2006). Interestingly, his research was qualitative as only four men and four women at the University of Pacific were interviewed to discuss their involvement in campus recreation programs. The interviewers asked the participants the following questions: Describe those activities you participated in growing up. What do you do to stay in shape? Do you consider recreation a social activity? What role, if any, has recreation played in continuing your education here at the University of Pacific? Why do you participate in recreational activities? What recreational facilities do you use on campus? Why? What has your use of recreational facilities or participation in recreation programs allowed you to do on campus? The goal of the interview was to determine if participation in campus recreation programs was related to retention. In his analysis, the researcher searched for keywords and common themes reported by participants. The most popular themes included physical activeness, diversity, socialization, meeting new people, friendship, sense of community, faculty relationships, student relationships, small campus, background/lifestyle, competition, academic/major, fun, and self-esteem. Among many other benefits of campus recreation participation, students commented on the relationship they believed occurred between campus recreation participation and retention. When students were asked how they believed campus recreation influenced continued education at the university, three participants commented that they continued their education at that particular university due to their involvement in campus recreation programs. As with every research study, this one had limitations. Considering the researcher administered the program for this study, there was a possibility of bias. Also, a small sample size warrants caution to generalizing the results of this study. Although the participants commented they felt their use of campus recreation facilities was related to several benefits, only three out of the eight participants believed campus

recreation influenced their choice to stay at the university. Hall suggested that future research should use a mixed methodology to obtain information about recruiting, retention, and the benefits of participating in campus recreation programs. Additional research with a larger sample size may provide more encouraging results about the relationship between campus recreation participation and retention.

Miller (2011) studied campus recreation as an entity with which students bonded to determine if it played a role in their retention. Miller (2011) explained that personal bonds occur between students and places on campus but unfortunately, campus recreation had not been studied as a place students had a personal bond with. Evaluating personal bonds between students and campus recreation provided the possibility that bonding strengthens the chance for retention. To study campus recreation as an entity on campus with which students had personal bonds, Miller distributed a 20-question survey about social belonging and retention to undergraduate students as they walked into the student recreation center. After four weeks of administering surveys to students, Miller received 453 completed surveys. Students who completed the survey commented that the campus recreation center provided them with strong emotional ties due to the ability to interact with new people, an increase in self-confidence, improved leadership abilities, improved happiness, and an improvement in time management skills. Study participants also commented that the student recreation center was necessary in creating a social bonding experience for them. Experiences gained allowed students to meet and develop friendships with other students, build a sense of community to establish relationships with other students, helped create a network of friends, and increased students' trust in their peers. Finally, Miller found that the campus recreation center not only attracted students to the university but also was a major reason why they did not leave the university. Retention may have

been explained by the students' sense of community at the university due to the relationships built and social bonds in creating a network of friends. This study also had limitations. These results are not generalizable and are largely applicable to universities similar to the university studied. An additional limitation focused on the participant sample. Most participants were campus recreation users. Therefore, the results of this study may be have been biased. Another limitation involved the self-report survey that was distributed to participants. Although Miller administered this survey in a pilot study and α=.82, Miller stated using a self-reported survey could be a limitation. For future studies, Miller suggested that researchers investigate how each campus recreation program relates to outcome variables like retention. Additionally, Miller suggested that conducting similar mixed methodology based studies will assist in building the knowledge of the influence of participating in campus recreation programs. Overall, Miller (2011) suggested that the social bonds made at the campus recreation center assisted in improving the academic persistence for campus recreation participants at the university. Explaining how social bonds are created at campus recreation centers and how that ultimately may lead to retention should provide justification for campus administrators to continue funding for these types of programs. Future research providing similar results will add to the relationship between campus recreation participation and retention.

Forrester (2015) noted that while previous research has demonstrated the benefits of participating in campus recreation programs, many studies are lacking in sample size and multi-institutional designs. Therefore, he investigated the benefits of participating in campus recreation sports using a large multi-institutional sample. The 2013 NASPA Assessment and Knowledge Consortium was distributed to students at 38 universities across the United States. Of those who completed the survey (n=33,522), 29,142 students attended public universities and 4,380

attended private universities. Approximately 75% of respondents indicated they used campus recreation sports facilities, programs and services. Participants indicated campus recreation programs (66.6%) and campus recreation facilities (73.9%) were important in their decision to stay at their university. Study limitations include data being collected via self-report. In addition, the large sample size produced a statistically significant finding that might not be "practically significant". However, the positive results suggest that campus recreation center directors should recognize and promote the benefits campus recreation programs and facilities may offer to the university as a means to meet university retention goals.

Some researchers have studied the relationship of campus recreation with retention and recruitment of students to determine if participation may assist in both drawing in and retaining students. Lindsey & Sessoms (2006) recognized the importance of not only attracting prospective students but also retaining them, so the purpose of their study was to determine the effect campus recreation use had on recruitment and retention. To examine the perception students had about participating in campus recreation programs, a modified version of the National Intramural Recreational Sport Association's Quality and Importance of Recreational Services Survey was distributed to undergraduate students at a small university in the southeast U.S. Students were instructed to complete questions on the QIRS related to demographic data such as class standing, ethnicity and age in addition to questions about the importance and quality of campus recreation programs. The results of this survey showed that 31% of survey respondents reported campus recreation was either important or very important when deciding the university they wanted to attend. Additionally, 37.3% reported campus recreation was either important or very important when deciding to continue at their universities. Although these findings provide an argument for campus recreation to be used as a recruitment tool, Lindsey &

Sessoms noted that the results of this study were not generalizable to all universities. Additionally, researchers conducting studies similar to this should use a more random method of choosing study participants rather than a convenience sample. Furthermore, the QIRS survey has had issues with reliability and validity in the past so researchers may want to implement other surveys or use with caution. Nevertheless, results of this study can be used for universities similar in size and demographics. Moreover, some methods utilized in this study may be used for future studies at other universities to further study the relationship between campus recreation participation and recruitment and retention.

Lindsey, Sessoms & Willis (2009) replicated their previous study by implementing it at a historically black university. Since research lacks using this subpopulation, the purpose of the Lindsey, Sessoms & Willis (2009) study was to assess the impact of campus recreation programs on student recruitment and retention. Undergraduate students in the Department of Health and Human Performance completed the National Intramural Recreational Sports Association's Quality and Importance of Recreational Services Survey to indicate the importance of recreational sports facilities and programs to their college experience. When asked about how important recreational sports were when choosing a university, 47% of students reported sports were important/very important. An even greater percentage (50%) reported the availability of recreational sports to be important/very important in deciding to stay at their university. Considering the researchers focused their study at a historically black institution, the results from this study may be most relevant to other historically black universities of a similar size with similar campus recreation facilities. Furthermore, these researchers also limited their results by the fact that they chose a convenience sample as opposed to one more representative of the university overall. The authors suggested to randomly select participants and continue this type

of research at all types of universities to strengthen the knowledge of the benefits of campus recreation.

Henchy (2011) acknowledged the academic strategies university administrators utilize to recruit and retain students but also noted the importance of nonacademic departments on campuses that may lead to retaining students. Although Henchy (2011) provided several research findings that supported campus recreation participation, she did not discuss where the research was lacking. Therefore, in addition to the research that has been previously conducted, the purpose of Henchy's study was to determine the influence of campus recreation participation on recruitment and retention for students who participated in campus recreation programs. Additional nonacademic outcome variables; such as quality of student life, interest in staying fit, and feelings of well-being and stress, were also measured. Henchy sent the National Intramural Recreational Sports Association/Student Voice Campus Recreation Impact Study survey to 2,500 students at a university located in southeastern United States. The survey included questions about recruitment, retention, satisfaction, involvement, and benefits students received from participating in campus recreation programs. Of the 2,500 students who were sent the survey, only 237 completed it in its entirety. Results showed that 28% of respondents believed that campus recreation programs had a moderate or strong influence on their decision to attend the southeastern university and 31% of all respondents noted that campus recreation programs had a moderate or strong influence on them staying at their university. Although these results agreed with results previous researchers have found, Henchy stated that almost half the respondents of this study were graduate students, overall response rate was poor, and the study followed a cross sectional design. Henchy suggested that future researchers should encourage survey completion to improve response rates. Furthermore, it may be beneficial to analyze undergraduate students

results separate from graduate students' results due to the differences in responses about choosing and staying at a university (Henchy, 2011).

SUMMARY

Numerous researchers have studied the relationship between campus recreation and retention. Several have also studied the relationship between recruitment and retention in order to explain if campus recreation has any influence in attracting students to campus and then retaining them. While researchers have found positive relationships between campus recreation and retention (Miller, 2011; Forrester, 2015; Lindsey et al., 2009), some of these findings may be questionable in how significant these results are for justifying campus recreation to administrators (Hall, 2006; Lindsey & Sessoms, 2006; Henchy, 2011). Furthermore, the methodology for the campus recreation and retention literature differs from study to study. While most researchers use surveys to find a relationship between campus recreation participation and retention, some use previously developed surveys (Forrester, 2015; Lindsey & Sessoms, 2006; Lindsey, Sessoms & Willis, 2009), some develop their own survey (Miller, 2011), while others use a scripted interview to collect responses from their study participants (Hall, 2006). While most researchers suggest positive relationships between campus recreation participation and retention, limitations such as poor response rates, using convenience samples, using surveys with questionable reliability, and self-report all explain the necessity for future research.

THE RELATIONSHIP BETWEEN CAMPUS RECREATION PARTICIPATION AND MULTIPLE ACADEMIC ACHIEVEMENT OUTCOME MEASURES

Many researchers approach campus recreation participation and academic success research to determine if campus recreation participation has a relationship with several success measures to justify the argument for universities to continue to support campus recreation

(Kampf & Teske, 2013; McElveen & Rossow, 2014; Henchy, 2013, Danbert et al., 2014). While focusing on one outcome measure is simplistic, studying multiple success outcome measures would be advantageous if researchers can obtain such data easily via survey or from a Registrar's Office. Kampf & Teske (2013) ensured multiple success variables would be measured considering retention and GPA data would be provided by the Office of Institutional Research at the university where their research was being conducted. The investigators believed that more campus recreation research was needed due to the fact that students were not enrolling in college at the rates they previously did and universities were having trouble retaining them. Considering many campus recreation centers need to justify funding for programming, Kampf & Teske (2013) believed research showing the success campus recreation has on student recruitment and retention was necessary. Therefore, the purpose of Kampf & Teske's (2013) study was to investigate the engagement-persistence relationship in a campus recreation program. Demographic data, precollege data, latest term one-year college GPA, and Fall-to-Fall retention status were collected from the Office of Institutional Research at the university studied. To analyze campus recreation participation data, the researchers were able to collect data indicating participation in club sports, campus recreation student employment status, and recreation center entry counts from the Division of Student Affairs. Results showed there were not significant differences in academic variables (ACT score, high school GPA, latest term cumulative one year college GPA) between club sports participants and nonparticipants but there was a significant relationship in Fall-to-Fall retention with club sports participants. The researchers also analyzed the data by developing a regression model to determine factors that would explain retention. After controlling for academic and demographic data, club sports were significant and kept in the regression model. Students participating in club sports had 2.22 times greater odds of enrolling

the following year when compared with nonparticipants. The researchers also found that student entry counts into the campus recreation center were positively correlated with high school GPA and latest term one-year college GPA. This was true after controlling for academic and demographic data. Students who used the campus recreation center were also more likely to be retained. In fact, the more that students used the campus recreation center, the greater the correlation with retention. The study had a number of limitations. One of the most important limitations to review is that the results of this study do not prove causality between exposures and outcomes, but rather examine the relationship between the exposures and outcomes. There may be several variables that could have played a role in academic success that were not measured. Additionally, this study lacks direct measures of persistence within the logistic regression. Therefore, there may be variables that are significant to influence the outcome measures but not included in the analysis. Like many other campus recreation studies, generalizability of results is limited. Since this was a single institution study, results gathered may be most relevant for other universities of the same size, same recreational facilities, and same student demographics. Overall, this study offers promising results for participating in club sports and campus recreation center programs (via card swipe). Although the methods of this study may be improved, positive results like these may still be used to argue resources for campus recreation programs (Kampf & Teske, 2013).

McElveen & Rossow (2014) agreed with the purposes of conducting campus recreation participation research to determine if there is a positive influence campus recreation has on academic success outcomes. The researchers recognized that many campus recreation professionals attempt to justify funding for their programs to administrators but are starting to feel the pressure to provide evidence for continued funding (McElveen & Rossow, 2014). In

addition to a need for more research to convince university administration of the benefits of campus recreation programs, McElveen & Rossow suggested that it is critical to focus on students with the lowest rate of retention; freshmen. Therefore, the purpose of their study was to examine the relationship between intramural sports participation and academic performance and retention in first time in college (FTIC) students. Students who participated in intramural sports in the Fall 2010 and/or Spring 2011 semesters were included in this study. Participation data were cross-referenced with institutional data to determine GPA per semester, retention from semester to semester, and retention from year one to year two. Researchers then split the sample by students who participated in 1) zero intramural sports, 2) 1-3 sports per semester (moderate participation), 3) 4 or more sports per semester (heavy participation). After analyses were conducted, McElveen & Rossow found there was not a significant difference in GPA across groups but there was a difference in retention. From Fall 2010 to Spring 2011, FTIC students who participated in intramural sports were retained at 4.7% higher rate than FTIC students who did not participate in intramural sports. From Fall 2010 to Fall 2011, FTIC students who participated in intramural sports were retained at 5.9% higher rate than FTIC students who did not participate in intramural sports. Although it is encouraging to link intramural sports with academic success, it is necessary to review the limitations of this study. Unfortunately, the investigators did not control for confounding variables. Participation in other student services on campus, and external and individual variables could have affected the results of this study suggesting that intramural sports may not be named the sole reason for the academic success outcomes in this study. Nevertheless, the finding of increased retention of FTIC students who participated in intramurals was encouraging. The researchers suggested that future research

should control for confounders, include other campus recreation programs, and be studied at other universities to increase generalizability of results.

Henchy (2013) suggested it is important to understand the influence of campus recreation on recruitment, retention, and other factors such as social belonging, sense of campus community, and relationship building. Previous research has reviewed the social benefits, recruitment, and retention benefits campus recreation has to offer for undergraduate students, but studies focusing on graduate students are lacking (Dalgarn, 2001; Miller, 2011; Elkins et al., 2011; Kampf & Teske, 2013). The purpose of Henchy's study was to compare undergraduate and graduate perceived benefits of campus recreation participation. Specific areas Henchy wanted to study included how campus recreation influenced recruitment, retention, social, health, and other outcome measures. To obtain undergraduate and graduate students perceptions of campus recreation participation, Henchy requested students to complete the National Intramural Recreational Sports Association/Student Voice Campus Recreation Impact Study survey. The survey focused on questions targeting how students believed campus recreation participation influenced recruitment, retention, satisfaction, and involvement on campus. When reviewing recruitment and retention results, Henchy (2013) found that 36% of undergraduate and 24% of graduate students reported that campus recreation had a moderate or strong influence on their choice of university. Additionally, when asked if campus recreation influenced students' decision to stay at the university, 38% of undergraduates and 27% of graduate students responded that campus recreation had a moderate or strong influence on their decision to stay at their university. Finally, when asked about campus recreation influencing academic performance, 41% of undergraduate and 30% of graduate students noted that they believed academic performance moderately or strongly improved based on participation in campus

recreation programs. These results are exciting because this is the first study to show that participation in campus recreation benefits both undergraduate and graduate students. On the contrary, the study design used for this study was cross-sectional which does not allow for changes in participation over time. Overall, while the percentage of undergraduate and graduate students who benefit and continue to attend their universities because of campus recreation could be higher, there are still a substantial number of students who are positively influenced by campus recreation programs. This information should be conveyed to higher administration to justify campus recreation programs and the importance they provide to students at both the undergraduate and graduate levels.

To review campus recreation participation and multiple academic success measures, Danbert et al. (2014) collected data on fitness center membership, GPA, credits completed, and retention to determine if there was a relationship between participation in campus recreation and the outcome measures. Unlike many university campus recreation center payment methods in which students are charged a fee as part of their tuition to use the campus recreation facilities, students at the university studied were required to pay a separate fee for their fitness center membership. Previous researchers have found that students who pay a separate fee to utilize campus recreation facilities in their first semester in college have had higher GPAs, complete more credit hours, and are more likely to be retained when compared to nonmembers. Therefore, the purpose of this study was to determine the relationship between recreational sports membership and college student academic success and retention in first time degree seeking freshmen. Data on first time degree seeking freshmen were provided to the researchers from the Registrar's database. Academic data including high school GPA, cumulative college GPA, college credits completed, one-year and two-year retention, and class standing were provided as

well. Students were classified as members of the campus recreation center if they purchased a membership in their first semester. Nonmembers included first semester freshmen who did not purchase a membership. Comparing members to nonmembers showed that members completed more credits and had higher GPAs than nonmembers. Following these students longitudinally, it was found that college GPA was higher in members than nonmembers and members completed more credits than nonmembers. After the first year, members were more likely to be retained than nonmembers. The same was true after the second year. Although Danbert et al. (2014) addressed limitations of previous research (e.g. self-report, lack of longitudinal data, and insufficient information of how students accessed the campus recreation center); there were limitations to their research as well. The main limitation mentioned was that confounding variables were not figured into the statistical analysis of this study. Danbert et al. (2014) suggested that confounders like high school GPA, gender, and socioeconomic status have the ability to effect college GPA so it is important to account for confounders. In conclusion, Danbert et al. (2014) found that several factors of student success were related to participation in campus recreation participation at a campus recreation facility that required a fee to participate.

SUMMARY

Researchers that study the relationship between campus recreation participation and several success outcomes seek the possibility of finding several positive relationships between campus recreation and success outcome variables to justify their argument for appropriate funding for campus recreation programs. On the contrary, these researchers also run the risk of adding to the mixed results that have been a continuing issue in campus recreation research. Researchers like Danbert et al. (2014) found a positive relationship between campus recreation members and GPA, while other researchers have not found this same relationship (Kampf &

Teske, 2013; McElveen & Rossow, 2014). The success outcome found to be positively related to campus recreation participation in many studies is retention. Not only have researchers studied this relationship in a quantitative manner (through retention rates), but they have also determined this relationship through survey. Several researchers have found the relationship between campus recreation participation and retention allowing for a strong argument for campus recreation to higher administration. Future research should focus on controlling for confounding variables, encourage higher response rates for studies requiring surveys, and include additional campus recreation programs to study.

It is evident by previous campus recreation and academic success research that mixed results have been found. While some researchers reported positive relationships between campus recreation participation and GPA (Danbert et al., 2014; Todd, et al., 2009; Kampf & Teske, 2013), many have not found this same result (Todd, et al., 2009; Washke, 1940; Baker, 2008; Zizzi et al., 2004; Kampf & Teske, 2013; McElveen & Rossow, 2014). Most researchers have found positive relationships between campus recreation participation and recruitment and retention measures, even though research methods have varied (Lindsey & Sessoms, 2006; Miller, 2011; Lindsey et al., 2009; Forrester, 2015; Henchy, 2011; Kampf & Teske, 2013; McElveen & Rossow, 2014; Henchy, 2013; Danbert et al., 2014). Furthermore, few researchers have reviewed success outcomes like credits completed (Danbert et al., 2014); therefore, additional research focused on multiple variables of student academic success are necessary.

FIRST GENERATION STUDENTS

Over the past 25 years, the number of first generation students attending colleges and universities in the United States has increased; causing concern about their education. With 4.5 million first generation students enrolled in institutions across the nation, this subpopulation of

students needs proper attention when it comes to student success, especially since first generation students tend to show lower academic performance compared to traditional students (Pryor, Hurtado, DeAngelo, Blake & Tran, 2010). First generation students are one of the most disadvantaged populations of students on college campuses (Choy, 2001; Horn & Nunez, 2000; Nunez & Cuccaro-Alamin, 1998; Warburton, Bugarin & Nunez, 2001). First generation students tend to be older, come from minority backgrounds, have a disability, are immigrants, are single parents, English is not their primary language, are independent from their parents, are low-income, live off campus, do not attend college immediately after high school graduation, attend college closer to home, are not full time students, work full time, are nontraditional students, are female, and are over the age of 24 years old (Bui, 2004; Engle & Tinto, 2008). First generation students are the first in their families to experience college, and many struggle academically and culturally with the transition into college (London, 1989, 1992, 1996; Choy, 2001; Horn & Nunez, 2000; Nunez & Cuccaro-Alamin, 1998; Warburton, Bugarin & Nunez, 2001). When focusing on academic success measures, first generation students are about four times more likely to leave college after their first year when compared with traditional students (Engle & Tinto, 2008). Clearly, it is necessary to identify strategies that promote academic success in a population like first generation students as they continue to enroll in universities across the United States.

Although first generation students have been studied for a few decades, retention research on this group has not been as plentiful (Duggan, 2001, 2002; Ishitani, 2003; Somers, Woodhouse & Cofer, 2000). In particular, first to second year retention research with first generation students is especially needed due to the fact that a great deal of students drop out of college after their first year (Duggan, 2001, 2002). Lohfink & Paulsen (2005) identified this gap in the research and

therefore used data from a national sample to analyze the determinants of first to second year retention for first generation and traditional students at four-year universities. To determine if there were reasons for persistence between the first year and second year of college in first generation and traditional students, Lohfink & Paulsen (2005) used data from the Beginning Postsecondary Students Longitudinal Survey-BPS: 96/01. Students were considered first generation if their parents did not have any education past high school (Choy, 2001; Nunez & Cuccaro-Alamin, 1998). In contrast, traditional students were classified as such if at least one parent had any type or quantity of education past high school (Somers et al., 2000). In this study, the independent variables consisted of the following: background characteristics, precollege achievement, academic, social and financial reasons for choosing a university, institutional variables, and in-college experiences. These independent variables were analyzed to determine their likelihood of influencing the dependent variable of first to second year retention. After logistic regressions were run to analyze the relationships between the independent variables and first to second year retention, significant differences between first generation and traditional students were found. Specifically, 76.5% of first generation students persisted from their first to second year. Students possessing the following characteristics or reported expectations were less likely to persist from year one to year two: married, females, English speaking, Hispanic, lower family income, desire to complete a Bachelor's degree or less (versus students who expected to complete higher than a Bachelor's degree), choice of university not based on faculty reputation, choice of university not based on the opportunity to live at home, attending a private institution, smaller institutions, or institutions with a lower academic integration index, lower GPA, lack of satisfaction with their social lives, lower grant aid, and lower work-study aid. Traditional students were more likely to persist from year one to year two when compared with first

generation students (82.2% vs 76.5%, respectively). Traditional students possessing the following characteristics or reported expectations were less likely to persist from year one to year two: expectation to complete a Bachelor's degree or less, choice of university was not due to the school's reputation, choice of university was not due to lower tuition, lower GPA, lack of satisfaction with their intellectual growth, social lives, campus climate, participation in fewer school clubs, and less work-study aid. These results offer important information for first generation retention literature. While Lohfink & Paulsen (2005) found a couple similarities in reasoning to leave college between traditional and first generation students, there were more differences in the reasoning between the groups for leaving. Thus, it may be beneficial to focus on the characteristics and expectations first generation students possess when developing retention efforts. Choy (2001) explains that first generation students are many times non-White, from low-income families, and female. Lohfink & Paulsen (2005) found that race, class, and gender were specific characteristics that relate to first generation students who are not retained. Specifically, Lohfink & Paulsen (2005) found first generation students who are Hispanic, come from a low-income family and are female all influenced first to second year retention substantially. To better assist these students, it is suggested that programs should be offered based on those specific students' wants and needs. Developing programs that are beneficial to the whole population of students may not benefit specific populations similarly. First generation students from low-income families likely come from different social classes that may view financial obligations to universities differently (Lohfink & Paulsen, 2005). Educating these students on the strategies of funding their education should be available so that persistence is not affected. Finally, Lohfink & Paulsen (2005) suggested that since females made up the majority of first generation students in their study, universities should be aware of this and further

investigate the possibilities of why first generation female student retention is substantially different. Although women are attending universities at rates higher than males, a greater number of female first generation students are also attending and may need programs that influence retention. It is important to identify the reasons first generation students persist to create programs that offer the best benefits for this population of students.

While Lohfink & Paulsen (2005) shed some light on the differences between first generation students and traditional students, Pascarella, Wolniak, Pierson & Terenzini (2003) commented that there is still much to research with this population. Pascarella et al. (2003) acknowledged the shortcomings first generation students typically have; knowledge about postsecondary education, low income, lack of secondary school preparation (Berkner & Chavez, 1997; Hossler, Schmidt & Vesper, 1999; Warburton, Burgarin & Nunez, 2001), and believe it is important to understand more about first generation student experiences. To study this population of college students, the researchers gathered their sample from five different community colleges from five different states. Pascarella et al. (2003) randomly chose 144 students from the five universities sampled. The researchers categorized students into three groups to ensure a more sensitive analysis. Many researchers group students as either first generation (both parents did not complete a Bachelor's degree) or traditional/other. Defining students as traditional or other could group students whose parents have varying levels of education (e.g. both parents have Bachelor's degrees, one parent has a Bachelor's degree and one does not, etc.). Therefore, Pascarella et al. (2003) categorized groups by first generation, high parental postsecondary education (both parents earned a Bachelor's degree or higher), and moderate postsecondary education (one or more parents completed at least some college education but no more than one parent earned a Bachelor's degree or higher). A questionnaire

was distributed to participants and they were asked to answer the 21 measures relating to academic and nonacademic experiences while in college. The following areas were measured: credit hours completed, time spent studying, number of courses taken in natural sciences and engineering, mathematics, social sciences, technical/pre-professional and arts and humanities, college grades, course-related interaction with peers, academic effort/involvement, computer use, reading and writing involvement, hours worked per week, athletic participation, Greek affiliation, non-course related interaction with peers, extracurricular involvement, and volunteer involvement. After multiple regressions were run and pre-college confounders were controlled, the greatest differences in experiences occurred between the first generation students and students whose parents both completed a Bachelor's degree. First generation students completed fewer credit hours, studied less, took fewer courses in the natural sciences, mathematics, and the arts and humanities, had lower grades, were less likely to join a Greek organization, and worked more hours per week. Additionally, first generation students were more likely to take technical/pre-professional courses and less likely to use computers than students whose parents both completed Bachelor's degrees. Although first generation students did not perform as well in science reasoning, were not as open to diversity/challenge, and had lower learning for self-understanding, they showed better writing skills and greater internal locus of attribution for academic success, had a preference for higher order cognitive tasks, and showed more resiliency in community college than previous research predicted. This study was unique in the fact that first generation students were not compared to the rest of the population of students, yet were compared to students whose parents both completed a Bachelor's degree and students who had only one parent that may have completed a Bachelor's degree. This difference in categorization shows the importance of comparing first generation students to the rest of the student population

because the significant differences occurred between the first generation students and students whose parents both completed a Bachelor's degree.

Stebleton, Soria & Huesman Jr. (2011) added to the work of Lohfink & Paulsen's in studying the differences in first generation students' college experiences. Stebleton et al. (2011) recognized the challenges first generation students face as they attempt to continue their education at four-year institutions. Since first generation students carry several typical demographic characteristics of disadvantaged populations (e.g., low-income, minority, English as a second language students), Stebleton et al. (2011) wanted to better understand first generation students' college experiences and compare them to traditional students' experiences to determine if valuable suggestions could be promoted. The overall purpose of the study was to determine if first generation students faced different kinds of stress when compared with traditional students. Specifically, Stebleton et al. (2011) examined differences in sense of belonging between first generation students and traditional students, if there was a relationship between sense of belonging and satisfaction and their level of well-being, and if there were differences between first generation students and traditional students level of mental well-being and their usage of mental health services. Stebleton et al. (2011) distributed surveys to 145,150 students at six large universities across the United States. Of the 145,150 students, 58,017 completed the study that focused on student life and development, mental health, and the use of counseling services. Students were classified as first generation students if they responded that both parents have not earned a Bachelor's degree. The researchers analyzed student life and development, mental health, and the use of counseling services. When asked about sense of belonging on campus, traditional students reported a greater sense of belonging when compared with first generation students. Traditional students reported lower levels of depression and stress

when compared with first generation students. Finally, first generation students reported needing but not using counseling services at a higher rate than traditional students. In addition to the suggested outreach that college counselors should implement for first generation students, Stebleton et al. (2011) also recommended that first generation students be encouraged to participate in learning communities, service learning opportunities, study abroad programs, writing intensive courses, and first year seminars to improve social engagement opportunities. These programs may help students meet other students, faculty and staff of the university and enhance their sense of belonging with the university.

SUMMARY

Considering first generation students have a more difficult time with the transition into college and being retained, it is necessary to determine factors that may aid in a successful college experience. For decades, researchers have studied what makes college more challenging for this population (Pascarella et al., 2003; Lohfink & Paulsen, 2005), but only recently have researchers started to study programs that may assist first generation students in achieving academic success (Stebleton et al., 2011). Considering only a few programs have been studied to determine the relationship between participation and student academic success, it is necessary to explore other programs that may promote or be related to academic success outcomes.

FRESHMEN STUDENTS

According to Tinto (2006), student retention is one of the most widely studied areas in higher education. Early work by Spady (1970, 1971), Tinto (1975, 1987), Astin (1975, 1984), and Pascarella & Terenzini (1980) focused on student retention over periods of time in college to determine patterns of attrition. Additionally, strategies for retention have been studied to determine factors leading to persistence. What was determined decades ago was that

involvement in the university setting is important and it matters most during the first year of college (Tinto, 1975, 1987; Astin, 1975, 1984; Pascarella & Terenzini, 1980). Haines (2001) and Moffitt (2010) have found that campus recreation departments may be that source of involvement for students to choose and stay at a university. Other researchers have also attempted to find this link for freshmen students, although results are mixed (Danbert et al., 2014; Kampf & Teske, 2013; McElveen & Rossow, 2014).

Danbert et al. (2014) collected campus recreation participation data to determine if there was a relationship between participation and several academic success measures in freshmen students. Data collected included fitness center membership, GPA, credits completed, and retention. Fitness center membership was unique at the university studied as students paid a separate fee (not included in tuition) to obtain access to campus recreation programs. Due to results found from previous research focusing on similar campus recreation membership, Danbert et al. (2014) speculated that students would have higher GPAs, complete more credit hours, and would be more likely to be retained when compared to nonmembers. Hence, the purpose of this study was to determine the relationship between recreational sports membership and college student academic success and retention in first time degree seeking freshmen. Academic data for first time degree seeking freshmen including high school GPA, cumulative college GPA, college credits completed, one-year and two-year retention, and class standing were provided by the Registrar. Campus recreation center members were included if they purchased a membership in their first semester. Nonmembers included first semester freshmen that did not purchase a membership in their first semester. To determine if there was a significant difference in academic success between members and nonmembers, GPA, credits completed, and retention were compared between the groups. Results showed that members completed more

credits and had higher GPAs than nonmembers. When reviewing one-year and two-year retention, members were more likely to be retained after the first year and the second year. While limitations of previous research were taken into account (e.g. self-report, lack of longitudinal data, and insufficient information of how students accessed the campus recreation center); there were limitations to this study as well. Danbert et al. (2014) explained that confounders like high school GPA, gender, and socioeconomic status may effect college GPA so it is important to account for these confounders. The researchers suggested that future research should incorporate confounding variables in the statistical analysis to determine the effect they have on college academic success variables. Overall, Danbert et al. (2014) found that several student success variables for freshmen were related to participation in campus recreation participation.

Since attrition rates are highest in freshmen students, Kampf & Teske (2013) studied this population to determine if there were programs that may encourage retention in the first year of college. Reiterating Tinto's (1993) theory that a predictor of retention is academic and social integration, Kampf & Teske (2013) suggested out-of-classroom experiences may be linked with academic success and should be further studied. Unfortunately, not all out-of-classroom activities are seen by higher education administrators as links to success. For instance, Brandon (2010) notes that campus recreation programs have been thought to be nonimportant to the overall collegiate learning experience and viewed as a "perk" to students. Consequently, these beliefs lead campus recreation professionals to having to justify funding for programming. Therefore, Kampf & Teske (2013) believed it was necessary to continue to research the relationship between campus recreation and recruitment and retention. The purpose of Kampf & Teske's (2013) study was to investigate the engagement-persistence relationship with club sports, campus recreation employment, and student recreation center entry counts (via electronic

card swipe) in first time, full time students. Demographic data, precollege data, latest term one-year college GPA, and Fall-to-Fall retention status were collected from the Office of Institutional Research at the university studied. Participation in club sports, campus recreation student employment status, and recreation center entry counts were collected from the Division of Student Affairs. Results for club sports participants and nonparticipants showed there were not significant differences in ACT score, high school GPA, latest term cumulative one-year college GPA but there was a significant relationship in Fall-to-Fall retention with club sports participants. The researchers also reviewed retention by building a regression model to determine factors that explain retention. After controlling for possible confounders (academic and demographic data), club sports were a significant variable in the regression model. Club sports participants had 2.22 times greater odds of enrolling the following year when compared with nonparticipants. Utilizing the campus recreation center (via card swipe) was also positively correlated with high school GPA and latest term one-year college GPA after controlling for confounders. Retention was more likely in students who used the campus recreation center. Additionally, the more that students used the campus recreation center, the greater the correlation with retention. As with many studies, this study had its limitations. One of the most important limitations to clarify is that the results of this study do not prove causality between campus recreation participation and student success outcomes, but do review the relationship that exists between the variables. Another limitation is that this study lacks direct measures of retention within the regression model. Therefore, there may be other variables (e.g. other programs students participate in) that could influence success but are not included in the analysis. As reported in other campus recreation studies, generalizability of results is another limitation. Results from this study may be used for other universities of the same size, same recreational

facilities, and same student demographics, although may not be relatable to other universities. Overall, this study offers encouraging results for first time, full time students participating in club sports and campus recreation center programs (via card swipe). Although continued research is suggested, results from this study may be helpful for campus recreation professionals to justify needed resources (Kampf & Teske, 2013).

McElveen & Rossow (2014) believed that since freshmen attrition rates are higher than any other academic class, institutions should study on-campus programs that may encourage retention. The researchers reiterated the importance of the findings of Miller (2011) that students who are not involved early in their college careers, tend to stay uninvolved and are less likely to be retained. Therefore, the purpose of their study was to examine the relationship between intramural sports participation and academic performance and retention in first time in college students. Freshmen students who participated in intramural sports in the Fall 2010 and/or Spring 2011 semesters were included in this study. Intramural sports participation data, GPA per semester, retention from semester to semester, and retention from year one to year two were collected. Researchers then split the sample by students who participated in 1) zero intramural sports, 2) 1-3 sports per semester (moderate participation), 3) 4 or more sports per semester (heavy participation). Comparing participant and nonparticipant results, McElveen & Rossow found there was not a significant difference in GPA across groups but there was a difference in retention. From Fall 2010 to Spring 2011, freshmen students who participated in intramural sports were retained at 4.7% higher rate than freshmen students who did not participate in intramural sports. From Fall 2010 to Fall 2011, freshmen students who participated in intramural sports were retained at 5.9% higher rate than freshmen students who did not participate in intramural sports. Although the link between campus recreation program participation and

multiple measures of academic success was not found in this study, the relationship between intramural sports and retention should be encouraging for campus recreation departments and institutions seeking strategies to improve retention in freshmen students. Additionally, it is necessary to review the limitations of this study to determine the next step for future research. Like other campus recreation and student academic success studies, the researchers did not control for confounding variables. For example, participation in other on-campus and off-campus activities was not configured in the analysis of this study; therefore, intramural sports may have not been the only positive influence on retention. Regardless, the relationship between intramural sports and retention that was found is encouraging and should be included with other programs to determine its effect on academic success in future studies.

SUMMARY

With attrition rates ranging from 20-30% in freshmen students, it is imperative to determine strategies that encourage student involvement early on in students' college careers (Kampf & Teske, 2013). Considering mixed results have been found when studying campus recreation participation in freshmen, it is necessary to continue to research in the hope of producing more consistent results (Danbert et al., 2014; Kampf & Teske, 2013; McElveen & Rossow, 2014). Continued positive relationships between campus recreation participation in freshmen and academic success may help institutions change their perception of campus recreation as a "perk" and justify using it for improving success measures like retention.

SOPHOMORE STUDENTS

Researchers agree that attrition rates from sophomore to junior year are the second highest (10-13%) compared to freshmen attrition rates (Lipka, 2006; Adelman, 2006), although sophomore retention tends to be overlooked since most universities devote retention efforts

towards freshmen students. Gahagan & Hunter (2006) note that even though research on sophomore students has been conducted for decades, the sophomore experience is "less well understood." What is known is that the second year of college tends to present a different and possibly more challenging time in the college career (Gahagan & Hunter, 2006). Two topics that researchers have been able to agree upon when studying the difference in the sophomore experience include 1) developmental changes that take place within students during their sophomore years and 2) institutional policies and support from administrators that either help or hinder students' progress during their second year (Gahagan & Hunter, 2006).

Schaller (2005) suggests that since universities are aware of freshmen retention issues, they are quick to offer programs that promote retention to the second year. Unfortunately, less is known about student retention from the second to third year in college and educators are left wondering what needs may or should be met to ensure attrition rates are at a minimum. To learn more about these needs, Schaller (2005) asked sophomore students if they would join focus groups or would be willing to complete interviews about their sophomore experience. Students (n=19) were selected from a mid-size, private Catholic university. Questions about spirituality, campus involvement, and home life were asked within the interviews, although many of the respondents spoke upon how they viewed themselves, their relationships, and their academic experiences and decisions throughout their sophomore year. Schaller (2005) found through these interviews and focus groups that students transitioned through four stages during their college careers including 1) random exploration, 2) focused exploration, 3) tentative choices, and 4) commitment. The random exploration stage explains a time during the college experience when students are still learning about themselves and their new community. Many study participants in this study were aware of what they wanted and voiced their opinions and frustrations for the

choices they previously made or bypassed as freshmen. Schaller (2005) believed that these comments reflected the fact that the participants had reached the focused exploration phase which demonstrates frustrations felt with current relationships, themselves, and/or their academic experiences. Some participants stressed about feeling as if they were being forced to choose a major during their sophomore year and experienced uncertain thoughts about their futures. It was clear to Schaller (2005) that many students already transitioned from random exploration in freshmen year to focused exploration due to their experience as sophomores in college. Once students realized they were making more permanent choices, they transitioned from the focused exploration phase to the tentative choices phase. The tentative choice phase allows students to make decisions that will set them in the direction they would like to travel through the rest of their college careers. Students in this phase felt a different sense of responsibility. One student said "I pretty much know what I want out of my future, so I'm going to figure out what to do to get there and I don't mind doing things myself." This phase provides a more permanent realization for the future. The final phase; commitment, was a phase only few sophomore students experienced. Students in this phase do not question whether they made correct decisions to get to this more permanent point. They trust they have made a decision that will work out for them and their futures. Overall, Schaller (2005) indicated that each stage commented on by students had associated stressors. With random exploration, students may not have found their confidence yet and may be feeling doubtful about what they should do with their lives. In focused exploration, students are searching for direction in life while also being able to review previous choices. While tentative choices and commitment tend to feel more permanent than random and focused exploration, there may still be some anxiety about more permanent choices made. Overall, Schaller (2005) found significant concerns by the sophomores studied. Concerns,

anxieties, and stressors pose different reasons as to why sophomore students may not be retained as compared to reasons freshmen students are retained.

Gohn, Swartz, & Donnelly (2000) used an exploratory case study design to learn more about developmental changes experienced by students. Using qualitative and quantitative techniques, the researchers' goal was to gather information about how beginning freshmen who returned for their sophomore years envisioned themselves in relation to graduation. Gohn, Swartz, & Donnelly (2000) interviewed sophomore level students to study the experience in depth. Quantitative questions focused on persistence rates between freshmen to sophomore year, and sophomore to junior year while qualitative questions included: 1) What are the academic factors that influenced student retention? 2) What are the issues surrounding emotional and personal support? 3) What is the commitment and aspirations of the sophomore students? 4) What are the financial factors affecting the decision to continue? Twenty sophomore level students were selected to participate in the interview. Researchers selected students who would represent a cross section of the second year undergraduate population based on the following characteristics: they were enrolled at the university, represented a variety of majors, academic standing, high school GPA, ACT scores, cumulative GPA, living on campus or off campus, scholarship status, racial and ethnic background, and gender. Nine of those twenty students did not participate due to failure to enroll in the semester the data collection was occurring, no response, did not want to participate, and did not show for the interview. The remaining eleven students represented the overall sophomore population at the institution. Quantitative measures were obtained from the university student database. Factors such as second year to graduation persistence rates, comparison of retention and graduation rates among regional universities, net loss of beginning freshmen, beginning freshmen enrolled, and profiles of second year students

were collected. Qualitative data focused on the following areas of concern when studying sophomore retention: commitment and aspirations, pre-college factors, college factors, academic issues, and financial concerns. With respect to commitment and aspirations, sophomore students felt that their confidence and maturity increased along with their optimism of finishing their degrees in a timely fashion. Another common theme appeared to include the students' involvement with the campus community. "Having fun, enjoying the campus and community, working, and some involvement" supported the fact that these students felt like they were at home. In fact, the researchers noted that the idea of a "sophomore slump" was non-existent. The students in this study mentioned several themes when asked about surrounding emotional and personal support including "social integration," "lack of isolation," "personal relationships," and "community." Many students noted that they made friends and felt comfortable talking to faculty and staff. Academic factors that affected students were a little more complex. Students mentioned that they seemed satisfied with instructors, especially instructors teaching their major courses. They mentioned concern with teaching assistants but believed they were doing a good job overall. The students mentioned that they felt their classes were not as challenging, although they recognized the importance of attending classes and how attendance is related to academic performance. In contrast, students who were challenged and struggled through freshmen year, worried about how grades would affect them throughout their collegiate careers. Several students mentioned their anxiety with grades and maintaining scholarships. This financial anxiety of paying for college was a major concern to some respondents. While many common stresses and anxieties about grades were evident in the data collected in this study, there were some noticeable differences discovered by Gohn, Swartz, & Donnelly (2000). Although it is important to determine the reasons for sophomore attrition, it may also be as important to determine the

reasons for retention in this population so universities can pinpoint opportunities for effective retention efforts.

SUMMARY

Although researchers have suggested factors that may play into the "sophomore slump," others have not witnessed its occurrence through research (Gohn, Swartz, & Donnelly, 2000). The idea that sophomore students face different challenges than freshmen students has merit as noted by Gahagan & Hunter (2006), although it may be worthwhile to determine if there are similarities for retention. Gohn, Swartz, & Donnelly (2000) indicated that sophomore students who were retained commented on how they felt at home at their universities and that involvement on campus allowed them to feel a sense of belonging, make friends, and feel comfortable approaching faculty and staff on campus. It is especially important to continue to study sophomore students since attrition rates can be substantial, although it may also be noteworthy to compare freshmen reasons for retention and sophomore reasons for retention to determine if retention efforts may be managed similarly.

OVERALL SUMMARY

The relationship between campus recreation participation and student academic success has been studied for decades. Recently, one of the main reasons to study this relationship is for justification for higher administrators at universities to continue to fund campus recreation programs during a time when universities may be cutting budgets (Danbert et al., 2014; Lindsey & Sessoms, 2006; Kampf & Teske, 2013). Several researchers have studied campus recreation participation and student academic success using different methodologies and focusing on several academic success outcomes. Some study results are successful at finding a relationship between campus recreation participation and student academic success (Danbert et al., 2014;

Todd, et al., 2009; Kampf & Teske, 2013), while others do not find a significant difference in academic success outcomes between campus recreation participants and nonparticipants (Todd, et al., 2009; Washke, 1940; Baker, 2008; Zizzi et al., 2004; Kampf & Teske, 2013; McElveen & Rossow, 2014). It has been suggested that future campus recreation participation research should focus on campus recreation programs individually, several academic success outcomes should be studied at a time, and more research should be conducted across the nation to help generalize results. Due to the significant percentage of first generation students at the university within this study, it is necessary to study first generation students as a subpopulation in addition to the general population of students. It is obvious that first generation students enter and continue through college with challenges that traditional students may not face. Rendon (2000) has suggested that this population of students gain a better sense of belonging with their universities in ways that are beneficial to them. Campus recreation research has been linked with sense of belonging, retention, GPA, credits completed, and overall academic success in other populations (Danbert et al., 2014; Todd, et al., 2009; Kampf & Teske, 2013; Lindsey & Sessoms, 2006; Miller, 2011; Lindsey et al., 2009; Forrester, 2015; Henchy, 2011; McElveen & Rossow, 2014; Henchy, 2013). Considering campus recreation participation of first generation students has not specifically been studied, research is needed to determine if first generation students can benefit in many of the same ways as the general population of students when using campus recreation programs. Furthermore, it is necessary to determine if the general population and first generation students benefit from participating in any individual campus recreation program and if that participation is related to several academic success outcomes. Additionally, freshmen students deserve focus when studying academic success. Considering freshmen student attrition can range anywhere from 20-30%, freshmen seem to be an obvious population that needs attention (Kampf

& Teske, 2013). While some researchers have found positive relationships between campus recreation participation and academic success outcomes (Danbert et al., 2014; Kampf & Teske, 2013) others have only found positive relationships between campus recreation participation and retention (McElveen & Rossow, 2014). Consistent results are needed to confirm the influence campus recreation programs may have on academic success.

REFERENCES

REFERENCES

Adelman, C. (2006). The toolbox revisited. Paths to degree completion from high school through college. Washington, DC: US Department of Education.

Astin, A. (1975). *Preventing students from dropping out.* San Francisco: Jossey-Bass.

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

Baker, C. N. (2008). Under-represented college students and extracurricular involvement: the effects of various student organizations on academic performance. *Social Psychology of Education, 11,* 273-298.

Berkner, L. & Chavez, L. (1997). *Access to postsecondary education for the 1992 high school graduates* (NCES 98-105). Washington, DC: National Center for Education Statistics, U. S. Government Printing Office.

Brandon, C. (2010). *Five year party.* Dallas, TX: Benbella Books Inc.

Bui, K. V. T. (2002). First-generation college students at a four-year university: Background characteristics, reasons for pursuing higher education, and first-year experiences. *College Student Journal, 36,* 3-11.

Choy, S. (2001). Students whose parents did not go to college: Postsecondary access, persistence, and attainment. US Department of Education, National Center for Education Statistics, 2001-126.

Dalgarn, M. K. (2001). The role of the campus recreation center in creating a community. *NIRSA Journal, 25(1),* 66-72.

Danbert, S. J., Pivarnik, J. M., McNeil, R. N. & Washington, I. J. (2014). Academic success and retention: The role of recreational sports fitness facilities. *Recreational Sports Journal, 38,* 14-22.

Duggan, M. (2001). *Factors influencing the first-to-second-year persistence of first-generation college students.* Paper presented at the annual meeting of the North East Association for Institutional Research, Cambridge, MA.

Duggan, M. (2002). The effects of social capital on the first-to-second-year persistence of first-generation college students. *Dissertation Abstracts International, 63(03),* 188. (UMI No AAT 3045365).

Elkins, D. J., Forrester, S. A. & Noel-Elkins, A. V. (2011). The contribution of campus

recreational sports participation to perceived sense of campus community. *Recreational Sports Journal, 35(1),* 24-34.

Engle, J. & Tinto, V. (2008). *Moving beyond access: College success for low-income, first generation students.* Washington, DC: The Pell Institute.

Forrester, S. (2015). Benefits of collegiate recreational sports participation: Results from the 2013 NASPA assessment and knowledge consortium study. *Recreational Sports Journal 39,* 2-15.

Gahagan, J. & Hunter, M. S. (2006). The second-year experience: Turning attention to the academy's middle children. *About Campus, July-August.*

Gohn, L., Swartz, J., & Donnelly, S. (2000). A case study of second year student persistence. *Journal of College Student Retention, 2(4),* 271-294.

Haines, D. J. (2001). Undergraduate student benefits from university recreation. *Recreational Sports Journal, 25(1),* 25-33.

Hall, D. A. (2006). Participation in a campus recreation program and its effect on student retention. *Recreational Sports Journal, 30,* 40-45.

Henchy, A. (2011). The influence of campus recreation beyond the gym. *Recreational Sports Journal, 35,* 174-181.

Henchy, A. (2013). The perceived benefits of participating in campus recreation programs and facilities: A comparison between undergraduate and graduate students. *Recreational Sports Journal, 37,* 97-105.

Horn, L. & Nunez, A. (2000). Mapping the road to college: First-generation students' math track, planning strategies, and context of support. *Education Statistics Quarterly, 2(1).* Retrieved from http://nces.ed.gov/programs/quarterly/vol_2/2_1/q5-1.asp.

Hossler, D., Schmidt, J. & Vesper, N. (1999). *Going to college: How social, economic, and educational factors influence the decisions students make.* Baltimore: Johns Hopkins University Press.

Ishitani, T. T. (2003). A longitudinal approach to assessing attrition behavior among first-generation students: Time-varying effects of pre-college characteristics. *Research in Higher Education, 44,* 433-449.

Kampf, S. & Teske, E. J. (2013). Collegiate recreation participation and retention. *Recreational Sports Journal, 37,* 85-96.

Lindsey, R. & Sessoms, E. (2006). Assessment of a campus recreation program on student

recruitment, retention, and frequency of participation across certain demographic variables. *Recreational Sports Journal, 30,* 30-39.

Lindsey, R., Sessoms, E. & Willis, G. (2009). Impact of campus recreational sports facilities and programs on recruitment and retention among African American students: A pilot study. *Recreational Sports Journal, 33,* 25-34.

Lipka, S. (2006). After the freshman bubble pops. Chronicle of Higher Education, p. A34. Retrieved from http://chronicle.com/article/After-the-Freshman-BubblePops/4556

Lohfink, M. M. & Paulsen, M. B. (2005). Comparing the determinants of persistence for first-generation and continuing-generation students. *Journal of College Student Development, 46(4),* 409-428.

London, H. B. (1989). Breaking away: A study of first-generation college students and their families. *American Journal of Education, 97,* 144-170.

London, H. B. (1992). Transformations: Cultural challenges faced by first-generation students. In Zwerling, L. and London, H. editors. First-Generation Students: Confronting the Cultural Issues (New Directions for Community Colleges) 80, winter. San Francisco: Jossey-Bass.

London, H. B. (1996). How college affects first-generation college students. *About Campus, 23,* 9-13.

McElveen, M. & Rossow, A. (2014). Relationship of intramural participation to GPA and retention in first-time-in-college students. *Recreational Sports Journal, 38,* 50-54.

Miller, J. J. (2011). Impact of a university recreation center on social belonging and student retention. *Recreational Sports Journal, 35,* 117-129.

Moffitt, J. (2010). Recreating retention. *Recreational Sports Journal, 34,* 24-33.

Nunez, A. & Cuccaro-Alamin, S. (1998). First-generation students: Undergraduates whose parents never enrolled in postsecondary education (NCES 98-082). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Pascarella, E. T. & Terenzini, P. T. (1980). Predicting freshmen persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education, 5(1),* 60-75.

Pascarella, E. T., Wolniak, G. C., Pierson, C. T. & Terenzini, P. T. (2003). Experiences and outcomes of first-generation students in community colleges. *Journal of College Student Development, 44(3),* 420-429.

Pryor, J. H., Hurtado, S., DeAngelo, L., Blake, P. L. & Tran, S. (2010). *The American freshman: National norms fall 2010.* Retrieved from University of California, Los Angeles, Higher Education Research Institute website: http://www.heri.ucla.edu/PDFs/pubs/TFS/Norms/

Monographs/TheAmerucanFreshman2010.pdf

Rendon, L. I., Jalomo, R. E., & Nora, A. (2000). Theoretical considerations in the study of minority student retention in higher education. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 127–156). Nashville: Vanderbilt University Press.

Schaller, M. A. (2005). Wandering and wondering: Traversing the uneven terrain of the second college year. *About Campus, July-August.*

Somers, P., Woodhouse, S. & Cofer, J. (2000). *Persistence of first-generation college students.* Paper presented at the annual conference of the Association for the Study of Higher Education, Sacramento, CA.

Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange, 1,* 64-85.

Spady, W. (1971). Dropouts from higher education: Toward an empirical model. *Interchange, 2,* 38-62.

Stableton, M. J., Soria, K. M., Huesman Jr., R. L. (2014). First-generation students' sense of belonging, mental health, and use of counseling services at public research universities. *Journal of College Counseling, 17,* 6-20.

Stier, W. F., Schneider, R. C., Kampf, S., Haines, S. G. & Wilding, G. E. (2005). A survey of campus recreation directors at NIRSA institutions: Activities emphasized, student participation patterns, trends and future offerings contemplated. *Kinesiology, Sport Studies and Physical Education Faculty Publications*. Paper 45.

Tinto, V. (1975). Dropouts from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45,* 89-125.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition* (1st Ed.). Chicago: University of Chicago Press.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd Ed.). Chicago: University of Chicago Press.

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

Todd, M. K., Czyszczon, G., Carr, J. W. & Pratt, C. (2009). Comparison of health and academic indices between campus recreation facility users and nonusers. *Recreational Sports Journal, 33,* 43-53.

Warburton, E., Bugarin, R. & Nunez, A. (2001). *Bridging the gap: Academic preparation and*

postsecondary success of first-generation students (NCES 2001-153). Washington, DC: National Center for Educational Statistics, U.S. Government Printing Office.

Washke, P. (1940). A study of intramural sports participation and scholastic attainment. *Research Quarterly, 11(2),* 22-27.

Zizzi, S., Ayers, S. F., Watson, J. C. & Keeler, L. A. (2004). Assessing the impact of new student campus recreation centers. *NASPA Journal, 41(4),* 588-630.

CHAPTERS THREE, FOUR, AND FIVE: METHODS

ORGANIZATION OF THE METHODS

Chapters three, four, and five of the dissertation are Methods Sections that focused on the Specific Aims of this study. Chapter three focused on the overall sample of campus recreation participants, chapter four focused on first generation campus recreation participants, and chapter five focused on freshmen campus recreation participants. Chapter three addressed 1) The relationship between participating in campus recreation programs (club sports, intramural sports, group fitness classes) and academic success measures (credits completed per academic year and GPA), 2) If a relationship existed between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and academic success measures (credits completed per academic year and GPA) (Specific Aims 1 and 3). Chapter four addressed 1) The relationship between participating in campus recreation programs (club sports, intramural sports, group fitness classes) and academic success measures (credits completed per academic year and GPA) in first generation students, 2) If a relationship existed between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and academic success measures (credits completed per academic year and GPA) in first generation students (Specific Aims 2 and 4). Chapter five addressed 1) If a relationship existed between campus recreation participation (club sports, intramural sports, or group fitness classes) in freshmen students on retention (one-year retention and two-year retention), 2) If a relationship existed between campus recreation participation (club sports, intramural sports, or group fitness classes) in first generation freshmen students on retention (one-year retention and two-year retention) (Specific Aims 5 and 6).

METHODS: CHAPTER THREE

Chapter three focused on Specific Aims one and three:

Specific Aim 1: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) and the following academic success measures: credits completed per academic year and GPA.

Specific Aim 3: To determine if a relationship existed between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and the following academic success measures: credits completed per academic year and GPA.

The dissertation study was observational that utilized a cross sectional design.

METHODS: CHAPTER FOUR

Chapter four focused on Specific Aims two and four:

Specific Aim 2: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) and the following academic success measures: credits completed per academic year and GPA in first generation students.

Specific Aim 4: To determine if a relationship existed between amount of campus recreation participation (club sports, intramural sports, group fitness classes) and the following academic success measures: credits completed per academic year and GPA in first generation students.

METHODS: CHAPTER FIVE

Chapter five focused on Specific Aims five and six:

Specific Aim 5: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) in freshmen students and the following academic success measures: one-year retention and two-year retention.

Specific Aim 6: To determine the relationship between campus recreation participation (club sports, intramural sports, or group fitness classes) in first generation freshmen students and the following academic success measures: one-year retention and two-year retention.

STUDY POPULATION AND RECRUITMENT

The population of interest was college students. The sample consisted of male and female undergraduate students who participated in club sports, intramural sports, and/or group fitness classes at Saginaw Valley State University in University Center, Michigan during the 2013-2014 and 2014-2015 academic years. Data were collected as part of participation data that the Director of Campus Recreation used to evaluate each program. The intention for this study was to determine if there were relationships between participating in these programs and academic success outcomes. Positive relationships between participation and academic success measures add to the argument that non-academic university programs may be related to a number of academic outcomes such as grade point average, successful completion of coursework, and retention.

Demographic Variables

Study participants were male and female undergraduate students eighteen years old and older. Gender and age were determined by the gender and date of birth the participants claimed on their college entrance applications. For class standing, participants fell under one of the following categories: Freshmen, Sophomore, Junior, or Senior. Class standing was determined by the number of credits accumulated by participants at the beginning of the 2013-2014 and 2014-2015 academic year. Participants were classified by class standing using the following credit scheme implemented by the university Registrar: 1) Freshmen earned 30 credits or less, 2) Sophomores earned 31-61 credits, 3) Juniors earned 62-92 credits, and 4) Seniors earned 93

credits or more. Race was determined by participants' response on their college entrance applications. Available categories for race included: American Indian, Alaska Native, Asian, African American, Canadian, Hispanic/Latino, Native Hawaiian/Pacific Islander, International, Multiple Race, Not Reported/Unknown, White. Subgroups of interest were first generation and freshmen students. The same demographic variables populated for campus recreation participants were also determined for first generation and freshmen campus recreation participants.

ACADEMIC SUCCESS OUTCOMES

Academic success outcome variables were populated for each participant. Academic success variables in this study included credits completed per year and GPA for all campus recreation participants. Additionally, one-year and two-year retention were determined for freshmen campus recreation participants. The total number of credits completed during 2013-2014 and 2014-2015 was calculated. GPA was calculated as a continuous variable and expressed on a 0.0-4.0 scale based on the credits earned during the 2013-2014 and 2014-2015 academic years. Age, class standing, race, Pell Grant eligibility, gender, year of freshmen year, ACT score, high school GPA, number of transfer credits, AP credits transferred, and post-secondary credits transferred were also populated. These variables were included as covariates in the analysis as they could have been possible confounding variables.

CAMPUS RECREATION PARTICIPATION

Club Sport Participation

Club sport participation for the 2013-2014 and 2014-2015 academic year was recorded at the time it occurred. Demographic data and academic success outcome variables were populated for each participant and then de-identified prior to analysis.

Intramural Sport Participation

Intramural sport participation for the 2013-2014 and 2014-2015 academic year was collected at the time it occurred using an online registration program called IMLeagues® (IMLeagues.com). Participation in intramural sports was reliant on students' successful registration through IMLeagues®. Demographic data and academic success outcome variables were populated for each participant and then de-identified prior to analysis.

Group Fitness Class Participation

Group fitness class participation for the 2013-2014 and 2014-2015 academic year was recorded at the time it occurred. Demographic data and academic success outcome variables were populated for each participant and then de-identified prior to analysis.

Non-Participants

After obtaining the participant list, a nonparticipant group was created. Demographic data and academic success outcome variables for each non-participant were populated and then de-identified prior to analysis. Propensity score matching allowed the principal investigator to match nonparticipants to participants to reduce the number and effect of possible confounding variables. The goal for using propensity score matching was to create a non-participant group that was similar to the participant group in as many ways as possible except that the nonparticipants did not participate in club sports, intramural sports, and group fitness classes. The non-participant group was used as the comparison group for the participant group.

Procedure

Student participation in club sports, intramural sports, and group fitness classes was recorded for the 2013-2014 and 2014-2015 academic years. Age, class standing, race, Pell Grant eligibility, gender, year of freshmen year, first generation status, ACT score, high school GPA,

SVSU GPA, credits completed, transfer credits, AP credits transferred, post-secondary credits transferred and retention were retrieved from the Registrar at Saginaw Valley State University. Participant and non-participant data were de-identified prior to analysis.

STATISTICAL ANALYSES

Descriptive statistics (means, standard deviations, and proportions) were used to determine if the sample had similar demographics as the university as a whole (e.g. males/females, international population, first generation students). Propensity score matching allowed a non-participant group to be created as a comparison group for the campus recreation participant group. Greedy propensity score matching using nearest neighbor was implemented for this study to determine a one-to-one match. According to (Thoemmes & Kim, 2011), greedy propensity score matching using nearest neighbor allows researchers to find an untreated unique observation that has the closest propensity score to a treated unique observation. The propensity score assigned to each unique observation is based on the covariates included in the model. For this study, the following covariates were included: age, class standing, race, Pell Grant eligibility, gender, year of freshmen year, ACT score, high school GPA, number of transfer credits, AP credits transferred, and post-secondary credits transferred.

Several two-sample tests for proportions (z-tests) were used to analyze differences in credits completed per academic year, GPA, and one-year and two-year retention between the participants and nonparticipants (Specific Aims 1, 2, 5, 6). Effect sizes were calculated to determine the magnitude of effect in significant findings between participation in campus recreation programs and academic outcomes. The cross-sectional data were analyzed with an ANOVA to evaluate the relationships between amount of campus recreation participation and credits completed per academic year (Specific Aims 3, 4). Another ANOVA was conducted to

evaluate the relationships between amount of campus recreation participation and GPA (Specific Aims 3, 4). Program frequency groups were categorized as 1) nonparticipants, 2) individuals who participated in one campus recreation program per year 3) individuals who participated in two or more campus recreation programs per year. Covariates considered within this model included age, class standing, race, Pell Grant eligibility, gender, year of freshmen year, high school GPA, ACT score, transfer credits, AP credits transferred, and post-secondary credits transferred. Additionally, linear trend analyses were conducted to determine significant differences between the participant and nonparticipant groups.

Alpha was set at 0.05 for statistical significance and results were reported using $M \pm SD$. Descriptive statistics, ANOVAs, and linear trend analyses were run using SPSS 23 statistical software (SPSS, Inc., Chicago, IL, USA). Two-sample tests for proportions (z-tests) were conducted using Microsoft® Excel Version 15.38 (© 2017 Microsoft). Propensity Score Analysis was added to SPSS by uploading a plug-in for R (R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria). Effect sizes were calculated using a Cohen's D Effect Size Calculator for Z-Tests (Social Science Statistics, 2017).

REFERENCES

REFERENCES

Stangroom, J. (2017). *Z Score Calculator for 2 Population Proportions.* Retrieved from http://socscistatistics.com

Thoemmes, F. J. & Kim, E. S. (2011). A systematic review of propensity score methods in the social sciences. *Multivariate Behavioral Research, 46(1),* 90-118.

CHAPTER SIX: RESULTS

SPECIFIC AIM #1: CREDITS COMPLETED (TOTAL SAMPLE)

Prior to propensity score matching (PSM), there were 8613 unique individuals in the sample. Of the 8613 individuals, 1442 were campus recreation participants (treated) and 7171 were nonparticipants (controls). After PSM, there were 1442 participants matched with 1442 nonparticipants, leaving 5729 unmatched nonparticipants. None of the data were discarded. Table 1.0 shows the sample as a total, matched, unmatched, and discarded data.

Table: 1.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	7171	1442	1442	1442	5729	0	0	0

Figure 1.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows zero unmatched participants. The next two stratifications show the 1442 matched participants and 1442 matched nonparticipants. Finally, the last stratification shows the 5729 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.6) between the matched treatment group and the matched control group. This is meaningful because a small range suggests that if two individuals were chosen, one from each group, the main relevant difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze. To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 1.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the

absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 1.0. Distribution of Propensity Scores

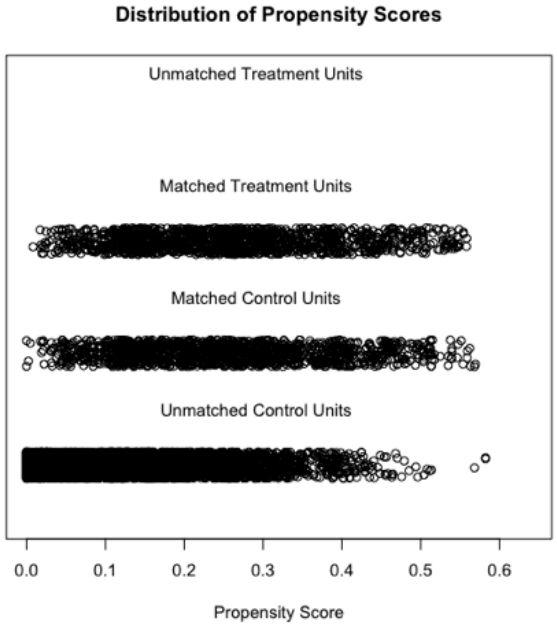
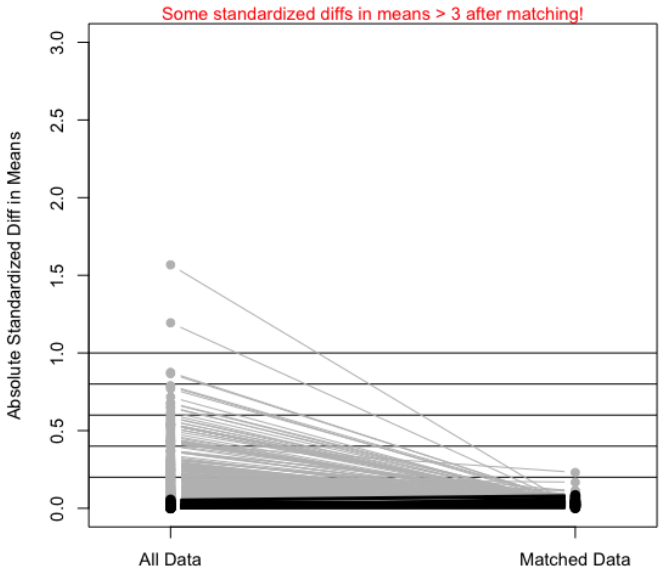
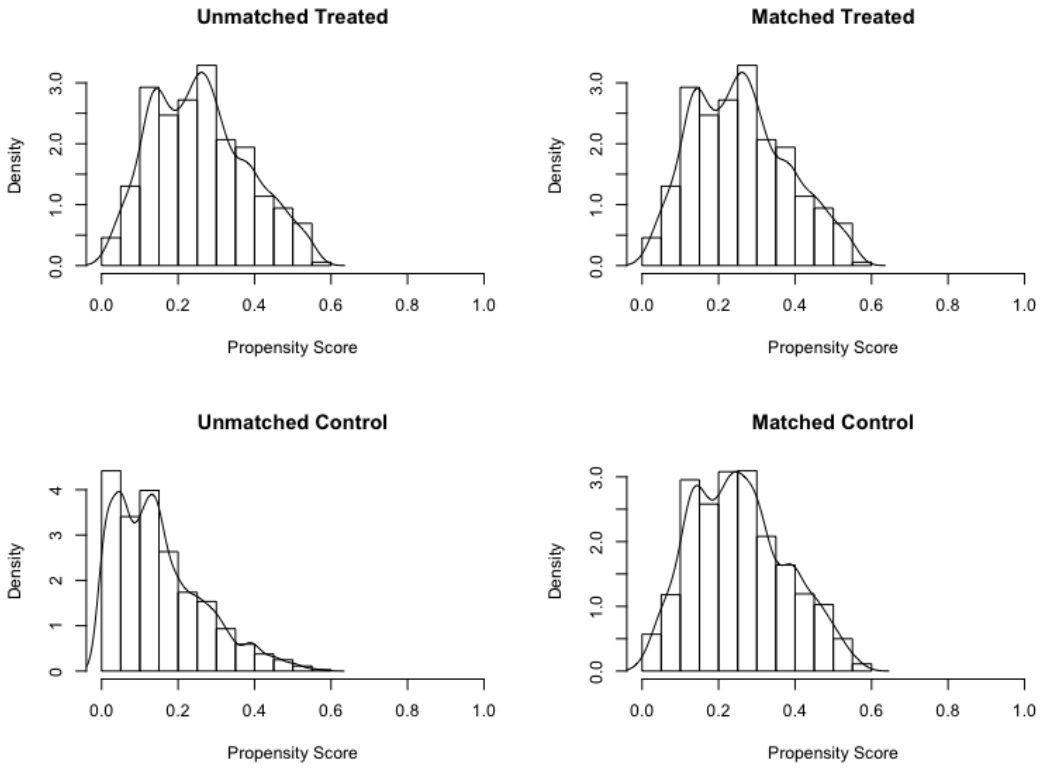


Figure 1.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 1.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis.

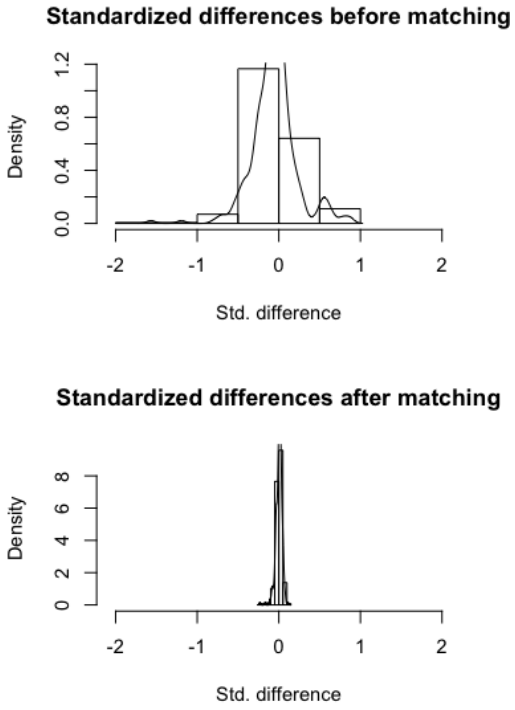
Figure 1.2. Histogram of Propensity Scores Before and After Matching



Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 1.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM.

Like the standardized differences in means figure (Figure 1.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 1.3. Histogram of Standardized Differences Before and After Matching



Of the 2884 individuals within the sample, 48.2% were male, 51.8% were female. The average age of individuals in the sample was 19.4 ± 1.6 years. Additionally, 65.1% lived on campus, 77.8% were white, 59.8% were Freshman status, 27.8% were Sophomore status, 10.1% were Junior status, 2.3% were Senior status, 92.8% started in 2011 or later, average ACT was 21.4 ± 6.5, average high school GPA was 3.18 ± 0.99, 14.3% were Pell Grant eligible, 27.9% were first generation status, and on average transferred in 4.6 ± 11.7 credits.

After PSM matched the participants with nonparticipants, a two-sample test for proportions (z-test) (Table 1.1) was conducted to determine if there was a difference in credits completed between the participants and matched nonparticipants. Participants in club sports, intramural sports, and fitness classes completed an average of 26.7 ± 14.9 credits per year.

Nonparticipants completed an average of 24.0 ± 14.2 credits. The difference in credits was significant ($\rho < 0.001$) suggesting participants completed significantly more credits per year when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.19$) suggested a low practical significance.

Table 1.1. Two-Sample Test for Proportions (z-test) for Participants and Nonparticipants: Credits Completed

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.666666667	0.512544803
Known Variance	0.22302158	0.25074134
Observations	279	279
Hypothesized Mean Difference	0	
z	3.740122446	
P(Z<=z) one-tail	9.19653E-05	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.000183931	
z Critical two-tail	1.959963985	

SPECIFIC AIM #1: GPA (TOTAL SAMPLE)

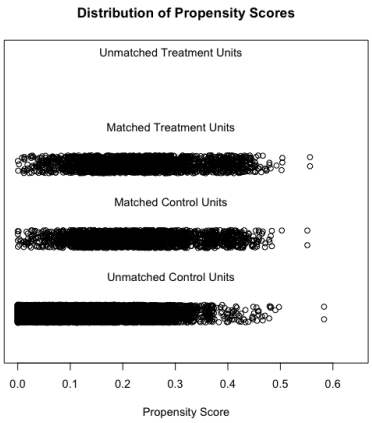
Prior to PSM, there were 13,205 unique individuals in the sample. Of the 13,205 individuals, 2119 were campus recreation participants (treated) and 11,086 were nonparticipants (controls). After PSM, there were 2119 participants matched with 2119 nonparticipants, leaving 8967 unmatched nonparticipants. None of the data were discarded. Table 1.2 shows the sample as a total, matched, unmatched, and discarded data.

Table 1.2. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	11086	2119	2119	2119	8967	0	0	0

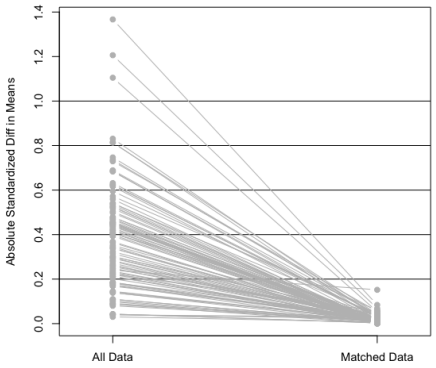
Figure 1.4 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows zero unmatched participants. The next two stratifications show the 2119 matched participants and 2119 matched nonparticipants. Finally, the last stratification shows the 8967 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.6) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main relevant difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

Figure 1.4. Distribution of Propensity Scores



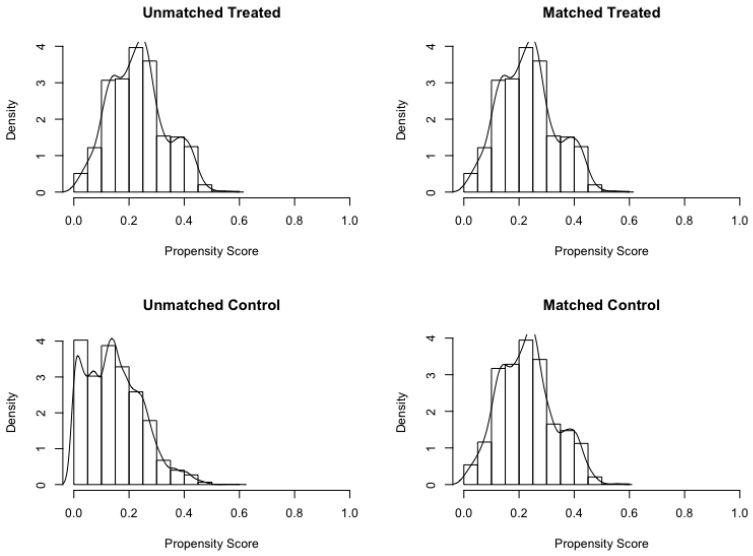
To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 1.5 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 1.5. Standardized Difference in Means



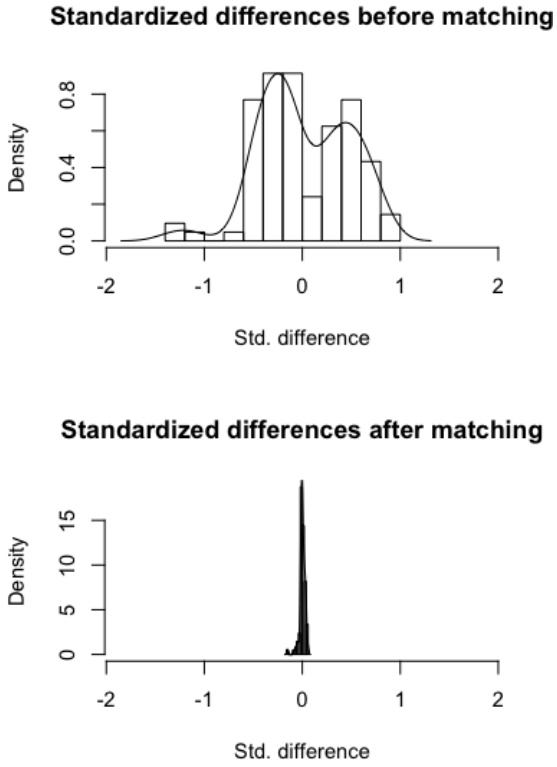
To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 1.6). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis.

Figure 1.6. Histogram of Propensity Scores Before and After Matching



Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 1.7). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 1.5), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 1.7. Histogram of Standardized Differences Before and After Matching



Of the 4238 individuals within the sample, 51.1% were male, 48.9% were female. The average age of individuals in the sample was 19.9 ± 2.1 years. Additionally, 58.3% lived on campus, 75.8% were white, 50.5% Freshman status, 25.8% Sophomore status, 16.4% Junior status, and 7.3% Senior status, 84.7% started in 2011 or later, average ACT score was 21.0 ± 6.7,

average high school GPA was 3.08 ± 1.05, 15.5% were Pell Grant eligible, 29.0% were first generation status, and on average transferred in 3.9 ± 11.2 credits.

After PSM matched the participants with nonparticipants, a two-sample test for proportions (z-test) (Table 1.3) was conducted to determine if there was a difference in GPA between the participants and matched nonparticipants. Participants in club sports, intramural sports, and fitness classes had an average GPA of 3.08 ± 0.61. Nonparticipants had an average GPA of 2.98 ± 0.69. The difference in GPA was significant ($\rho < 0.001$) suggesting participants had a significantly higher GPA per year when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.15$) suggested a low practical significance.

Table 1.3. Two-Sample Test for Proportions (z-test) for Participants and Nonparticipants: GPA

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	3.082760736	2.984374705
Known Variance	0.36930064	0.47367542
Observations	2119	2119
Hypothesized Mean Difference	0	
z	4.932774922	
P(Z<=z) one-tail	4.05348E-07	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	8.10696E-07	
z Critical two-tail	1.959963985	

SPECIFIC AIM #2: CREDITS COMPLETED (FIRST GENERATION)

Prior to PSM, there were 2625 unique individuals in the sample. Of the 2625 individuals, 412 were campus recreation participants (treated) and 2213 were nonparticipants (controls). After PSM, there were 383 participants matched with 383 nonparticipants. Twenty-nine participants could not be matched with nonparticipants, leaving 1830 unmatched nonparticipants.

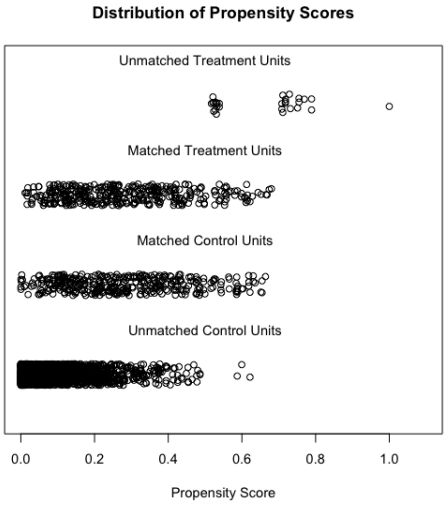
None of the data were discarded. Table 2.0 shows the sample as a total, matched, unmatched, and discarded data.

Table 2.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	2213	412	383	383	1830	29	0	0

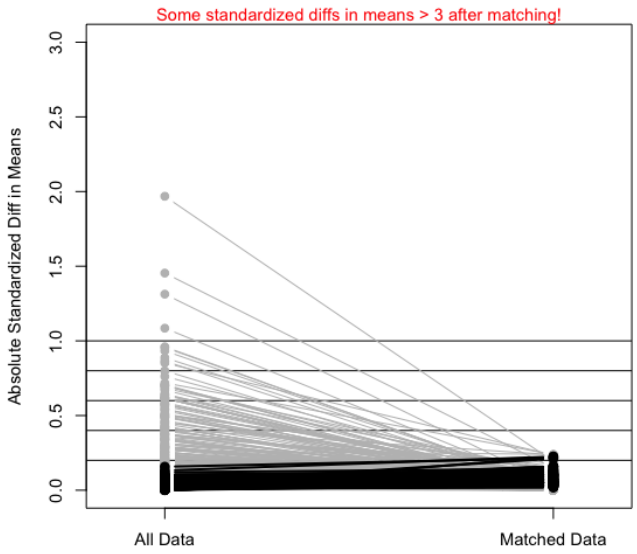
Figure 2.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows the 29 unmatched participants. The next two stratifications show the 383 matched participants and 383 matched nonparticipants. Finally, the last stratification shows the 1830 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

Figure 2.0. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 2.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 2.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 2.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the

data as overlaid kernel density estimates of standardized differences before and after matching (Figure 2.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 2.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 2.2. Histogram of Propensity Scores Before and After Matching

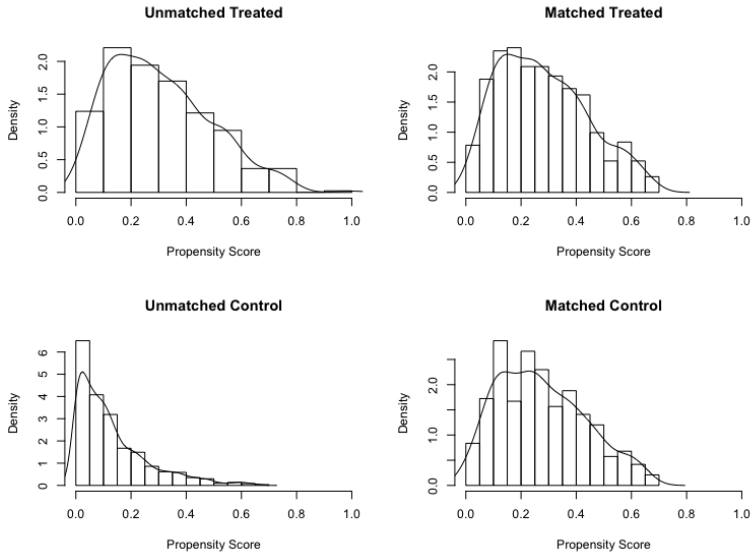
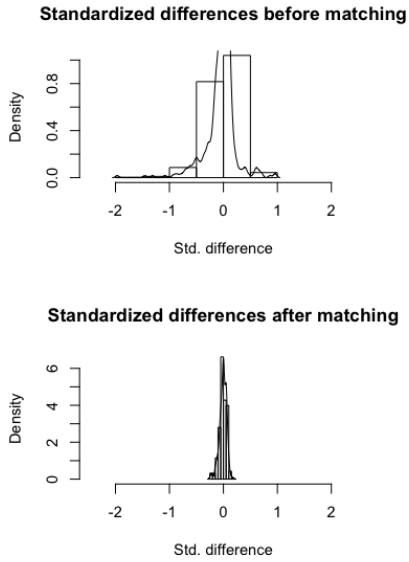


Figure 2.3. Histogram of Standardized Differences Before and After Matching



Of the 766 individuals within the sample, 49.3% were male, 50.7% were female. The average age of individuals in the sample was 19.7 ± 1.9 years. Additionally, 65.3% lived on campus, 74.8% were white, 54.4% Freshman status, 32.1% Sophomore status, 11.4% Junior status, and 2.1% Senior status, 93.3% started in 2011 or later, average ACT score was 20.6 ± 6.2, average high school GPA was 3.12 ± 0.93, 53.3% were Pell Grant eligible, and on average transferred in 4.2 ± 12.3 credits.

After PSM matched the participants with nonparticipants, a two-sample test for proportions (z-test) (Table 2.1) was conducted to determine if there was a difference in credits completed between the participants and matched nonparticipants. Participants in club sports, intramural sports, and fitness classes completed an average of 24.9 ± 13.9 credits per year. Nonparticipants completed an average of 22.5 ± 13.3 credits. The difference in credits was significant ($\rho = 0.013$) suggesting participants completed significantly more credits per year when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.18$) suggested a low practical significance.

Table 2.1. Two-Sample Test for Proportions (z-test) for First Generation Participants and First Generation Nonparticipants: Credits Completed

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	24.92428198	22.47519582
Known Variance	192.609435	176.09297
Observations	383	383
Hypothesized Mean Difference	0	
z	2.496120035	
P(Z<=z) one-tail	0.006278005	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.012556011	
z Critical two-tail	1.959963985	

SPECIFIC AIM #2: GPA (FIRST GENERATION)

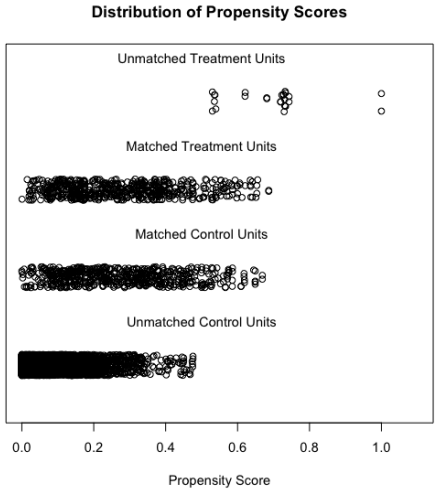
Prior to PSM, there were 4042 unique individuals in the sample. Of the 4042 individuals, 614 were campus recreation participants (treated) and 3428 were nonparticipants (controls). After PSM, there were 588 participants matched with 588 nonparticipants. Twenty-six participants could not be matched with nonparticipants, leaving 2840 unmatched nonparticipants. None of the data were discarded. Table 2.2 shows the sample as a total, matched, unmatched, and discarded data.

Table 2.2. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	3428	614	588	588	2840	26	0	0

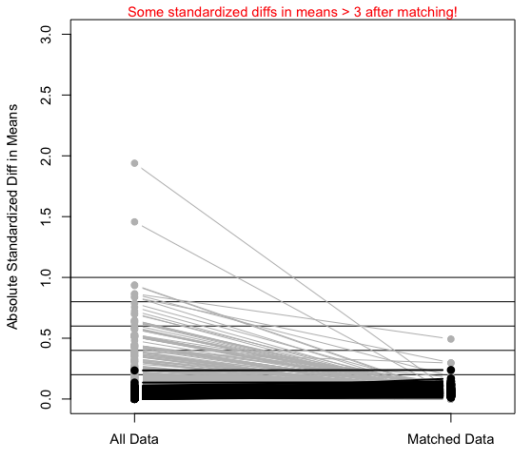
Figure 2.4 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows 26 unmatched participants. The next two stratifications show the 588 matched participants and 588 matched nonparticipants. Finally, the last stratification shows the 2840 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

Figure 2.4. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 2.5 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 2.5. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 2.6). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 2.7). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 2.5), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 2.6. Histogram of Propensity Scores Before and After Matching

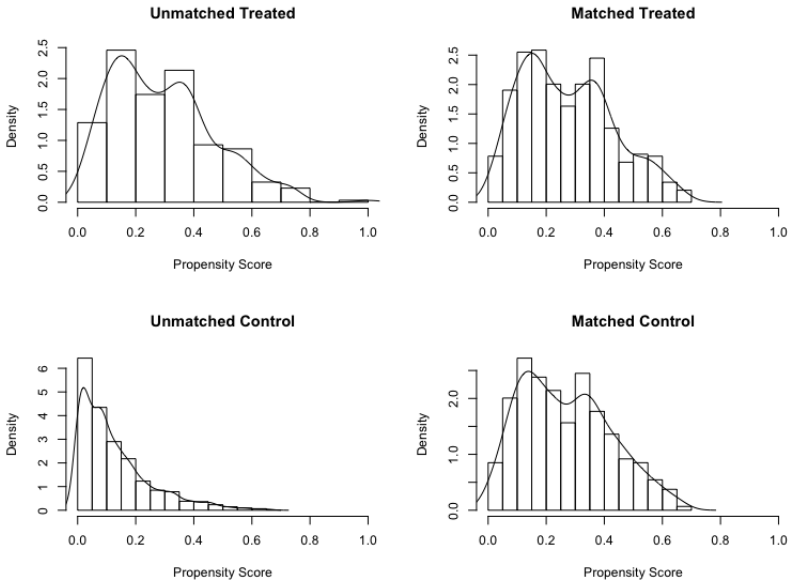
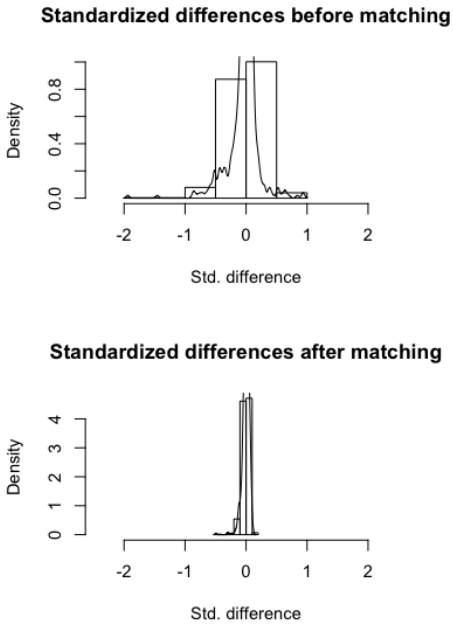


Figure 2.7. Histogram of Standardized Differences Before and After Matching



Of the 1176 individuals within the sample, 49.6% were male, 50.4% were female. The average age of individuals in the sample was 19.9 ± 1.8 years. Additionally, 60.0% lived on campus, 75.1% were white, 45.9% Freshman status, 30.1% Sophomore status, 19.6% Junior status, 4.4% Senior status, 85.3% started in 2011 or later, average ACT score was 20.4 ± 6.3, average high school GPA was 3.08 ± 0.98, 54.1% were Pell Grant eligible, and on average transferred in 3.8 ± 11.9 credits.

After PSM matched the participants with nonparticipants, a two-sample test for proportions (z-test) (Table 2.3) was conducted to determine if there was a difference in GPA between the participants and matched nonparticipants. Participants in club sports, intramural sports, and fitness classes had an average GPA of 3.03 ± 0.59. Nonparticipants had an average GPA of 2.95 ± 0.67. The difference in GPA was not significant ($\rho = 0.050$) suggesting there was not a significant difference in GPA between the participants and nonparticipants.

Table 2.3. Two-Sample Test for Proportions (z-test) for First Generation Participants and First Generation Nonparticipants: GPA

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	3.025986395	2.954166667
Known Variance	0.34846938	0.44369692
Observations	588	588
Hypothesized Mean Difference	0	
z	1.956699964	
P(Z<=z) one-tail	0.025191377	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.050382754	
z Critical two-tail	1.959963985	

SPECIFIC AIM #3: CREDITS COMPLETED (TOTAL SAMPLE - AMOUNT OF PARTICIPATION)

Prior to PSM, there were 8613 unique individuals in the sample. Of the 8613 individuals, 1442 were campus recreation participants (treated) and 7171 were nonparticipants (controls). After PSM, there were 1442 participants matched with 1442 nonparticipants, leaving 5729 unmatched nonparticipants. None of the data were discarded. Table 3.0 shows the sample as a total, matched, unmatched, and discarded data.

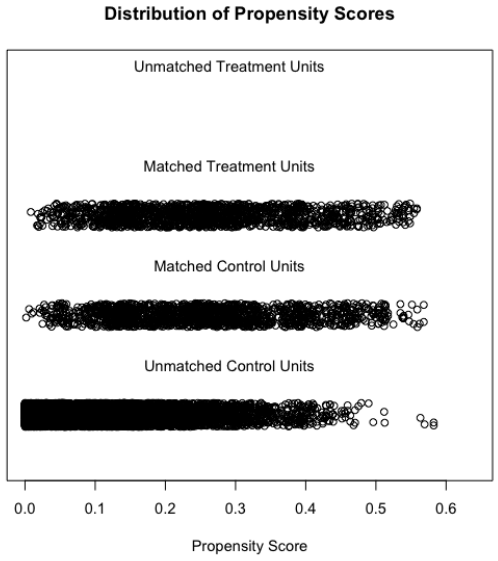
Table 3.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	7171	1442	1442	1442	5729	0	0	0

Figure 3.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows zero unmatched participants. The next two stratifications show the 1442 matched participants and 1442 matched nonparticipants. Finally,

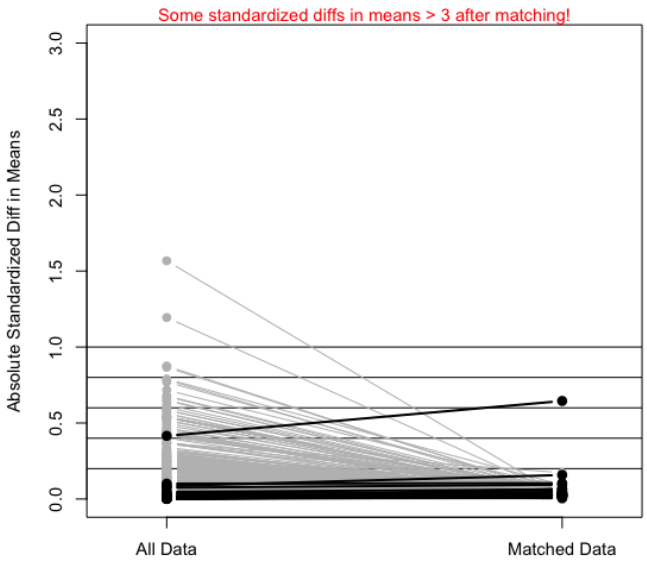
the last stratification shows the 5729 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.6) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

Figure 3.0. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 3.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 3.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 3.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 3.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 3.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 3.2. Histogram of Propensity Scores Before and After Matching

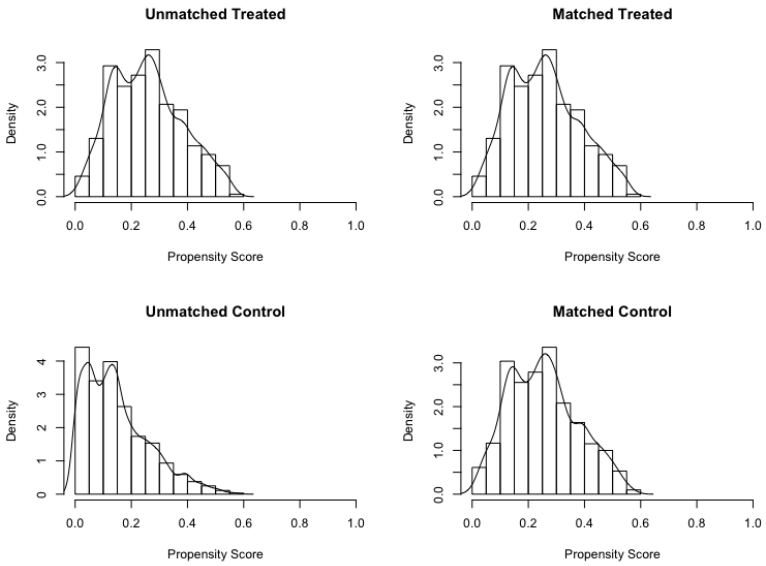
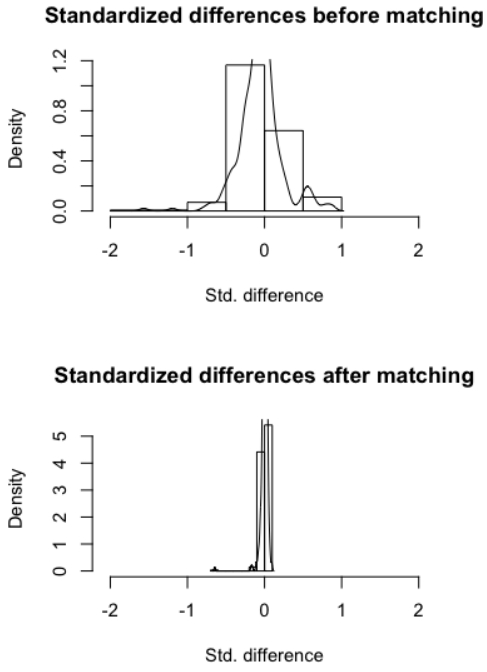


Figure 3.3. Histogram of Standardized Differences Before and After Matching



Of the 2884 individuals within the sample, 47.7% were male, 52.3% were female. The average age of individuals in the sample was 19.4 ± 1.5 years. Additionally, 64.8% lived on

campus, 77.5% were white, 59.7% Freshman status, 28.4% Sophomore status, 10.2% Junior status, 1.7% Senior status, 92.9% started in 2011 or later, average ACT score was 21.4 ± 6.5, average high school GPA was 3.19 ± 0.97, 15.0% were Pell Grant eligible, 27.9% were first generation status, and on average transferred in 4.8 ± 12.0 credits.

After PSM matched the participants with nonparticipants, an ANOVA was conducted to determine if there was a difference in credits completed between participants in one program per year (n=1278), participants in two or more programs per year (n=164) and nonparticipants (n=1442). Participants in one program completed an average of 26.8 ± 15.0 credits per year. Participants in two or more programs completed an average of 26.0 ± 14.6 credits per year. Nonparticipants completed an average of 24.3 ± 14.3 credits per year (Table 3.1).

Table 3.1. Descriptives for Participants and Nonparticipants: Credits Completed

Oneway

Descriptives

TotalCred

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
						Lower Bound	Upper Bound			
.00		1442	24.2613	14.28698	.37623	23.5233	24.9993	.00	73.00	
1.00		1278	26.7983	14.95797	.41842	25.9774	27.6191	.00	91.00	
2.00		164	26.0549	14.64016	1.14320	23.7975	28.3123	.00	53.00	
Total		2884	25.4875	14.65530	.27290	24.9524	26.0226	.00	91.00	
Model	Fixed Effects			14.60801	.27202	24.9542	26.0209			
	Random Effects				1.09732	20.7662	30.2089			2.51358

Since the assumption of homogeneity of variance was violated (as shown in Table 3.2), it was necessary to review the Welch and Brown-Forsythe F-ratios (Table 3.4) rather than the main table (Table 3.3: ANOVA Results). A statistically significant finding occurred in Table 3.4 ($\rho < 0.001$). It can be determined that an F-ratio of this size would occur if there was no effect, therefore providing an overall difference between the groups.

Table 3.2. Test of Homogeneity of Variances

TotalCred

Levene Statistic	df1	df2	Sig.
6.811	2	2881	.001

Table 3.3. ANOVA Results

TotalCred

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4416.708	2	2208.354	10.349	< 0.001
Within Groups	614787.603	2881	213.394		
Total	619204.311	2883			

Table 3.4. Robust Tests of Equality of Means

TotalCred

	Statistic[a]	df1	df2	Sig.
Welch	10.306	2	453.375	< 0.001
Brown-Forsythe	10.300	2	680.796	< 0.001

a. Asymptotically F distributed.

Since there was an overall difference between the groups, yet the homogeneity of variance assumption was violated, a Games Howell Post Hoc Test was conducted to determine differences between groups (Table 3.5). When comparing the difference in credits completed between participants in one program and nonparticipants, a significant difference was found ($\rho < 0.001$). Participants in two or more programs did not complete significantly more credits per year when compared to nonparticipants ($\rho = 0.298$). Finally, there was not a significant difference in credits completed between the participants in one program per year and participants in two or more programs per year ($\rho = 0.814$). Therefore, significance was found only with credits completed between the participants in one program per year and the nonparticipants.

Table 3.5. Post Hoc Tests

Multiple Comparisons

Dependent Variable: TotalCred

Games-Howell

(I) NumberofSports	(J) NumberofSports	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
.00	1.00	-2.53697*	.56269	< 0.001	-3.8565	-1.2174
	2.00	-1.79357	1.20352	.298	-4.6355	1.0483
1.00	.00	2.53697*	.56269	< 0.001	1.2174	3.8565
	2.00	.74340	1.21737	.814	-2.1302	3.6170
2.00	.00	1.79357	1.20352	.298	-1.0483	4.6355
	1.00	-.74340	1.21737	.814	-3.6170	2.1302

*. The mean difference is significant at the 0.05 level.

To determine if there were significant differences between the participation and nonparticipation groups based on level of participation, a linear trend test was run. Reviewing Table 3.6., a statistically significant difference between the groups was found ($\rho < 0.001$).

Table 3.6. ANOVA Table for Linear Trend Analysis

ANOVA

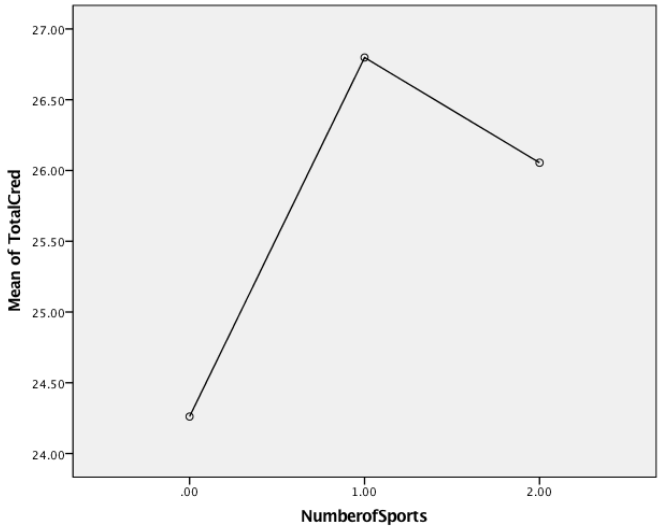
TotalCred

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		4416.708	2	2208.354	10.349	< 0.001
	Linear Term	Unweighted	473.699	1	473.699	2.220	.136
		Weighted	3332.045	1	3332.045	15.615	< 0.001
		Deviation	1084.662	1	1084.662	5.083	.024
Within Groups			614787.603	2881	213.394		
Total			619204.311	2883			

Figure 3.4. shows the visual representation of the differences in credits completed between the groups. While there was a significant difference in credits completed between the participants in

one program and nonparticipants, participants in two or more programs did not complete significantly more credits than nonparticipants. There was also not a significant difference in credits completed between the participants in one program per year and participants in two or more programs per year.

Figure 3.4. Means Plot for Linear Trend Analysis



SPECIFIC AIM #3: GPA (TOTAL SAMPLE - AMOUNT OF PARTICIPATION)

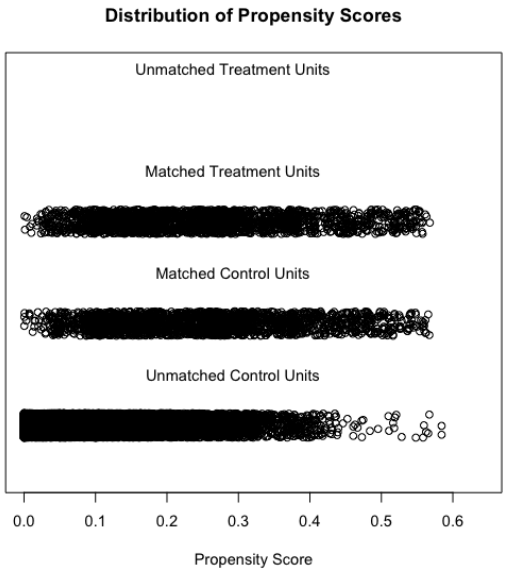
Prior to PSM, there were 13,207 unique individuals in the sample. Of the 13,207 individuals, 2120 were campus recreation participants (treated) and 11,087 were nonparticipants (controls). After PSM, there were 2120 participants matched with 2120 nonparticipants, leaving 8967 unmatched nonparticipants. None of the data were discarded. Table 3.7 shows the sample as a total, matched, unmatched, and discarded data.

Table 3.7. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	11087	2120	2120	2120	8967	0	0	0

Figure 3.5 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows zero unmatched participants. The next two stratifications show the 2120 matched participants and 2120 matched nonparticipants. Finally, the last stratification shows the 8967 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.6) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

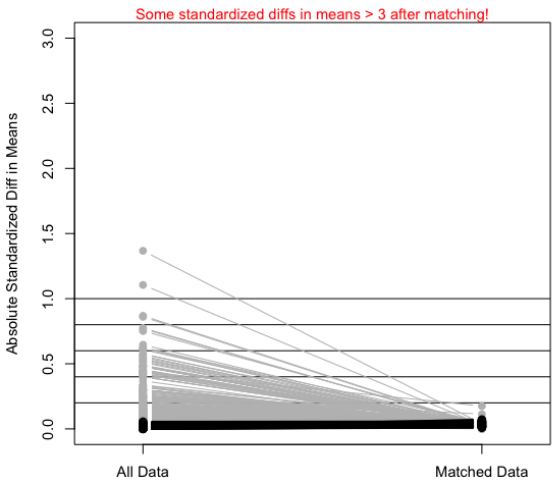
Figure 3.5. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 3.6 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are

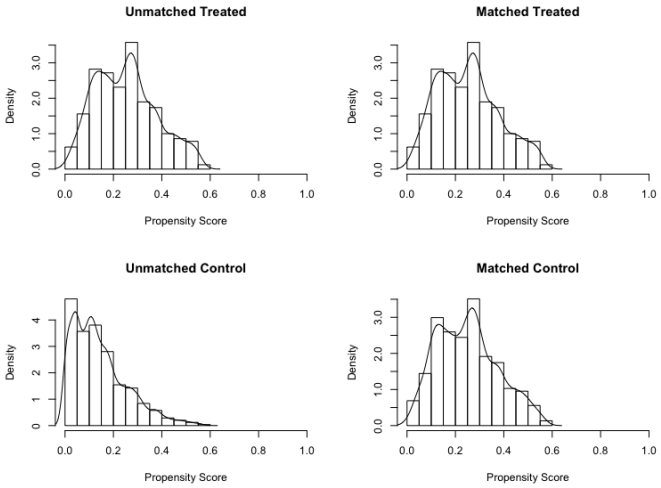
matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 3.6. Standardized Difference in Means



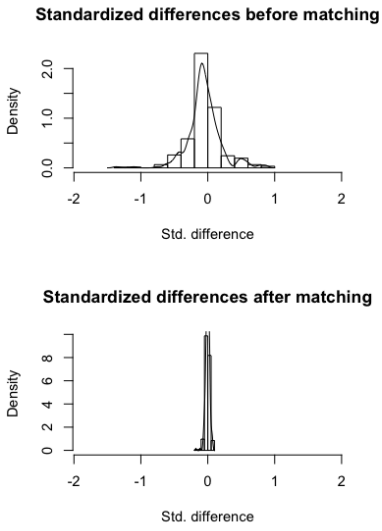
To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 3.7). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis.

Figure 3.7. Histogram of Propensity Scores Before and After Matching



Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 3.8). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 3.6), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 3.8. Histogram of Standardized Differences Before and After Matching



Of the 4240 individuals within the sample, 50.4% were male, 49.6% were female. The average age of individuals in the sample was 19.9 ± 1.8 years. Additionally, 58.4% lived on campus, 76.9% were white, 48.1% Freshman status, 28.5% Sophomore status, 17.7% Junior status, 5.7% Senior status, 86.1% started in 2011 or later, average ACT score was 21.0 ± 6.9, average high school GPA was 3.08 ± 1.06, 14.7% were Pell Grant eligible, 28.4% were first generation status, and on average transferred in 4.0 ± 11.6 credits.

After PSM matched the participants with nonparticipants, an ANOVA was conducted to determine if there was a difference in GPA between participants in one program per year (n=1184), participants in two or more programs per year (n=236) and nonparticipants (n=2120). Participants in one program had an average GPA of 3.08 ± 0.61. Participants in two or more programs had an average GPA of 3.13 ± 0.59. Nonparticipants had an average GPA of 3.03 ± 0.65 (Table 3.8).

Table 3.8. Descriptives for Participants and Nonparticipants: GPA

GPA

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
						Lower Bound	Upper Bound			
.00		2120	3.0267	.65403	.01420	2.9988	3.0545	.00	4.00	
1.00		1884	3.0756	.60942	.01404	3.0480	3.1031	.00	4.00	
2.00		236	3.1346	.59160	.03851	3.0587	3.2105	1.40	4.00	
Total		4240	3.0544	.63178	.00970	3.0354	3.0734	.00	4.00	
Model	Fixed Effects			.63118	.00969	3.0354	3.0734			
	Random Effects				.02670	2.9395	3.1693			.00137

Reviewing Table 3.9, it was determined that the variances of the three groups were not significantly different since $\rho > 0.05$. Therefore, the homogeneity of variance assumption has been met.

Table 3.9. Test of Homogeneity of Variances

GPA

Levene Statistic	df1	df2	Sig.
1.149	2	4237	.317

Table 3.9.1 shows that there was an overall significant difference between the groups ($\rho = 0.007$).

Table 3.9.1. ANOVA Results

GPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.996	2	1.998	5.015	.007
Within Groups	1687.982	4237	.398		
Total	1691.978	4239			

Since there was an overall difference between the groups, and the homogeneity of variance assumption was met, a Tukey Post Hoc Test was run to determine which specific groups differed. When reviewing GPA of participants in one program and nonparticipants, it was determined that there was a significant difference in GPA between the groups since $\rho = 0.038$. There was also a significant difference in GPA between the participants in two or more programs and nonparticipants ($\rho = 0.034$). There was not a significant difference in GPA between participants in one program and participants in two or more programs ($\rho = 0.365$). Therefore, significance was found with GPA between the participants in one program per year and nonparticipants, and participants in two or more programs per year and nonparticipants.

Table 3.9.2. Post Hoc Tests

Multiple Comparisons

Dependent Variable: GPA
Tukey HSD

(I) NumberofSports	(J) NumberofSports	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
.00	1.00	-.04894*	.01998	.038	-.0958	-.0021
	2.00	-.10795*	.04331	.034	-.2095	-.0064
1.00	.00	.04894*	.01998	.038	.0021	.0958
	2.00	-.05902	.04358	.365	-.1612	.0432
2.00	.00	.10795*	.04331	.034	.0064	.2095
	1.00	.05902	.04358	.365	-.0432	.1612

*. The mean difference is significant at the 0.05 level.

To determine if there were significant differences between the participation and nonparticipation groups based on level of participation, a linear trend test was run. Reviewing Table 3.9.3., a statistically significant difference between the groups was found ($\rho = 0.007$).

Table 3.9.3. ANOVA Table for Linear Trend Analysis

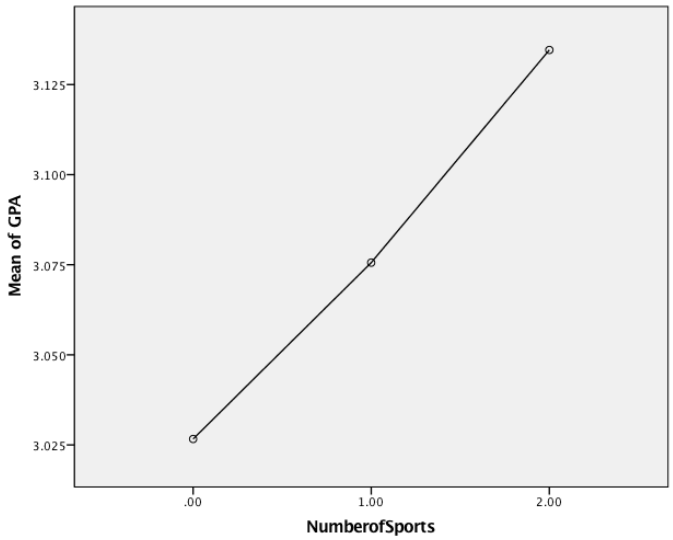
ANOVA
GPA

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		3.996	2	1.998	5.015	.007
	Linear Term	Unweighted	2.475	1	2.475	6.212	.013
		Weighted	3.981	1	3.981	9.993	.002
		Deviation	.015	1	.015	.037	.847
Within Groups			1687.982	4237	.398		
Total			1691.978	4239			

Figure 3.9. shows the visual representation of the differences in GPA between the groups. There was a significant difference in GPA between the participants in one program and nonparticipants, and between the participants in two or more programs and nonparticipants. There was not a significant difference in GPA between the participants in one program per year and participants

in two or more programs per year, although there was a trend of an increase in GPA with an increase in participation.

Figure 3.9. Means Plot for Linear Trend Analysis



SPECIFIC AIM #4: CREDITS COMPLETED (FIRST GENERATION-AMOUNT OF PARTICIPATION)

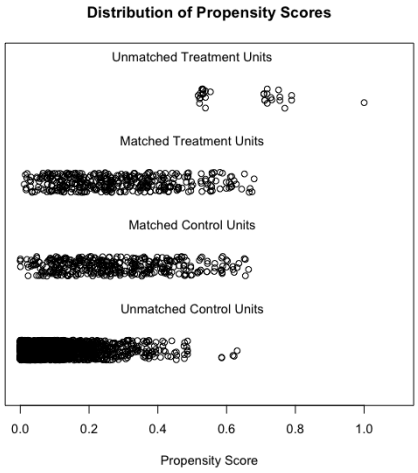
Prior to PSM, there were 2625 unique individuals in the sample. Of the 2625 individuals, 412 were campus recreation participants (treated) and 2213 were nonparticipants (controls). After PSM, there were 381 participants matched with 381 nonparticipants. Thirty-one participants could not be matched with nonparticipants, leaving 1832 unmatched nonparticipants. None of the data were discarded. Table 4.0 shows the sample as a total, matched, unmatched, and discarded data.

Table 4.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	2213	412	381	381	1832	31	0	0

Figure 4.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows 31 unmatched participants. The next two stratifications show the 381 matched participants and 381 matched nonparticipants. Finally, the last stratification shows the 1832 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

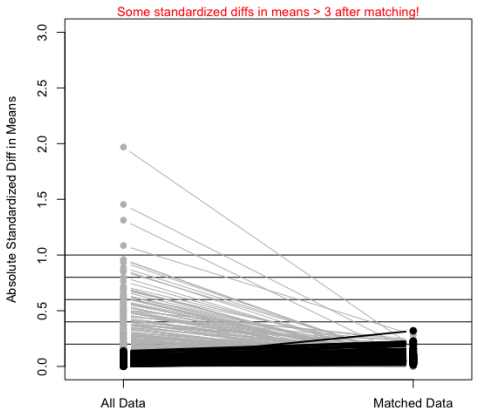
Figure 4.0. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 4.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are

matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 4.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 4.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 4.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 4.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 4.2. Histogram of Propensity Scores Before and After Matching

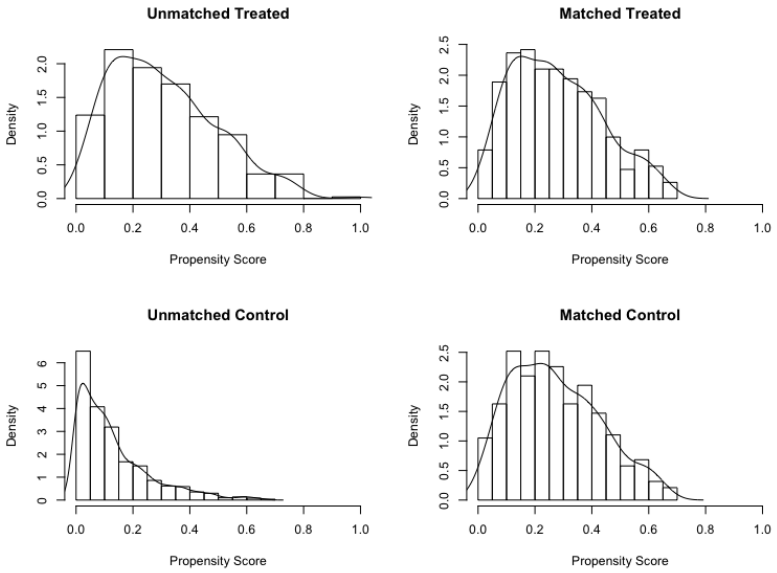
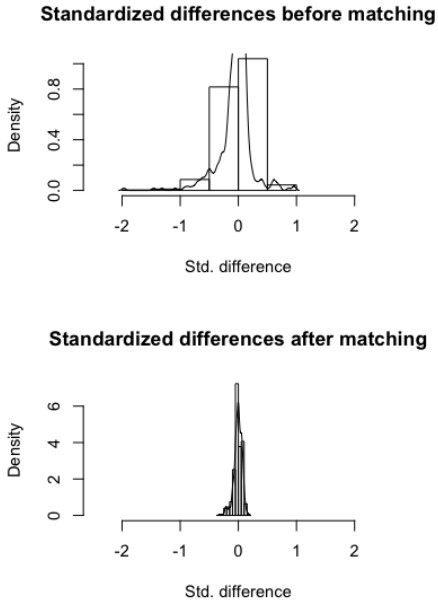


Figure 4.3. Histogram of Standardized Differences Before and After Matching



Of the 762 individuals within the sample, 48.2% were male, 51.8% were female. The average age of individuals in the sample was 19.7 ± 1.9 years. Additionally, 64.7% lived on campus, 74.0% were white, 54.5% Freshman status, 30.8% Sophomore status, 12.2% Junior status, 2.5% Senior status, 93.1% started in 2011 or later, average ACT score was 20.6 ± 6.1, average high school GPA was 3.14 ± 0.90, 52.6% were Pell Grant eligible, and on average transferred in 4.2 ± 12.3 credits.

After PSM matched the participants with nonparticipants, an ANOVA was conducted to determine if there was a difference in credits completed between participants in one program per year (n=327), participants in two or more programs per year (n=54) and nonparticipants (n=381). Participants in one program completed an average of 24.7 ± 13.8 credits per year. Participants in two or more programs completed an average of 25.8 ± 14.2 credits per year. Nonparticipants completed an average of 23.2 ± 13.7 credits per year (Table 4.1).

Table 4.1. Descriptives for First Generation Participants and First Generation Nonparticipants: Credits Completed

TotalCredits

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
						Lower Bound	Upper Bound			
.00		381	23.2047	13.69883	.70181	21.8248	24.5846	.00	59.00	
1.00		327	24.7370	13.80977	.76368	23.2346	26.2394	.00	55.00	
2.00		54	25.8148	14.22206	1.93538	21.9329	29.6967	6.00	52.00	
Total		762	24.0472	13.79388	.49970	23.0663	25.0282	.00	59.00	
Model	Fixed Effects			13.78365	.49933	23.0670	25.0275			
	Random Effects				.68559	21.0974	26.9971			.50254

Reviewing Table 4.2, it was determined that the variances of the three groups were not significantly different since $\rho = 0.555$. Therefore, the homogeneity of variance assumption has been met.

Table 4.2. Test of Homogeneity of Variances

TotalCredits

Levene Statistic	df1	df2	Sig.
.588	2	759	.555

Table 4.3 shows that there was not an overall significant difference between the groups ($\rho = 0.210$), therefore, there was not a significant difference in credits completed between the groups.

Table 4.3. ANOVA Results

TotalCredits

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	594.737	2	297.369	1.565	.210
Within Groups	144201.562	759	189.989		
Total	144796.299	761			

To determine if there were significant differences between the participation and nonparticipation groups based on level of participation, a linear trend test was run. Reviewing Table 4.4., a statistically significant difference between the groups was not found ($\rho = 0.210$).

Table 4.4. ANOVA Table for Linear Trend Analysis

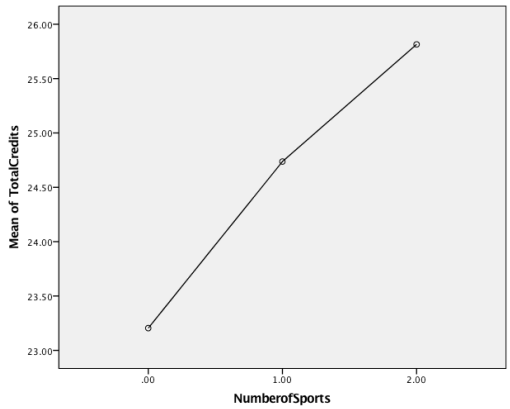
ANOVA

TotalCredits

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		594.737	2	297.369	1.565	.210
	Linear Term	Unweighted	322.211	1	322.211	1.696	.193
		Weighted	588.549	1	588.549	3.098	.079
		Deviation	6.188	1	6.188	.033	.857
Within Groups			144201.562	759	189.989		
Total			144796.299	761			

Figure 4.4. shows the visual representation of the differences in credits completed between the groups. There was not a significant difference in credits completed between the participant and nonparticipant groups, although there was a trend of an increase in credits completed with an increase in participation.

Figure 4.4. Means Plot for Linear Trend Analysis



SPECIFIC AIM #4: GPA (FIRST GENERATION-AMOUNT OF PARTICIPATION)

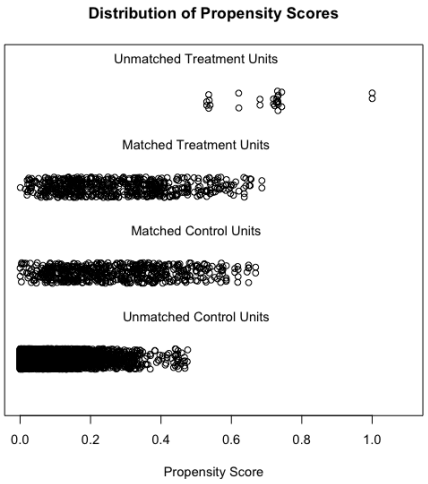
Prior to PSM, there were 4042 unique individuals in the sample. Of the 4042 individuals, 614 were campus recreation participants (treated) and 3428 were nonparticipants (controls). After PSM, there were 588 participants matched with 588 nonparticipants. Twenty-six participants could not be matched with nonparticipants, leaving 2840 unmatched nonparticipants. None of the data were discarded. Table 4.5 shows the sample as a total, matched, unmatched, and discarded data.

Table 4.5. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	3428	614	588	588	2840	26	0	0

Figure 4.5 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows 26 unmatched participants. The next two stratifications show the 588 matched participants and 588 matched nonparticipants. Finally, the last stratification shows the 2840 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

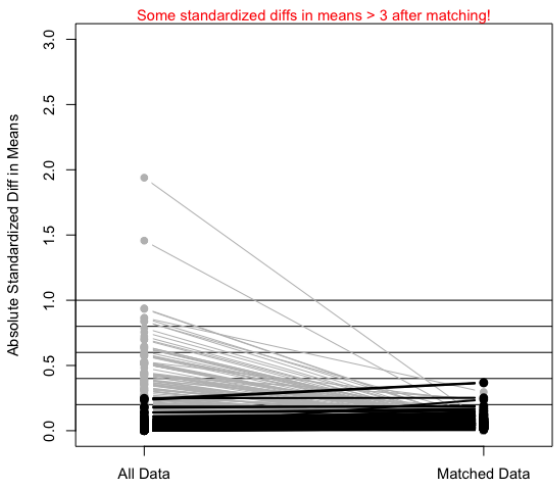
Figure 4.5. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 4.6 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are

matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 4.6. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 4.7). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 4.8). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 4.6), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 4.7. Histogram of Propensity Scores Before and After Matching

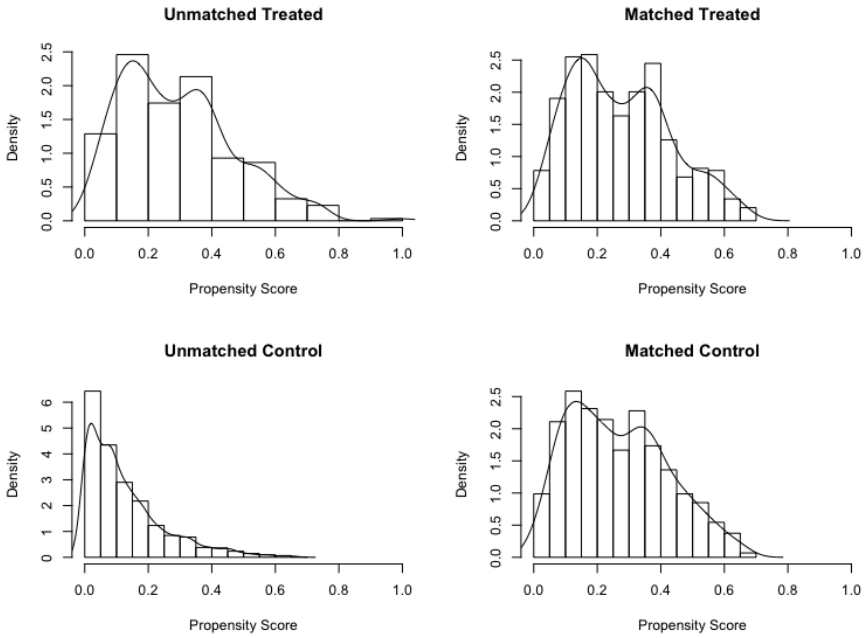
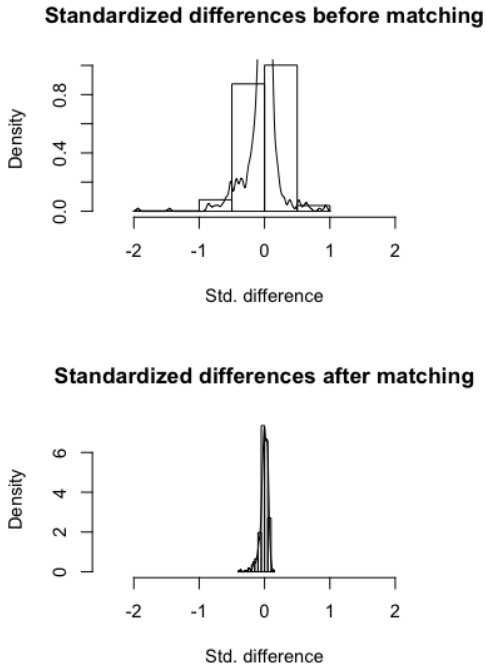


Figure 4.8. Histogram of Standardized Differences Before and After Matching



Of the 1176 individuals within the sample, 50.2% were male, 49.8% were female. The average age of individuals in the sample was 19.9 ± 1.8 years. Additionally, 58.7% lived on campus, 74.3% were white, 45.5% Freshman status, 30.2% Sophomore status, 18.5% Junior status, 5.9% Senior status, 85.1% started in 2011 or later, average ACT score was 20.7 ± 6.0, average high school GPA was 3.10 ± 0.94, 52.6% were Pell Grant eligible, and on average transferred in 3.5 ± 11.7 credits.

After PSM matched the participants with nonparticipants, an ANOVA was conducted to determine if there was a difference in GPA between participants in one program per year (n=510), participants in two or more programs per year (n=78) and nonparticipants (n=588). Participants in one program had an average GPA of 3.03 ± 0.59. Participants in two or more programs had an average GPA of 3.03 ± 0.62. Nonparticipants had an average GPA of 2.92 ± 0.69 (Table 4.6).

Table 4.6. Descriptives for First Generation Participants and First Generation Nonparticipants: GPA

GPA

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
						Lower Bound	Upper Bound			
.00		588	2.9243	.68744	.02835	2.8686	2.9800	.00	4.00	
1.00		510	3.0260	.58554	.02593	2.9750	3.0769	.00	4.00	
2.00		78	3.0250	.62382	.07063	2.8844	3.1657	1.40	4.00	
Total		1176	2.9751	.64241	.01873	2.9383	3.0118	.00	4.00	
Model	Fixed Effects			.64095	.01869	2.9384	3.0117			
	Random Effects				.04290	2.7905	3.1596			.00337

Reviewing Table 4.7, it was determined that the variances of the three groups were not significantly different since ρ = 0.07. Therefore, the homogeneity of variance assumption has been met.

Table 4.7. Test of Homogeneity of Variances

GPA

Levene Statistic	df1	df2	Sig.
2.658	2	1173	.070

Table 4.8 shows that there was an overall significant difference between the groups (ρ = 0.025).

Table 4.8. ANOVA Results

GPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.031	2	1.516	3.689	.025
Within Groups	481.881	1173	.411		
Total	484.912	1175			

Since there was an overall difference between the groups, and the homogeneity of variance assumption was met, a Tukey Post Hoc Test was run to determine which specific groups differed. When reviewing GPA of participants in one program and nonparticipants, it was determined that there was a significant difference in GPA between the groups since ρ = 0.039. There was not a significant difference in GPA between the participants in two or more programs and nonparticipants (ρ = 0.393). There was not a significant difference in GPA between participants in one program and participants in two or more programs (ρ = 1.000). Therefore, significant difference was only found between the participants in one program per year and the nonparticipants.

Table 4.9. Post Hoc Tests

Multiple Comparisons

Dependent Variable: GPA

Tukey HSD

(I) NumberofSports	(J) NumberofSports	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
.00	1.00	-.10166*	.03878	.024	-.1927	-.0106
	2.00	-.10074	.07724	.393	-.2820	.0805
1.00	.00	.10166*	.03878	.024	.0106	.1927
	2.00	.00091	.07793	1.000	-.1820	.1838
2.00	.00	.10074	.07724	.393	-.0805	.2820
	1.00	-.00091	.07793	1.000	-.1838	.1820

*. The mean difference is significant at the 0.05 level.

To determine if there were significant differences between the participation and nonparticipation groups based on level of participation, a linear trend test was run. Reviewing Table 4.9.1., a statistically significant difference between the groups was found ($\rho = 0.025$).

Table 4.9.1. ANOVA Table for Linear Trend Analysis

ANOVA

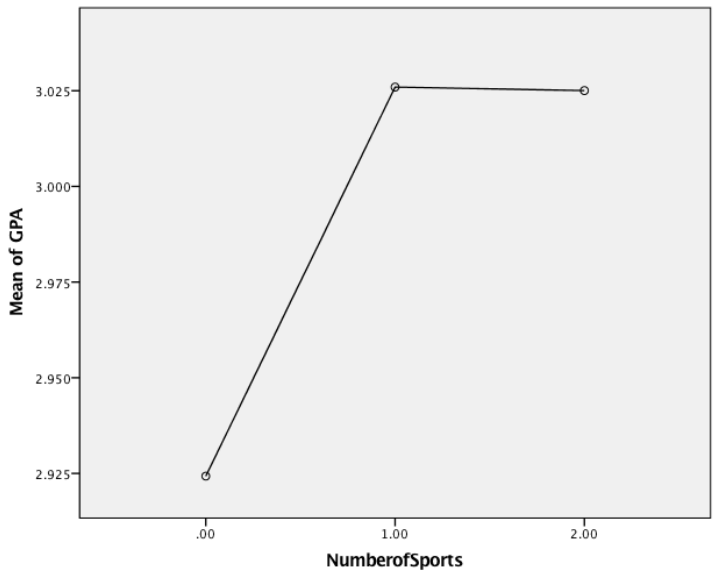
GPA

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		3.031	2	1.516	3.689	.025
	Linear Term	Unweighted	.699	1	.699	1.701	.192
		Weighted	2.561	1	2.561	6.233	.013
		Deviation	.470	1	.470	1.145	.285
Within Groups			481.881	1173	.411		
Total			484.912	1175			

Figure 4.9. shows the visual representation of the differences in GPA between the groups. While there was a significant difference in GPA between the participants in one program and nonparticipants, participants in two or more programs did not have a significantly higher GPA

than nonparticipants. There was also not a significant difference in GPA between the participants in one program per year and participants in two or more programs per year.

Figure 4.9. Means Plot for Linear Trend Analysis



SPECIFIC AIM #5: ONE-YEAR & TWO-YEAR RETENTION (TOTAL SAMPLE - FRESHMEN STATUS)

Prior to PSM there were 4757 unique individuals in the sample. Of the 4757 individuals, 1040 were campus recreation participants (treated) and 3717 were nonparticipants (controls). After PSM, there were 1038 participants matched with 1038 nonparticipants. Two participants could not be matched with nonparticipants, leaving 2679 unmatched nonparticipants. None of the data were discarded. Table 5.0 shows the sample as a total, matched, unmatched, and discarded data.

Table 5.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	3717	1040	1038	1038	2679	2	0	0

Figure 5.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows two unmatched participants. The next two stratifications show the 1038 matched participants and 1038 matched nonparticipants. Finally, the last stratification shows the 2679 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between individuals would be campus recreation program participation. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 5.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is essential when ensuring data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 5.0. Distribution of Propensity Scores

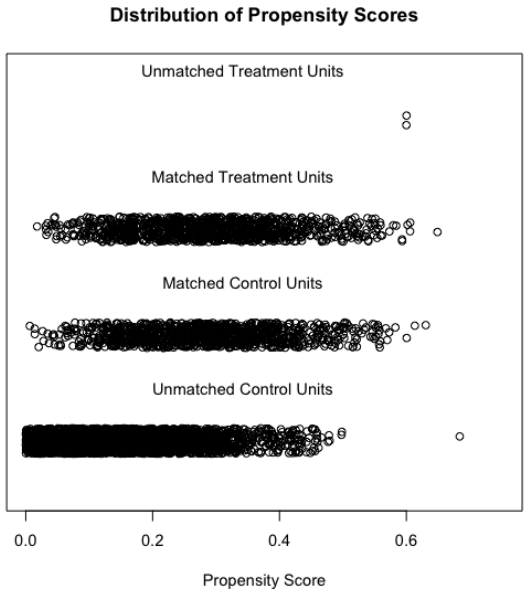
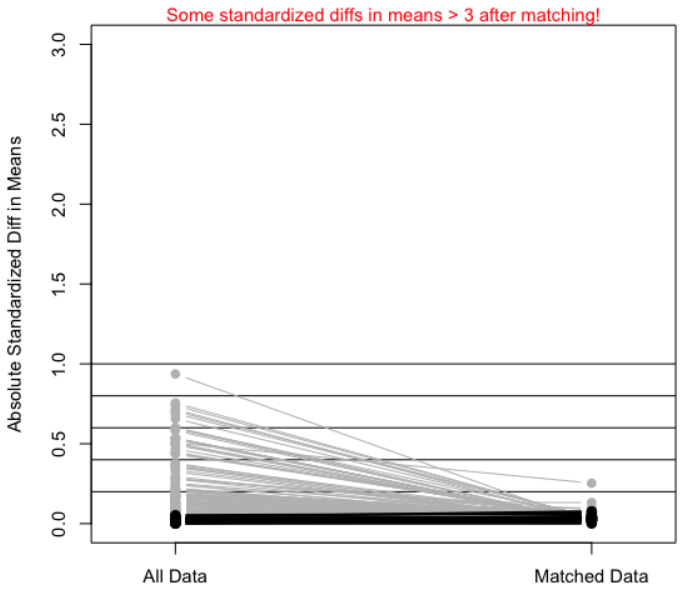


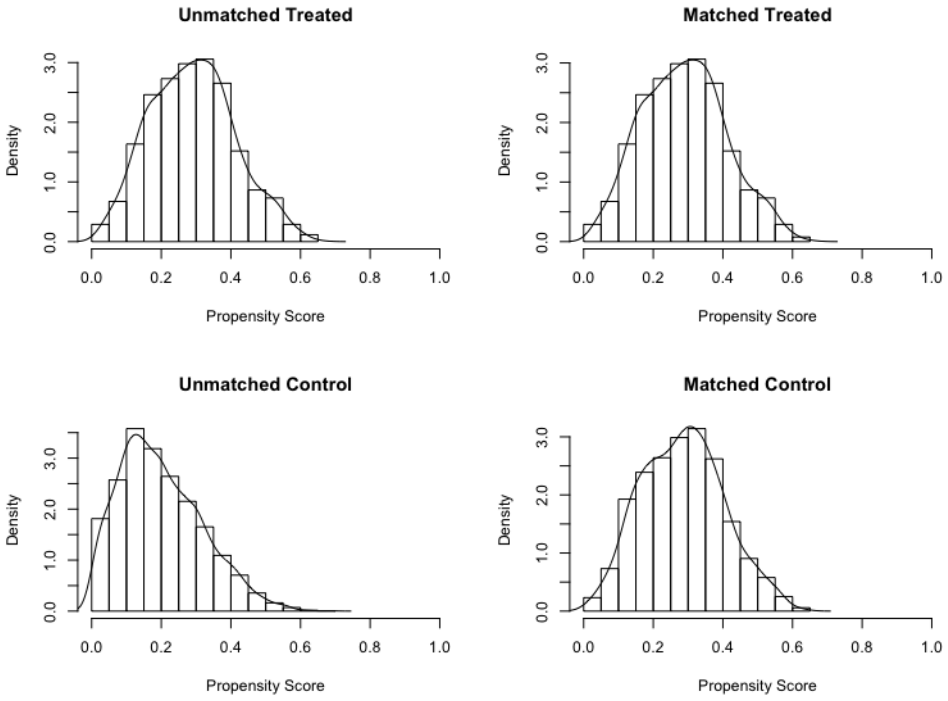
Figure 5.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 5.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution

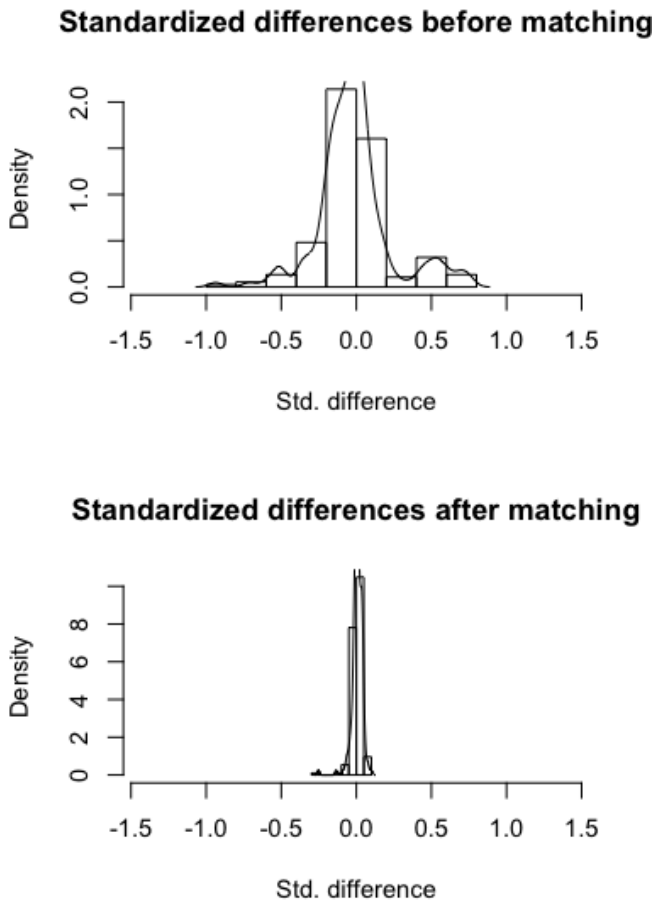
of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis.

Figure 5.2. Histogram of Propensity Scores Before and After Matching



Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 5.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 5.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 5.3. Histogram of Standardized Differences Before and After Matching



Of the 4757 individuals within the sample, 48.8% were male, 51.3% were female. The average age of individuals in the sample was 18.7 ± 1.2 years. Additionally, 78.8% lived on campus, 72.1% were white, 99.8% started in 2011 or later, average ACT score was 21.7 ± 5.0, average high school GPA was 3.21 ± 0.72, 14.2% were Pell Grant eligible, 26.2% were first generation status, and on average transferred in 4.2 ± 8.6 credits.

After PSM matched the participants with nonparticipants, two-sample tests for proportions (z-test) (Table 5.1, Table 5.2) were conducted to determine if there was a difference in one-year and two-year retention between the participants and matched nonparticipants. Individuals who were retained were coded with a "1" while individuals who were not retained

were coded with a "0." Participants in club sports, intramural sports, and fitness classes had an average one-year retention of 0.83 ± 0.38. Nonparticipants had an average one-year retention of 0.68 ± 0.46. The difference in one-year retention was significant ($\rho < 0.001$) suggesting participants had a higher one-year retention rate when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.36$) suggested a low practical significance.

Table 5.1. Two-Sample Test for Proportions (z-test) for Freshmen Participants and Freshmen Nonparticipants: 1-Year Retention

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.829479769	0.682080925
Known Variance	0.14157948	0.21705565
Observations	1038	1038
Hypothesized Mean Difference	0	
z	7.929874969	
P(Z<=z) one-tail	1.11022E-15	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	2.22045E-15	
z Critical two-tail	1.959963985	

Participants in club sports, intramural sports, and fitness classes had an average two-year retention of 0.69 ± 0.46. Nonparticipants had an average two-year retention of 0.56 ± 0.50. The difference in two-year retention was significant ($\rho < 0.001$) suggesting participants had a higher two-year retention rate when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.27$) suggested a low practical significance.

Table 5.2. Two-Sample Test for Proportions (z-test) for Freshmen Participants and Freshmen Nonparticipants 2-Year Retention

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.692678227	0.562620424
Known Variance	0.21308038	0.24631598
Observations	1038	1038
Hypothesized Mean Difference	0	
z	6.182175317	
P(Z<=z) one-tail	3.16121E-10	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	6.32242E-10	
z Critical two-tail	1.959963985	

SPECIFIC AIM #6: ONE-YEAR & TWO-YEAR RETENTION (FIRST GENERATION-FRESHMEN STATUS)

Prior to PSM there were 1396 unique individuals in the sample. Of the 1396 individuals, 282 were campus recreation participants (treated) and 1114 were nonparticipants (controls). After PSM, there were 279 participants matched with 279 nonparticipants. Three participants could not be matched with nonparticipants, leaving 835 unmatched nonparticipants. None of the data were discarded. Table 6.0 shows the sample as a total, matched, unmatched, and discarded data.

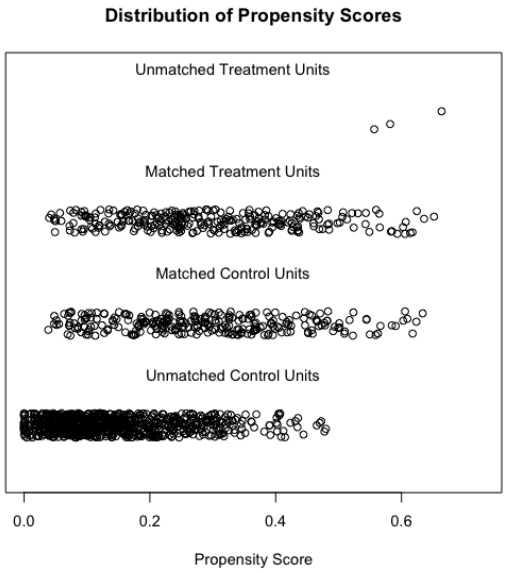
Table 6.0. Propensity Score Matching Sample Sizes

	All		Matched		Unmatched		Discarded	
Subsamples	Control	Treated	Control	Treated	Control	Treated	Control	Treated
(all cases)	1114	282	279	279	835	3	0	0

Figure 6.0 is a jitter plot distribution of propensity scores. Each circle represents each data point in the total sample. The upper stratification shows three unmatched participants. The next two

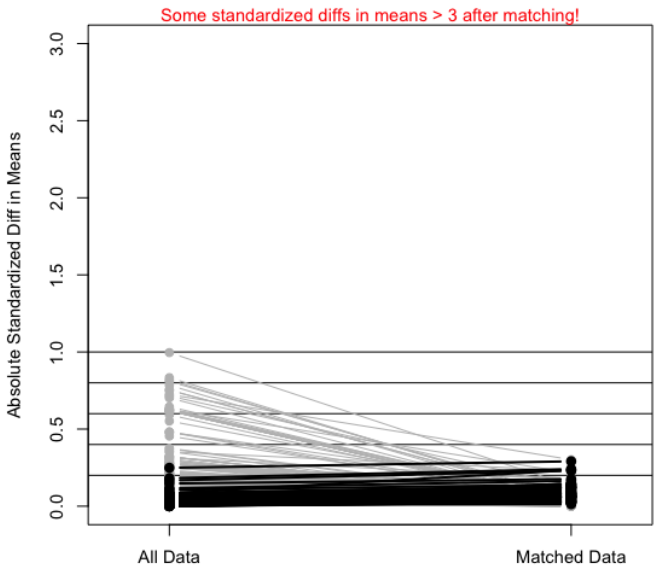
stratifications show the 279 matched participants and 279 matched nonparticipants. Finally, the last stratification shows the 835 unmatched nonparticipants. There was a great deal of overlap in propensity scores (0.0-0.7) between the matched treatment group and the matched control group. This is meaningful because this small range suggests that if two individuals were chosen, one from each group, the main difference between the individuals would be whether they participated in campus recreation programs. Since randomization is not possible for observational studies like this, matching is used as a way to imitate randomization to create comparable groups to analyze.

Figure 6.0. Distribution of Propensity Scores



To review the difference in the means of the data, PSM was used to show the covariate balance in the dataset. Figure 6.1 shows the improvement in the covariate balance in the dataset after PSM. The absolute standardized difference in the mean after PSM was less than the absolute standardized difference in the mean prior to PSM, which is important to ensure data are matched as precisely as possible. Ideally, the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 6.1. Standardized Difference in Means



To show how PSM matches participants to nonparticipants, a histogram of propensity scores before and after matching was created (Figure 6.2). On the left hand side, the histograms show the distribution of the data for the participants and nonparticipants prior to PSM. The distribution of the data looks different between the participants and the nonparticipants. On the right hand side, the histograms show the distribution of the data for the participants and nonparticipants after PSM. The similarity of the distribution of the matched cases is critical prior to further statistical analysis. Additionally, a histogram of standardized differences was created to show the data as overlaid kernel density estimates of standardized differences before and after matching (Figure 6.3). The histogram at the top of the figure shows the standardized differences prior to PSM. The histogram at the bottom of the figure shows the decreased standardized differences after PSM. Like the standardized differences in means figure (Figure 6.1), the closer to 0.0 the difference in the means are, the more exceptional the match.

Figure 6.2. Histogram of Propensity Scores Before and After Matching

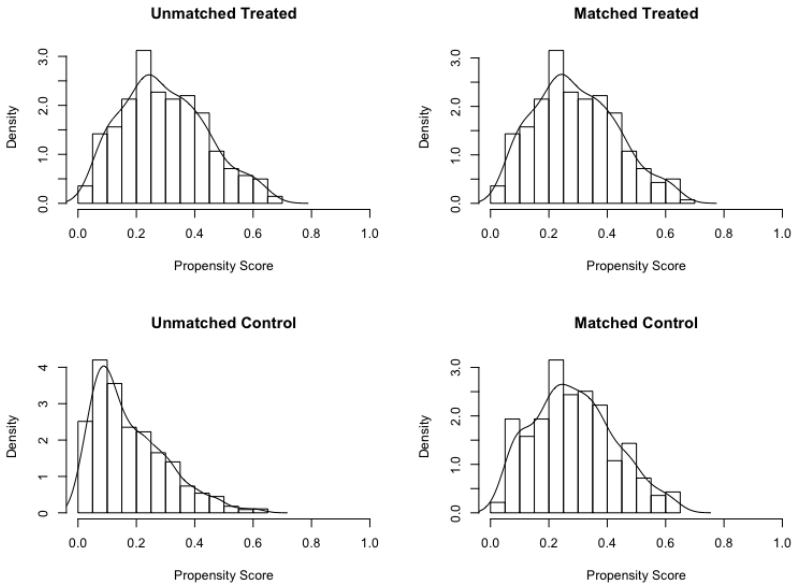
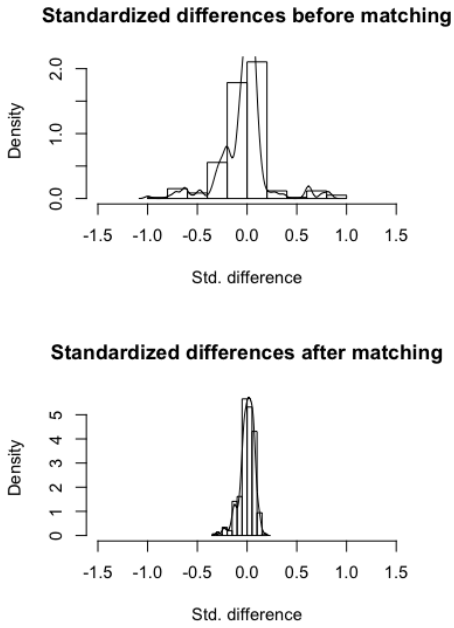


Figure 6.3. Histogram of Standardized Differences Before and After Matching



Of the 1396 individuals within the sample, 48.9% were male, 51.1% were female. The average age of individuals in the sample was 18.7 ± 0.8 years. Additionally, 80.5% lived on campus, 69.7% were white, 99.8% started in 2011 or later, average ACT score was 20.9 ± 4.0,

average high school GPA was 3.18 ± 0.59, 52.0% were Pell Grant eligible, and on average transferred in 2.9 ± 7.3 credits.

After PSM matched the participants with nonparticipants, two-sample tests for proportions (z-test) (Table 6.1, Table 6.2) were conducted to determine if there was a difference in one-year and two-year retention between the participants and matched nonparticipants. Individuals who were retained were coded with a "1" while individuals who were not retained were coded with a "0." Participants in club sports, intramural sports, and fitness classes had an average one-year retention of 0.82 ± 0.38. Nonparticipants had an average one-year retention of 0.68 ± 0.47. The difference in one-year retention was significant ($\rho < 0.001$) suggesting participants had a higher one-year retention rate when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.33$) suggested a low practical significance.

Table 6.1. Two-Sample Test for Proportions (z-test) for First Generation Freshmen Participants and First Generation Freshmen Nonparticipants: 1-Year Retention

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.82437276	0.681003584
Known Variance	0.14530311	0.21801913
Observations	279	279
Hypothesized Mean Difference	0	
z	3.97293901	
P(Z<=z) one-tail	3.54956E-05	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	7.09912E-05	
z Critical two-tail	1.959963985	

Participants in club sports, intramural sports, and fitness classes had an average two-year retention of 0.67 ± 0.47. Nonparticipants had an average two-year retention of 0.51 ± 0.50. The difference in two-year retention was significant ($\rho < 0.001$) suggesting participants had a higher

two-year retention rate when compared to the nonparticipants. Cohen's (1988) effect size value ($d = 0.33$) suggested a low practical significance.

Table 6.2. Two-Sample Test for Proportions (z-test) for First Generation Freshmen Participants and First Generation Freshmen Nonparticipants: 2-Year Retention

z-Test: Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.666666667	0.512544803
Known Variance	0.22302158	0.25074134
Observations	279	279
Hypothesized Mean Difference	0	
z	3.740122446	
P(Z<=z) one-tail	9.19653E-05	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0.000183931	
z Critical two-tail	1.959963985	

OVERALL SUMMARY

The main findings of this study are summarized below. When comparing the total sample of all participants and nonparticipants, participants of campus recreation programs completed significantly more credits per year and obtained a significantly higher GPA per year. First generation participants did not have a significantly different GPA than first generation nonparticipants, but did complete significantly more credits when compared to first generation nonparticipants. With respect to whether amount of participation in campus recreation programs had an effect on credits completed and GPA, participants in one campus recreation program per year completed significantly more credits than nonparticipants, although participants in two or more programs per year did not complete significantly more credits than nonparticipants or the participants in one campus recreation program per year. Participants in one campus recreation

program and participants in two or more campus recreation programs both obtained a significantly higher GPA when compared to nonparticipants, although there was not a significant difference in GPA between participants in one campus recreation program per year and participants in two or more campus recreation programs per year. There was not a significant difference in credits completed between any of the first generation groups, although first generation participants in one campus recreation program per year did obtain a significantly higher GPA when compared to first generation nonparticipants. First generation participants in two or more campus recreation programs per year did not have a significantly different GPA when compared to first generation nonparticipants. There also was not a significant difference in GPA between the first generation participants in one program per year versus first generation participants in two or more programs per year. In addition to reviewing academic success outcomes of all campus recreation participants, first generation campus recreation participants, all nonparticipants, and first generation nonparticipants, freshmen students were also studied. Retention was studied with this subgroup to determine if participation in campus recreation programs was beneficial to persistence over time. When reviewing freshmen campus recreation participants and freshmen nonparticipants, freshmen campus recreation participants had a significantly higher one-year retention rate and two-year retention rate. The same result was seen with first generation freshmen participants. First generation freshmen participants had a significantly higher one-year retention rate and two-year retention rate when compared to first generation nonparticipants.

REFERENCES

REFERENCES

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

CHAPTER SEVEN: DISCUSSION

CAMPUS RECREATION AND ACADEMIC SUCCESS

The impact campus recreation has on student success has been studied for years, but unfortunately the contribution campus recreation could make has been ignored due to lack of substance and consistency of findings in the research (Belch et al., 2001). Belch et al. (2001) suggests that for years recreational sport professionals have acknowledged the potential relationship between campus recreation participation and learning, development, and persistence in college, yet more research is needed for higher administration to be convinced of this relationship. Furthermore, Banta (1991) and Little & Guse (1988) have suggested this lack of substance and consistency in the literature have led individuals in higher education to misunderstand and undervalue results of a relationship between campus recreation participation and academic success. Considering these issues, it is necessary for continued research to be conducted and consistency in findings to occur for higher administration to be convinced if a relationship exists. Studying the academic related benefits associated with participation in campus recreation programs is especially important considering academic success is a typical area of assessment conducted by higher administration on a regular basis. There are several ways to define academic success including students achieving a GPA that meets program and university requirements, credits completed to fulfill program requirements, and retention to ensure students are returning each year to continue with their education at their respective universities. It is important to study each academic success factor to draw appropriate conclusions. Kampf & Teske (2013) studied retention rates of students who participated in club sports, used the student recreation center, were employed by the campus recreation department,

and compared them to nonparticipants. In addition to retention rates, the researchers also collected GPA data for each group. While club sport participants had higher retention rates than nonparticipants, they did not differ from nonparticipants when it came to GPA. Kampf & Teske (2013) suggested that while this particular program may contribute to better social integration and lead to retention, it might not necessarily affect other academic success outcomes. Therefore, it is important to study several academic outcomes to determine the relationship between participation and each outcome. In the current study, credits completed and GPA were compared in a total participant sample, first generation participants, and nonparticipants. One-year and two-year retention rates were studied in freshmen and first generation freshmen recreational sport participants and nonparticipants. Considering first generation students are more likely to struggle academically and freshmen students are the least likely of all class standings to be retained, it is of particular importance to study these specific populations that are known to earn lower GPAs, complete fewer credits, and leave college before graduation (Pascarella et al., 2004; Tinto, 1993; Ferguson, 1990). While it is necessary to continue research of total populations of college students to add to the existing knowledge in the field, many universities enroll thousands of first generation and freshmen students each year. Therefore, it is also worth studying whether first generation status affects the relationship between campus recreation program participation and academic success. Understanding the factors that could lead to success in populations that are known to struggle academically could lead to a better approach when working with these students.

CREDITS COMPLETED

In the current study, credits completed was evaluated in several ways, including in the total participant sample, as a dose-response relationship with number of programs students

participated in, and nonparticipants. The total participant sample completed significantly more credits than the total nonparticipant sample. A positive finding between participation in campus recreation programs and completing significantly more credits is encouraging for the progression through academic programs leading to graduation. It is possible that participation in campus recreation programs promotes the importance to overcome typical challenges associated with college. For example, students in the total participant sample may have learned time management skills that allowed them to participate in extracurricular activities while completing more credits per year. Similar results were found when Danbert et al. (2014) studied the relationship between campus recreation membership and credits completed. In their study, campus recreation members had a higher cumulative credits completed when compared with nonmembers. Consistency in results is encouraging when justifying the importance of campus recreation programs.

Interesting results were found when determining if a dose-response relationship existed for credits completed and participation in the current study. Specifically, participating in one program per year was associated with more academic success than participating in two or more programs, or no programs. When determining if more participation was related to more credits completed, it is possible that students who participated in two or more campus recreation programs did not believe they had the time to enroll in as many credits as students who participated in only one campus recreation program per year. Students who participated in one campus recreation program per year may have been able to balance a heavier course load successfully as compared with students who spent more time participating in two or more campus recreation programs per year. Therefore, our data suggest that moderate recreational sports participation may be optimal in helping improve academic success in terms of credits

completed. Reviewing the dose-response relationship of participation in campus recreation programs and retention, Kampf & Teske (2013) found that the more a student used the campus recreation facility, the greater correlation with retention (Kampf & Teske, 2013). However, Kampf & Teske (2013) also suggested that the influence of participation on retention is a result of social integration and may not necessarily affect other academic success outcomes (e.g., credits completed, GPA). Students who feel integrated within their campus communities tend to remain in school, but may not always perform strongly in the classroom or choose to take as many credits per year. The choice to enroll in fewer classes per year may be a result of the desire to participate in more extracurricular programs. Consequently, the desire to participate in campus recreation programs may be beneficial to some academic outcomes, but not all. Considering Kampf & Teske (2013) studied the dose-response relationship between campus recreation participation and retention rather than campus recreation and credits completed, it is not appropriate to compare their results to the current study results. Furthermore, Kampf & Teske (2013) included students as participants if they simply entered the campus recreation facility whereas the researchers in the current study included participants in specific programs such as club sports, intramural sports, or fitness classes within the analysis. Although the definition of participation was different between the two studies, there are very few studies that focus on the relationship between amount of campus recreation participation and credits completed. The results of the current study suggest that for the total sample, participating in one campus recreation program per year is most advantageous to student success as measured by successful credit completion.

GPA

GPA was also studied in the total participant sample, as a dose-response relationship with number of programs students participated in, and nonparticipants. GPA in the total participant sample was significantly higher than nonparticipant GPA. These results agree with what Danbert et al. (2014) found when studying academic outcomes of freshmen campus recreation members. Danbert et al. (2014) studied the freshmen cohort for four semesters to determine cumulative GPA between the campus recreation members and nonmembers. Analysis of the data showed that member cumulative GPA was significantly higher after four semesters when compared to nonmember cumulative GPA. Results of the current study did not support a dose-response relationship between amount of recreational sports participation and GPA. That is, students who participated in any amount of campus recreation programs per year attained higher GPAs when compared with nonparticipants, although there was not a significant difference in GPA between participants in one campus recreation program per year and two or more campus recreation programs per year. This finding makes sense when reviewing the results of the amount of campus recreation participation and credits completed. Participants in one campus recreation program completed significantly more credits per year than nonparticipants, but participants in two or more campus recreation programs did not complete significantly more credits per year when compared to the nonparticipants and other participant group. Therefore, it is possible that participants in two or more campus recreation programs per year understood how many credits they should enroll in per year and still be successful with respect to GPA. Our results differ from those of Todd and associates (2009) who attempted to determine if a dose-response relationship existed between campus recreation usage and GPA. These researchers noticed that students who visited the campus recreation center three or more times per week had a significantly higher

GPA than moderate users, low users, and nonparticipants. Differences in results could be attributed to data collection methodology. The current study compared amount of campus recreation programs students participated in per year, whereas the study by Todd et al. (2009) focused on average number of visits students made to the campus recreation center via swipe card system. Todd et al. (2009) also noted that intramural field sports and club sports data were not included in the analysis because only limited data were available. Since the current study specifically focused on intramural sports, club sports, and fitness class participation, a direct comparison with the Todd et al. study is not possible. Brock, Carr, & Todd (2015) examined campus recreation usage as a dose-response relationship with GPA. The researchers reviewed usage in two different ways. The first approach to determine if more participation was related to greater results was to review frequency of campus recreation participation as it related to GPA. The researchers created high, moderate, and nonuser/low user groups to compare GPAs. The high user group had a 5.0% higher GPA than the moderate user group and a 9.5% higher GPA than the nonuser/low user group. The second approach to determine if more participation was related to greater results was to determine if changes in campus recreation participation in freshmen were related to changes in GPA. The researchers found that an increase in one day per week of participating in campus recreation programs did not improve GPA. They also found that there was a small (2.5%) yet not statistically significant increase in GPA with students who increased their participation in campus recreation programs by two days per week. When comparing the first approach by Brock et al. (2015) to the current study, some similarities exist. We found that regardless of amount of participation, GPA was significantly higher in the participant groups compared to the nonparticipant group. This finding was also seen in the Brock et al (2015) study. The high user group and moderate user group had higher GPAs when

compared with the nonuser/low user group. Differing methods in the second approach by Brock et al. (2015) prove it difficult to make direct comparisons between the two studies, since we did not compare "change" in the two variables. In contrast with the findings by Todd et al. (2009) and Brock et al. (2015), a multi-institutional study conducted by NIRSA (2004) showed negative results. NIRSA researchers found no difference in GPA between heavy recreational sport users, light users, and nonusers at several universities. Major differences in the NIRSA study and the current study methodologies exist. NIRSA relied on self-report as they distributed surveys to students at universities across the United States to determine if there was a relationship between campus recreation usage and GPA. Students were required to report their campus recreation usage and academic variables such as GPA. In the current study, we collected campus recreation participation directly from the campus recreation department and academic outcome data were obtained from the university registrar. It is possible that students who completed the self-reported survey by NIRSA may have found it difficult to recall campus recreation center usage or overestimated their participation. Students were also required to input their academic information. It is possible that students did not want to include poor GPA values or could have estimated their GPA if they were unsure of their GPA at the moment they completed the survey. Another difference between the NIRSA and present study was that NIRSA researchers collected data from many institutions that differed in size and student demographics, whereas the current study data were collected at a single institution. While it is important to collect data using a multi-institutional approach, it is difficult to compare results of a multi-institutional study to a study which data are only collected at one institution. Results from a single institution may be best compared with other universities similar in size and student demographics. Finally, the study by NIRSA (2004) differed in methodology in the fact that they surveyed students about

their campus recreation center usage rather than participation in specific programs as evaluated in the current study. Differences in GPA between participants in different campus recreation programs may exist due to GPA requirements of campus recreation programs like club sports. At most universities, using the campus recreation center does not require students to maintain a certain GPA. As long as students are enrolled in classes or purchase a membership, they may use the fitness center. This may be the reason the results of the study by NIRSA (2004) did not show a difference in GPA across any participation level. On the contrary, since there are GPA requirements for students who participate in club sports, their GPA must meet campus recreation club sport guidelines, should they exist, and therefore may be higher than other participant groups that are not required to maintain a certain GPA to participate.

ONE-YEAR AND TWO-YEAR RETENTION

In addition to reviewing credits completed and GPA, retention was also studied to determine if participation in campus recreation was beneficial to retention over time. In the current study, one-year and two-year retention in freshmen participants and nonparticipants was analyzed. Freshmen participants in campus recreation programs were retained at a significantly higher rate compared to their nonparticipant counterparts. These findings are encouraging considering the highest attrition rates occur from freshmen to sophomore year (Tinto, 1993; Ferguson, 1990). In the study by Danbert et al. (2014), more freshmen campus recreation members were retained after one year and two years when compared with freshmen nonmembers, although the only statistically significant finding was that members were retained at a higher rate than nonmembers at the two-year retention mark. This finding is especially important when thinking about the thousands of students who would return to the university the following year if they were retained. Although the study by Danbert et al. (2014) was conducted

at a larger institution than ours, similar methodology was used to analyze data and similar outcomes were measured. In another study that focused on the retention of freshmen students, Kampf & Teske (2013) collected census data from a large four-year college in the Midwest. In addition to demographic data, the researchers were also provided GPA and Fall-to-Fall retention data. Campus recreation participation data available for these analyses included participation in club sports, campus recreation employment, and campus recreation center entry counts. Unlike the current study, Kampf & Teske (2013) analyzed the relationship between each individual program and Fall-to-Fall retention. Results showed that there was a significant relationship between club sports participation and retention. After controlling for demographic and academic variables, club sports participation was still significant in their statistical model. When comparing club sports participants with nonparticipants, the authors determined that club sports participants were 2.22 times more likely to be retained the following fall. Although the current study was not designed to evaluate the effects of each individual campus recreation program, club sports were included in the analysis as part of the participant data. Kampf & Teske (2013) suggest that participation in campus recreation programs allow students to feel a sense of belonging at their universities and therefore may add to the reasoning to stay. It is possible that the students' campus community involvement played a part in their decisions to continue the following year at the university. Their enjoyment and/or sense of belonging could have influenced their choice to stay. In contrast to the current study, Lindsey & Sessoms (2006) surveyed their study sample and asked specifically whether students believed campus recreation facilities or programs directly impacted their decision to attend or continue at a university. The authors found that only junior and senior level students believed recreational sports facilities or programs were important factors in deciding whether to attend college at all, and/or or continue

at their universities. The current study did not include questions relating participation with retention. Many times there are potential issues with the reliability of self-reported data. Additionally, Lindsey & Sessoms (2006) mentioned the survey they administered has had issues with reliability and validity since its implementation and future investigators need to develop ways to increase the reliability and validity measures. Furthermore, just because students may have agreed with certain survey questions, does not mean they agreed with others. For instance, students may not have decided to choose a specific university because of their campus recreation facilities and programs, but that may have played a large role in staying and vice versa. It is also possible that freshmen and sophomore students who participated in the study by Lindsey & Sessoms (2006) did not realize the impact campus recreation programs played in their early careers as students. Furthermore, only one-year and two-year retention data of freshmen students was analyzed in the current study. It is not known whether junior and senior level students were retained at similar or higher rates.

A finding agreed upon generally by many higher education researchers is that students who have a sense of community due to participation in programs on university campuses may be retained at higher rates when compared to students who are not integrated into their campus communities (Belch et al., 2001). Campus recreation departments can play an integral role in offering students programs that might help them feel like they belong, which is likely to have occurred in the current study.

FIRST GENERATION STUDENTS

According to the U.S. Department of Education and National Postsecondary Student Aid Study, first generation students have certain characteristics that may disadvantage them for successfully completing their degrees. For example, first generation students are more likely to

be older, come from minority backgrounds, have some kind of disability, English may be their second language, they could be immigrants, are more likely to be single parents, and are financially independent (Bui, 2002). Pascarella et al. (2004) stated that first generation students tend to enroll and earn fewer credits, are more likely to live off campus, work more hours, participate in less out of the classroom activities, have fewer non-academic peer interactions, and earn lower grades than their peers, therefore, participating in extracurricular activities can be very beneficial. In the current study, participation in campus recreation by first generation students proved to be beneficial as they completed more credits than their nonparticipating counterparts. This is encouraging for the progression through academic programs leading to graduation. It is possible that the first generation students in the current study developed the time management skills needed to participate in extracurricular activities while also being enrolled in several classes. If true, this result is significant considering Pike & Kuh (2005) found that first generation students were less likely to be engaged in academic and social activities related to success in college. It is possible that the negative effect first generation status is traditionally thought to have on academic success was not as strong in the participants of the current study, considering there were factors (like campus recreation programs) in these students' lives that encouraged success.

When determining if there was a dose-response relationship with participation in campus recreation programs and credits completed, the total sample completed significantly more credits when participating in one campus recreation program per year compared with nonparticipants. First generation students in one campus recreation program and first generation students in two or more campus recreation programs did not complete significantly more credits when compared to nonparticipants. Separating the first generation students into participant groups based on

amount of participation resulted in a different finding than that which was found in specific aim two (e.g. first generation participants completed significantly more credits than first generation nonparticipants). Although not statistically significant, it is interesting to note that as participation increased, so did average number of credits completed (nonparticipants=23.2 ± 13.7 credits per year; participation in one campus recreation program per year=24.7 ± 13.8 credits per year; participation in two or more campus recreation programs per year=25.8 ± 14.2 credits per year). Although there was not a significant difference in credits completed between the participant groups, it is possible that first generation participants learned how to balance extracurricular activities with a similar course load as their nonparticipating counterparts. Considering students tend to excel in their collegiate experience when they are involved within the campus community, encouraging students to participate in extracurricular activities like campus recreation programs may help the students who are known to struggle the most academically.

GPA in the total participant sample was significantly higher than nonparticipant GPA, although GPA was not significantly different in the first generation participants and first generation nonparticipants. Specifically, first generation participants did not have a higher GPA when compared with first generation nonparticipants. First generation participants in the current study may not necessarily be completing courses with significantly better grades despite the fact this subgroup completed significantly more credits per year when compared with nonparticipants. Therefore, it is possible that the academic challenges the first generation students faced in the current study did not relate to retention and completion of classes, rather this population might have had issues with obtaining higher grades. It appears that this subgroup performed less than average in their classes, but still passed their classes and obtained credit for

completing them. Depending on program and university requirements, even a below average grade may be a passing grade and count towards credits completed in students' degree programs. Pascarella et al. (2004) suggests that one of the academic outcomes first generation students typically struggle with is achieving a high GPA; which agrees with our findings. Furthermore, it is possible that since the first generation participants in this study were enrolled and completed more credits per year, they struggled with achieving high grades in their courses due to available study time being stretched too thin. In addition, it is possible that first generation students might attempt to take more credits per year due to financial reasons. Some universities allow students to pay a set tuition as long as they are completing 12-18 credit hours per semester. This might encourage some first generation students to take the maximum amount of credits per semester at the same cost, regardless of the outcome in grades obtained. However, students are required to pay per credit hour at the current study institution. Therefore, it is more likely that first generation students in the current study were involved in extracurricular activities and completed more credits per year, yet did not achieve higher GPAs when compared with nonparticipants.

When reviewing amount of campus recreation participation and GPA in first generation students, first generation student results differed from that seen with the total sample results. In the total sample, participants in one campus recreation program and participants in two or more campus recreation programs both obtained a significantly higher GPA when compared to nonparticipants, although there was not a significant difference in GPA between participants in one campus recreation program per year and participants in two or more campus recreation programs per year. First generation students in one campus recreation program had a significantly higher GPA when compared with first generation nonparticipants, although first generation participants in two or more campus recreation programs per year did not have a

significantly higher GPA compared to first generation nonparticipants. As previously stated, first generation participants may be able to balance participation in extracurricular activities and completing more credits, but the quality of their coursework may not be higher than nonparticipants. Participating in two or more campus recreation programs per year and obtaining a high GPA may not be reasonable if first generation students are also spending time on other obligations. It is possible that if first generation students in this study were living off campus, had a job, were caring for family members and then were also participating in two or more campus recreation programs, they may not have devoted as much time to schoolwork, therefore their GPAs would be affected accordingly. Furthermore, although first generation participants may have completed more credits than their nonparticipating counterparts, they may not have earned significantly better grades. Therefore, it is possible that with the challenges and responsibilities faced by first generation students, there may be a recommended amount of campus recreation participation for the most beneficial effect.

Participation in recreational sports may also benefit other academic outcomes such as retention. According to the National Center for Education Statistics' Beginning Postsecondary Study, first generation students were four times more likely to leave their universities after the first year when compared with non-first generation students (Engle & Tinto, 2008). In the current study, freshmen campus recreation participants were studied to determine if they had a higher one-year and two-year retention rate when compared with freshmen nonparticipants, and it turns out that they did. Furthermore, when studying whether first generation freshmen participation had the same effects on one-year and two-year retention, it was determined that first generation freshmen were retained at a higher rate when compared to first generation freshmen who did not participate in campus recreation programs. This finding is encouraging for campus recreation

departments and higher administration because not only are freshmen the class with the highest attrition rates, but first generation students have traditionally been a population with low retention rates in postsecondary education. Early participation in campus recreation programs is exciting considering Terenzini et al. (1994) found that first generation students tend to delay participating in extracurricular activities on campus until they have determined how to integrate these activities into their academic calendars, even though involvement in these types of activities may prove to be beneficial in the long run. Tinto (1993) stated that college students' activities and experiences have a more profound effect on academic success and persistence than precollege experiences. In the case of the first generation participants in this study, it is possible that experiences gained by students participating in campus recreation programs played a significant role in their choice to stay. Garcia (2015) agreed with Tinto (1993) and suggested that in order to succeed, first generation students should consider getting involved in co-curricular activities on their campuses. The results of the current study provide similar evidence for campus related activity participation, in the form of recreational sports. For the most beneficial academic outcomes, it may be necessary for first generation students to find an ideal amount of participation that allows for socialization benefits to occur while also providing time for academic and other obligations.

FRESHMEN STUDENTS

According to Tinto (1993), more than half of all attrition at four-year institutions occurs in the freshmen population. Ferguson (1990) predicts freshmen attrition to be as high as 60% of the total attrition seen on college campuses. Many researchers have argued that attrition rates in freshmen students have not changed since the 1970s (Levitz & Noel, 1989; Tinto, 1993). Considering the financial implications of a substantial number of students leaving universities

before their second year, university administrators should promote and support options available on their college campuses to decrease such attrition.

According to a multi-institutional study by NIRSA (2010), the majority of campus recreation participants are freshmen and sophomore students. The same finding occurred in the current study with freshmen and sophomore students making up the majority of the samples in research aims 1-4. The population of interest in research aims five and six were exclusively freshmen to narrow focus on retention through the critical first two years of college. The current study found that freshmen students who participated in campus recreation programs had significantly higher one-year and two-year retention rates when compared to freshmen nonparticipants. Focusing in on even a smaller subgroup (i.e., first generation freshmen); results showed that first generation freshmen participants had significantly higher one-year and two-year retention rates when compared to first generation freshmen nonparticipants. Tinto (1993) and Garcia (2015) have suggested the importance of involvement in extracurricular activities on campus. It is possible the freshmen participants and first generation freshmen participants in this study enjoyed their experiences in campus recreation programs and gained a sense of belonging due to their participation. Thus, retention could be at least partially affected by involvement in extracurricular activities like club sports, intramural sports, and/or fitness classes. Support for the role of campus recreation and freshmen retention was provided by Danbert et al. (2014). Researchers collected student information from a university database and participation data from the campus recreation department. Focusing on freshmen students, the researchers evaluated campus recreation center membership and academic success measures. Danbert et al. (2014) and researchers of the current study were interested in determining one-year and two-year retention rates of freshmen campus recreation participants. The two studies found similar results

suggesting freshmen participants had a higher retention rate than freshmen nonparticipants. The main difference in results was that the study by Danbert et al. (2014) did not find one-year retention between the members and nonmembers to be statistically different. The researchers argued that the practical significance is worth mentioning considering the number of students who were retained at the university was a high amount and would have impacted the university financially if they were not retained. The financial issue is important as higher education administrators review the implications of various retention rates. Other researchers found different results. Lindsey & Sessoms (2006) found that only junior and senior level students believed recreational sports facilities or programs were important factors when deciding to attend college or continue at their universities. The major difference between the study by Lindsey & Sessoms (2006) and the current study is the data collection method. Lindsey & Sessoms (2006) surveyed their study participants and asked specifically whether students believed campus recreation facilities or programs directly impacted their decision to attend or continue at a university. The current study did not require participants to respond to a question requesting perception about a direct relationship between participation and retention. Furthermore, the current study found that freshmen participants and first generation freshmen participants were retained at a higher rate (both one-year and two-year) when compared with freshmen nonparticipants and first generation freshmen nonparticipants, respectively. Lindsey & Sessoms (2006) surveyed students from each class level to determine their opinions about the impact of campus recreation on retention. It is also important to note that Lindsey & Sessoms (2006) suggest the reliability and validity of the survey instrument could have been an issue. Although there are mixed results relating participation in campus recreation and retention for freshmen students, it is important to acknowledge the programs that may encourage retention for this

population. Considering this population holds the highest attrition rate at universities across the nation, it is prudent for higher administration professionals to understand the value of campus programs, including recreational sports, as avenues to positively impact and effect freshmen students.

LIMITATIONS OF THE STUDY

Generalizability of the results of this study is limited to universities similar in size and student population to the university used in this study. A multi-institutional approach is suggested when attempting to generalize results, although this approach tends to be difficult when data are collected in methods other than survey. Furthermore, when multi-institutional data are collected, it is crucial to ensure data are collected properly with a method that can be used across universities. When multi-institutional research is not possible, continued research conducted at various universities differing in size and student population help add knowledge to the field. Another limitation of the current study is the possible influence of additional and/or unknown confounding factors that may have played a role in the effect of the outcome variables. Although propensity score matching was used to compare participants to nonparticipants based on many covariates that were collected (i.e., age, class standing, high school GPA, etc.), there may have been additional factors related to recreational sports use that had an effect on academic success. The researchers of the current study did not have access to student participation in other on-campus or off-campus activities that might have played a role in their academic success (i.e., wellness program offerings, fundraising activities on campus, etc.). This study focused on undergraduate student participation in intramural sports, club sports, and fitness classes. Although there are other programs offered through campus recreation at the university (i.e., weight loss challenges, wilderness experiences, personal training, etc.), the data for all programs

were not collected consistently over the collection time period. Furthermore, although data via swipe card reader were available for potential fitness center usage, the investigators could not specify whether students used the fitness center, weight room, walked to a classroom or event within the recreation center, received treatment in the athletic training room, or met a faculty or staff member in the recreation center. Having data for all campus recreation programs would provide a more robust dataset representative of all programs provided by campus recreation. Additionally, having data from all campus recreation programs would provide the opportunity for researchers to compare academic success outcomes of individual programs. Researchers like Kampf & Teske (2013) found differences in retention rates when comparing effects of individual campus recreation programs. It may be relevant to study individual campus recreation programs in the future if funding decided by higher administration limits offer-ability. Lower et al. (2013) compared the benefits of participating in specific campus recreation programs (i.e., group fitness, intramural sports, club sports). Instead of comparing the benefits of participating versus not participating, the researchers compared the results of each campus recreation program along with results of nonparticipants to determine the impact of specific programs. Lower et al. (2013) stated that reviewing the effects of each campus recreation program might help administrators analyze each program's strengths and weaknesses and determine whether programs work together to meet university objectives. Since college administrators determine program funding, it may be beneficial to pinpoint programs that provide the best impact for students. From a research perspective, analyzing the effects of each campus recreation program may help campus recreation professionals and administrators understand their benefits, and hopefully, encourage participation. The current study included data collected at a university that requires a minimum GPA for participation in club sports. This requirement is typical for club sports offered at

universities across the United States. Combining club sports participants with participants from other campus recreation programs as one participant group might increase selection bias since the user group could potentially have a higher GPA due to the GPA requirement. Analyzing each campus recreation program and comparing academic success outcomes amongst the groups would decrease the possibility of including a participant group that is required to maintain a minimum GPA. Finally, reviewing the effects of each individual campus recreation program may help understand the benefits each program has to offer. For instance, club sports participants could potentially meet most days of the week if they are practicing, competing, and traveling to compete. Therefore, the time commitment for club sports and other high time demand activities may convince participants to take fewer credits in the semester(s) they participate. If credits completed is an academic outcome being studied but certain campus recreation programs pose a higher time commitment, participation could exert a negative influence on the academic outcome. However, students who participate in club sports may enjoy their experiences so much that they continue at the university for another year and are retained. Therefore, whenever possible, it is important to study each individual campus recreation program to determine the benefits each program may offer. Although some programs may not influence all academic outcomes in a positive manner, they may still contribute to a successful college experience.

STRENGTHS

Although there were a number of limitations of the current study, there were many strengths worth mentioning. Using propensity score matching as the first step in the analysis was a factor that contributed to the strength of this study. The purpose of propensity score matching is to decrease the selection bias in an observational study (Randolph, Falbe, Manual, Balloun, 2014). Olmos & Govindasamy (2015) suggest that propensity score matching can strengthen

quasi-experimental and observational studies to decrease the number of potential confounders that are included in the pathway of a treatment and outcome. Essentially, propensity score matching decreases the possibility of other factors' effects on the outcome (Olmos & Govindasamy, 2015). Furthermore, it has been argued that propensity score matching is beneficial because if specific cases cannot be matched, they may be dropped (Olmos & Govindasamy, 2015). Ultimately, matching is an important analysis because it uses every data point that can be matched so that fair comparisons can be made. A relatively large sample size was another strength of this study. Considering data were collected over a couple of years, thousands of data points were available to potentially be included in propensity score matching and in the final dataset. Very few cases were dropped due to inability to match. Another strength of the study was the way data were collected. Participation in intramural sports, club sports, and fitness classes were collected electronically. Participation data were not collected based on whether a student swiped an ID or completed a paper copy registration form. Rather, data for intramural sports, club sports, and fitness classes were collected electronically allowing for confidence in safe storage and easy access for analysis. The researchers did not need to rely on survey data that would require participants to recall participation and academic outcomes from previous years since the campus recreation department provided participation data and the university registrar provided demographic and academic data. The number of academic outcomes included in this study was another major strength. Since academic success is multi-faceted with many possible causal exposures, studying several factors that may define academic success was helpful. Finally, considering many variables could have played a role in the academic success of this sample, it is encouraging that many positive results were found between

the participation in campus recreation programs and academic success outcome variables, even though individual effect sizes were not high.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should include multi-institutional studies, employing similar methodology, that review the academic outcomes of campus recreation participants at different size and types of universities. Continued research in the area of campus recreation and student academic success is needed to provide higher administration with more generalizable results. Another recommendation for future research includes the possibility of collecting data documenting other on-campus student participation. The current study included only campus recreation program participation data, although many student affairs departments have access to student participation in other on-campus programs. While this would call for a very complex study, it could provide researchers the opportunity to use more covariates in the propensity score matching analysis to decrease the possibility of other confounding variables that may have an effect on academic success.

Another recommendation for future research would be to increase the data collection period. In the current study, data were collected for only two years; therefore, data like retention data, could only be analyzed through sophomore year. University administrators regularly review retention from freshman through senior year, graduation in four years, and graduation in six years. Engle & Tinto (2008) found that after following a cohort of students for six years, 43% of the first generation student population left their institutions without earning degrees. Of the first generation students who left sometime within the six years, 60% left after their first year. The current study was successful in determining the retention of first generation students after their first and second year of college, but the value of our study results could have improved if we had

been able to follow these students throughout their college careers. Studying these students longitudinally would not only determine retention from year to year, but would also determine if students graduated within the six-year time frame that many universities encourage for their undergraduate population. Additionally, data across all campus recreation programs should be collected to determine the relationship between participation in individual programs and academic success. Such data could help explain the role of specific programs on student success in various academic areas. Finally, individual versus group exercise program effects should be studied to determine the benefits each type of program has to offer. While participation in general may influence academic success, the sense of belonging students may gain due to participating in certain programs, such as group exercise or intramural team sports, is worth studying.

CONCLUSIONS

The purpose of this study was to examine the relationship between campus recreation participation and undergraduate academic success. We also performed further evaluation of first generation students to determine if the same effects of participation occurred. It was found that participants of campus recreation programs (total sample) completed significantly more credits per year and obtained a significantly higher GPA per year. Amount of participation in campus recreation programs had a positive effect on credits completed and GPA. Participants in one campus recreation program per year completed significantly more credits than nonparticipants. Participants in one campus recreation program and participants in two or more campus recreation programs both obtained a significantly higher GPA when compared to nonparticipants. First generation participants completed significantly more credits when compared with first generation nonparticipants. Additionally, first generation participants in one campus recreation program per

year had a significantly higher GPA when compared with first generation nonparticipants. Freshmen campus recreation participants and first generation freshmen participants had a significantly higher one-year and two-year retention rate when compared with freshmen nonparticipants and first generation freshmen nonparticipants, respectively. The findings of this study should be encouraging for students, campus recreation professionals and higher administration. Students who are academically successful and are retained are needed for a university to operate. Programs that provide positive relationships with such university academic goals and objectives justify their need for support with results such as those displayed in this study. Furthermore, it is suggested that students who feel a sense of social belonging due to participating in campus recreation programs may be more likely to become involved in other university activities and hence become more integrated into the university community (Miller, 2011). Students who are involved in several campus activities fit Tinto's (1975) student integration model that suggests the overall success of college students is due to their integration into the campus community. Campus recreation has the possibility to not only influence academic success, but also encourage a better sense of belonging and integration into the campus community.

REFERENCES

REFERENCES

Banta, T.W., Bradley, J., & Bryant, J. (1991). *Quality and importance of recreational services: Technical manual and survey*. Corvallis, OR: NIRSA.

Belch, H.A., Gebel, M., & Maas, G.M. (2001). Relationship between student recreation complex use, academic performance, and persistence of first-time freshmen. *Journal of Student Affairs Research and Practice*, *38*(2), 254–268.

Brock, M, Carr, J. W., Todd, M. K. (2015). An examination of campus recreation usage, academic performance, and selected health indices of college freshmen. *Recreation Sports Journal, 39, 27-36*.

Bui, K. V. T. (2002). First-generation college students at a four-year university: Background characteristics, reasons for pursuing higher education, and first-year experiences. *College Student Journal, 36,* 3-11.

Danbert, S. J., Pivarnik, J. M., McNeil, R. N. & Washington, I. J. (2014). Academic success and retention: The role of recreational sports fitness facilities. *Recreational Sports Journal, 38,* 14-22.

Engle, J. & Tinto, V. (2008). *Moving beyond access: College success for low-income, first generation students*. Washington, DC: The Pell Institute.

Ferguson, M. (1990). The role of faculty in increasing student retention. College and University, 65 (2), 127–135.

Garcia, V. (2015). First generation college students: How co-curricular involvement can assist with success.

Huang, Y. R. & Chang, S. M. (2004). Academic and co-curricular involvement: Their relationship and the best combination for student growth. *Journal of College Student Development, 45*(4), 391-406.

Inkelas, K. K., Daver, Z. E., Vogt, K. E. & Leonard, J. B. (2007). Living-learning programs and first-generation college students' academic and social transition to college. *Research in Higher Education, 48(4),* 403-434.

Kampf, S. & Teske, E. J. (2013). Collegiate recreation participation and retention. *Recreational Sports Journal, 37,* 85-96.

Levitz, R., & Noel, L. (1989). Connecting students to institutions: Keys to retention and success. In M. L. Upcraft & J. N. Gardner (Eds.), The freshmen year experience (pp. 65–81). San Francisco: Jossey-Bass.

Lindsey, R. & Sessoms, E. (2006). Assessment of a campus recreation program on student recruitment, retention, and frequency of participation across certain demographic variables. *Recreational Sports Journal, 30,* 30-39.

Little, S. L., & Guse, D. (1988). Campus recreation services: An enterprise in higher education. *Journal of Physical Education, Recreation & Dance*, 59(8), 62–63.

Lower, L. M., Turner, B. A. & Petersen, J. C. (2013). A comparative analysis of perceived benefits of participation between recreational sport programs. *Recreational Sports Journal, 37,* 66-83.

Miller, J. J. (2011). Impact of a university recreation center on social belonging and student retention. *Recreational Sports Journal, 35,* 117-129.

National Center for Education Statistics. (2007). *Digest of education statistics 2006*. Washington, DC: U.S. Department of Education.

National Intramural Recreational Sports Association. (2004). *Value of Recreational Sports in Higher Education*. Corvallis, Oregon: NIRSA.

NIRSA/NASPA (2010). NIRSA/NASPA consortium campus recreation impact study-descriptive summary report. Retrieved from http://www.nirsa.org/docs/Discover/Research/Campus_Rec_Impact_Study.PDF

Olmos, A. & Govindasamy, P. (2015). Propensity scores: A practical Introduction using R. *Journal of Multidisciplinary Evaluation, 11*(25), 68-88.

Pascarella, E. T., Pierson, C. T., Wolniak, G. C. & Terenzini, P. T. (2004). First generation college students: Additional evidence on college experiences and outcomes. *The Journal of Higher Education, 75,* 249-284.

Pike, G. R., & Kuh, G. D. (2005). First- and second-generation college students: A comparison of their engagement and intellectual development. *The Journal of Higher Education, 76,* 276–300.

Randolph, J. J., Falbe, K., Manual, A. K. & Balloun, J. L. (2014). A step-by-step guide to propensity score matching in R. *Practical Assessment Research and Evaluation, 19*(18), 1-6.

Terenzini, P. T., Rendon, L. I., Upcraft, M. L., Millar, S. B., Allison, K. W., Gregg, P. L., Jalomo, R. (1994). The transition to college: Diverse students, diverse stories. *Research in Higher Education, 35(1), 57-73*.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45(1),* 89-125.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd Ed.). Chicago: University of Chicago Press.

Todd, M. K., Czyszczon, G., Carr, J. W. & Pratt, C. (2009). Comparison of health and academic indices between campus recreation facility users and nonusers. *Recreational Sports Journal, 33,* 43-53.