

The Relationship of Participation in Recreational Sports with Retention Rates and  
Academic Success of First-Year College Students

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The Relationship of Participation in Recreational Sports with Retention Rates and Academic Success of First-Year College Students

**Abstract**

The study investigates if the number of visits to the campus recreational facilities would predict the year-to-year retention rate of new entering freshmen (NEF) who enrolled in fall 2006. Additional purposes were to examine retention rates and number of visits to the campus recreational facilities by gender, ethnicity, fall 2006 place of residence, and employment status on campus fall 2006. Finally, the number of student visits to the campus recreational facilities, first-semester grade point average (GPA), first-semester credits earned, first-year GPA, and first-year credits earned were used to determine if differences existed between returning and nonreturning students.

The data for the students were taken from the student record system and the system that scans the student access card as the student entered the campus recreational facilities. The data in these files were merged and analyzed to determine relationships between selected student-related variables and campus recreational facility usage. After the data was collected and entered into an SPSS file, statistical analyses were performed. First, frequency counts were generated on the nominal data (gender, ethnicity, place of residence, employment on campus, and retention). A frequency count of the number of campus recreational facilities visits was done to determine how to break the facility users into three or four groups that were the same size as the nonvisitor group. For the continuous data, general descriptive statistics were calculated including mean, standard deviation, and range. After the variables were grouped into adequate and reasonably equal cell sizes, a series of nonparametric and parametric

statistical tests were performed using academic performance and retention as dependent variables. First, a series of chi-square tests was done between the nominal variables and retention status. These tests showed if there was a significant difference between genders, place of residence, employment on campus, and ethnicity, and retention status. Next, a series of *t* tests was conducted to determine if there was a significant difference in cumulative fall 2006 credits earned, cumulative spring 2007 credits earned, cumulative fall 2007 credits earned, fall 2006 GPA, spring 2007 GPA, fall 2007 GPA, and retention rates. Another analysis was a two-way analysis of variance (ANOVA). Both linear and logistic regression analyses were performed to predict retention based on demographic variables that included gender, ethnicity, place of residence, employment on campus, and campus recreational facilities visits.

As the results of this and other studies have shown, there is an improvement in retention rates, GPA, and credits earned when students visit the campus recreational facilities. This would seem to tell administrators and students that campus recreational facilities serve a purpose for students on campus and should be funded much like any other campus activity to support students' academic success.

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## Chapter 1

### **Introduction**

Regular, consistent physical activity has been shown to provide a variety of health enhancing benefits to those who choose to engage in it, including reducing the risk of developing cardiovascular disease, certain types of cancer, diabetes, and stroke (Miller, Ogletree, & Welshimer, 2002). Physical activity improves general circulation, increases blood flow to the brain, and raises levels of norepinephrine and endorphins all of which may reduce stress, improve mood, induce a calming effect after exercise, and possibly improve achievement (Taras, 2005). The second of the two sets of benefits is especially important in considering challenges facing today's college students.

Including the previous two studies, many studies have shown that physical activity increases students' health, which may increase the likelihood that students will return. Moskal, Dziuban, and West (1996) showed that health problems such as heart disease, cancers, and even diabetes had an effect on students' academic performance. Collins, Valerius, King, and Graham (1997) found that physical activity enhanced physical, mental, and emotional capacity of the participants. Crews and Landers (1987) showed physical activity reduced both physiological stress and self-perceived psychological stress. Aerobically fit subjects have shown reduced physiologic stress when compared to an unfit control group (Crews & Landers, 1987). Healthy People 2010 by the U.S. Department of Health and Human Services (2000) showed that physical activity improved cardiovascular fitness.

In past studies of physical activity, researchers have focused primarily on exercise, and most interventions currently being implemented to improve physical

activity habits in the United States focus almost exclusively on exercise programs (Dishman & Buckworth, 1996). In recent decades, exercise prescription has shifted from structured, aerobic exercise, such as walking and climbing stairs, both of which are common activities for college students and adults (Centers for Disease Control, 2005). The next step in this process is the development and implementation of physical activity interventions that include recreational sports programs (Kilpatrick, Hebert, & Bartholomew, 2005). By developing cooperative and comprehensive recreational sports programs, college recreational centers enable students to adjust to the campus environment and become committed to the institution and dedicated to earning their degree (Haderlie, 1987).

### **Statement of the Problem**

In the 21<sup>st</sup> century, higher education must respond to an expanding, knowledge-based global marketplace. Unparalleled facilities and faculties can be a firm foundation, but only if the new context is clearly recognized. Like other important transitions, public policy leaders must lead, not simply oversee (Measuring Up, 2006). According to *Measuring Up*, Minnesota has consistently performed very well in the percentage of freshmen at four-year colleges and universities who return for their sophomore year, (i.e., 78%). This compares to the top states, Massachusetts with 83%, Washington with 82%, and Pennsylvania and Rhode Island with 81%. In 2006, the national average was 82% which earned Minnesota an A in this category.

Retention rates are low in many universities in the United States. In the last 20 years retention has become one of the topics that have kept university administrators busy. In all but the elite liberal arts colleges and research universities it has become an

obsession to prevent dropping out, which is at the highest level between freshman and sophomore years. (Barefoot, 2004). The United States colleges with the highest first-year retention rates are Princeton, Yale, Stanford, Massachusetts Institute of Technology, University of Pennsylvania, Columbia, and the University of Notre Dame with 98% freshmen retention rates. As a comparison, the retention rate of freshmen at the University of Minnesota is 86%, and at the university used in this study, it is 78% (USNews.com, 2007).

The retention of freshmen continues to be a major concern for many colleges and universities. In fact, research shows high attrition rates for first-year students (Bank, Biddle, & Slayings, 1990; Fidler, 1991; Tinto, 1993). Tinto (1987) found that approximately 75% of the students who leave college leave within the first two years and the majority of those students leave after the first year. Tinto further stated that 85% of the departures are voluntary and occur even though the student is making satisfactory academic progress. First year attrition continues to be a problem, and a number of strategies have been implemented by administrators and faculty to combat it (McGrath & Braunstein, 1997). As an example, Huesman, Brown, Lee, Kellogg, and Radcliffe (2008) found that at the University of Minnesota “first-term academic performance plays a critical role in the future academic success of all new freshmen students” (p. 20). It was further found that race or ethnicity tends not to play a major role after other demographic factors were controlled. Huesman et al. also reported that the “actual usage of campus recreational facilities does have a positive association with academic success” (p. 20).

The purpose of this study was to determine if the number of visits to the campus recreational facilities would predict the first-year retention rate of new entering freshmen (NEF) who enrolled in fall 2006. Additional purposes were to examine retention rates and number of visits to the campus recreational facilities by gender, ethnicity, fall 2006 place of residence, and if employed on campus fall 2006. Finally, the number of student visits to the campus recreational facilities, first-semester grade point average (GPA), first-semester credits earned, first-year GPA, and first-year credits earned were used to determine if differences existed between returning and nonreturning students.

### **Research Questions**

“An increasing number of state legislators are threatening to tie institutional funding to the percentage of students who graduate, which represents a potential blow to those public colleges and universities that enroll large numbers of at-risk students or experience high rates of transfer” (Barefoot, 2004, p. 10). “A second issue is the ‘matter of institutional reputation’. No college or university wants to be known for its high dropout rate” (p. 10). Students leaving before degree completion cost the institution thousands of dollars in unrealized tuition, fees, and alumni contributions (DeBerard, Spielmans, & Julka, 2004).

A recent survey of collegiate recreation providers showed that collegiate fitness centers are increasing in quantity and quality and that accommodating user demand is one of the biggest challenges facing administrators (Patton, 1999). In response to heightened student expectations and the need to stay competitive in recruiting students, colleges and universities have begun developing facilities that promote a variety of

recreational opportunities in addition to the traditionally available intramural activities.

Part of this expansion has included increased opportunities for participation in adventure and challenge experiences (e.g., rock climbing), individual fitness development (e.g., personal trainers), group-activity classes (e.g., spinning and tai chi) and family-based services (e.g., childcare and/or babysitting) (Reisberg, 2001).

Individuals trained in fitness evaluations, fitness planning, and personal training usually staff these centers. Some campus recreational centers also offer students access to electronic mechanisms to track their fitness progress as well as a myriad of other “bells and whistles” like massages, juice bars, and water slides (Reisberg).

With increased investment of resources, university administrators have become highly interested in both the economic and educational contributions campus recreational facilities make toward students’ higher education experiences. These relatively new accountability expectations range from head counts and usage patterns to academic benefits and retention rates (Belch, Gebel, & Maas, 2001). Several studies have also reported the positive impact from recreational programs on factors such as leadership and degree attainment (Astin, 1993), and students’ selection of and retention at an institution (Belch, et al.; Bryant, Banta, & Bradley, 1995).

This study explored the connection between use of campus recreational facilities and the retention rates and GPAs of a cohort of NEF. The data was from a comprehensive state university in the upper Midwest, tracking NEF from fall 2006 to fall 2007 and sought to answer the following questions:

1. Is there a difference in the number of visits to the campus recreational facilities during their freshman year based on gender, ethnicity, place of residence, and employment on campus of NEF who attend a comprehensive state university?
2. What is the relationship between the number of visits to the campus recreational facilities and GPAs and credits earned during their freshman year of NEF who attend a comprehensive state university?
3. Is there a difference in GPAs and credits earned based on gender, ethnicity, place of residence, and employment on campus of NEF who attend a comprehensive state university?
4. Is there a difference in retention rates based on gender, ethnicity, place of residence, employment on campus, and the number of campus recreational facilities visits of NEF who attend a comprehensive state university?
5. Can gender, ethnicity, place of residence, employment on campus, and the number of campus recreational facilities visits accurately predict the GPAs, total credits earned, and the retention rates in two succeeding semesters of NEF who attend a comprehensive state university?

### **Definitions**

#### **Access Cards**

Access cards are the student, faculty, or staff identification cards that are issued at the time of arrival on campus. They contain a photo of the student, faculty, or staff member and are used to allow entrance into the campus recreational facilities and athletic events, to check out materials from the library, etc.

**Campus Recreational Facilities**

The recreational facility is an on campus restricted-access building with basketball and volleyball courts, weight room, running or walking track, numerous cardiovascular machines (e.g., bicycles, rowing machines, treadmills, etc.), and swimming pool. The students may enter the building only by showing their access card.

**Comprehensive State University**

A comprehensive state university or post baccalaureate comprehensive state university is defined as an institution that awards master's degrees in the humanities, social sciences, and science, technology, engineering, and mathematics (STEM) fields, and degrees in one or more professional fields (Carnegie Foundation). The comprehensive state university in this study follows a semester-based academic calendar.

**Ethnicity**

Groups NEF based primarily on race or other traits of the students. For this paper the categories are African-American, American Indian, Asian-American, Caucasian, Hispanic, International, and unknown.

**New Entering Freshmen (NEF)**

The cohort of this study is the full-time students who enrolled at a comprehensive state university in the fall of 2006. These students have not attended another post-secondary institution, though many of them have post-secondary educational opportunity (PSEO) credits.

**Nonreturner**

A nonreturner is defined as a student who has not graduated and does not return for the next semester of study.

**Retention**

Retention is defined as a student who returns for the next semester of study.

**Semester**

At the comprehensive state university there are two academic terms of 15 weeks or 75 days and one week of final examinations. Throughout this dissertation fall 2006, spring 2007, and fall 2007 mean the fall or spring semester of the indicated academic year.

**Visit**

An access card must be scanned to enter the campus recreational facilities. The student may enter to attend a class, participate in intramural league play, exercise individually, or do nothing. Each entrance is considered a visit without taking into regard length of stay or type of activity. The date and time of each visit is recorded in a computer file. A student may visit the campus recreational facilities once or an unlimited number of times each semester.

## Chapter 2

### **Review of Literature**

The purpose of this study is to determine if the number of times a student visited the campus recreational facilities would predict the term-to-term retention rate of fall 2006 NEF. Additional purposes were to examine retention rates and the number of campus recreational facilities visits by various demographic characteristics, GPAs, and credits earned. This chapter reviews the literature regarding college student retention and recreation. The topics include history of recreational sports, perceived health benefits of exercise, benefits of recreational sport and exercise, reasons for not using the facilities, theories of engagement, related survey research, and technology available in recreational sports facilities.

### **History of Recreational Sports**

It is generally recognized that intramural sports in colleges and universities began with student-initiated or sponsored athletic contests in which students participated in their leisure time (Stewart, 1992). The contests occurred at a time when neither a well-developed intercollegiate program nor required physical education programs existed. At this time, most of the programs were not heavily attended or considered as important or essential. These contests were the only options for students looking for recreational sports on a college campus (Bourgeois et al., 1995).

In the late 19<sup>th</sup> century, a new emphasis on intramural sports began when fraternities and other campus organizations attempted to take control of the games. At that point, university administrators began to realize that supervision was needed for these programs. This supervision was finally realized in 1913, when both The Ohio

State University (OSU) and the University of Michigan appointed intramural directors to administer these programs (Stewart, 1992).

The first recreational sports facility was opened in 1928 at the University of Michigan and was designed strictly for men's participation in non-varsity club sports, intramural activities, and physical activity (Taylor, Canning, Brailsford, & Rokosz, 2003). For the next 30 years, universities used this model when designing their campus recreational facilities. Most of the funding of these facilities came from the general funds of the university and the athletic department (Taylor et al., 2003).

The 1960s and 1970s began a new era, when facilities were built closer to on campus housing and were designed for multipurpose functions in public institutions. Both men and women were participating in campus recreation, and modest student fees supported the construction, and in some cases, a portion of the construction debt (Taylor et al., 2003).

By the 1980s and 1990s, there was incredible growth in the number of recreational facilities being built. At this point, recreational sport facilities became architectural showcases on campuses (Taylor et al., 2003). "Banta (1991) indicated that recreational sports facilities and programs served as recruiting highlights, enhanced overall satisfaction with collegiate experiences, and made positive contributions to an institution's retention efforts" (Kovac & Beck, 1997, p. 10). Due to some of this research, projects ranging in price from \$60 to \$80 million were the norm, and some projects over \$100 million were being planned (Taylor et al., 2003). The purpose of these facilities includes providing a variety of leisure activities, which were selected on

the basis of their contribution to the development of the whole individual, physically, socially, intellectually, emotionally, and spiritually.

A building boom in recreational centers has been under way since the early 1990s, according to the National Intramural-Recreational Sports Association (NIRSA). The college trade group's 725 member institutions have 1,546 recreational centers, nearly half built since 1995, including 25% built since 2000. NIRSA data showed that by 2002 approximately 75% of students participated in some aspect of campus recreation (informal recreation, intramurals, sports clubs, outdoor recreation, etc.) (M. Callender, personal communication, September 29, 2008).

Participation in recreational activities should teach the individual the wise use of leisure time. Enjoyable leisure activities, when properly conducted, help develop wholesome mental hygiene by providing a diversion or relaxation from work and study. The participation in such leisure activities can fulfill some of the individual's personal needs of self-expression, self-reliance, self-esteem, recognition, and the need for belonging (Mueller & Reznik, 1979). Recreational sport facilities have become a social gathering point on campus. Areas designed for sitting, conversing, watching big screen televisions, using computers, and recreating passively are very popular (Taylor et al., 2003).

A list of reasons for the increase in the number of recreational facilities being built includes the increased quantity and quality of intercollegiate sports competition. This has occurred because the students could no longer share facilities with the athletes who use them year-round. A second reason is the large increase in the number of women in athletics, exercise, aerobics, and recreational games, which was stimulated by

the passage of Title IX in 1972. A third reason was the growth of student interest in sports and fitness. This was largely caused by the more recent medical research showing how exercise affects heart disease, diabetes and obesity (Miller et al., 2002). This made exercise a large part of both students and faculty everyday lives. The fourth reason was students demanding facilities for individual or small pick-up team recreation at nearly all hours of the day (Body, 1996)

### **Perceived Health Benefits of Exercise**

One of the most basic benefits recreational participation affords the student is momentary relief or escape from the need to attend to daily affairs. Even more beneficial, are those recreational engagements which offer college students an opportunity to develop and enhance their physical, mental, or emotional capacity (Collins et al., 1997). Physical fitness has also been shown to be a great stress reducer, because exercise reduces both physiological stress and self-perceived psychological stress. Aerobically fit subjects have shown reduced physiologic stress when compared to an unfit control group (Crews & Landers, 1987).

Fenzel (2001) conducted a study at a parochial liberal arts university on the East Coast found that many of the activities that lead to healthy lifestyles also have a positive effect on retention rates. This study was done using the Student Development Survey, which included many scales (e.g., social and academic problems resulting from respondents' alcohol use) and items (e.g., frequency of binge drinking and marijuana use and amount of alcohol consumed during a typical weekend drinking episode).

Results have been reported in national college student drinking studies conducted by the Harvard Graduate School of Public Health (Wechsler, Davenport,

Dowdall, Moeykens, & Castillo, 1994) and others. In addition, students completed several demographic items and scales of attitudes and behaviors that included daily hassles, self-worth, commitment to social justice, independence from parents, and symptoms of anxiety (Fenzel, 2001). Students were also asked to name up to six different co-curricular activities in which they had participated during the first six weeks of school. Participators (n=114) were defined as those who visited the recreational facilities and nonparticipators (n=95) were defined as those who did not visit the recreational facilities.

Results showed that becoming involved in co-curricular activities provided many benefits, even in the first six weeks of college. The results also indicated that early involvement led to better class attendance. High levels of class attendance are likely to contribute to student classroom success and higher levels of academic self-efficacy. The study also showed that estimated GPA for nonparticipators was 3.03 and for the participators it was 3.21. The study additionally, showed that binge drinking frequency, typical amount of alcohol consumed, and problems due to alcohol were also less in the participator category (Fenzel, 2001).

The results from the 1995 National College Health Risk Behavior Survey were obtained from 148 institutions that were selected on the basis of the relative percentage of black, non-Hispanic students, and Hispanic students at the institutions. This survey suggested that despite the known benefits of lifetime physical activity, only (36.7%) of the students reported they had participated in vigorous physical activity on three or more of the seven days preceding the survey (Douglas et al., 1997). Vigorous physical activity is defined as causing heavy sweating, breathing or heart rate, three or more

times a week, for at least 20 minutes each time (U.S. Department of Health and Human Services, 2000). Participation in vigorous physical activity was significantly higher among male students than among female students, and for students aged 18 to 24 than for older students. Participation in vigorous physical activity did not vary by race, ethnicity, or institutional type.

According to the 1995 National College Health Risk Behavior Survey, 38.7% of Whites participated in vigorous activity, 36.6% of Blacks, and 35.4% of Hispanics. Black students, however, engaged in moderate physical activity significantly more often than did white students. Moderate physical activity is defined as activities that use large muscle groups and is at least equivalent to brisk walking (U.S. Department of Health and Human Services, 2000). Moderate physical activity did not vary by gender, age group, or institutional type. Results for moderate intensity exercise showed that 27.6% of Blacks participated, versus 21.4% of Hispanics, and 18.2% of Whites (Douglas et al., 1997).

Although vigorous physical activity is recommended for improved cardio-respiratory fitness, increasing evidence suggests that moderate physical activity also can have significant health benefits, including a decreased risk of coronary heart disease (CHD). For people who are inactive, even small increases in physical activity are more readily maintained than vigorous physical activity. As research continues to illustrate the links between physical activity and selected health outcomes, people will be able to choose physical activity patterns optimally suited to individual preferences, health risks, and physiologic benefits (U.S. Department of Health and Human Services, 2000).

## **Benefits of Recreational Activities and Exercise**

This section examines some of the benefits that recreational activities and exercise have on the well-being of participants. It focuses on gender differences, ethnic differences, effect on GPA, and other effects of campus recreational facilities.

### *Gender Differences in the Benefits of Exercise and Competitive Sports*

Kanters and Forester (1997) studied participants in a university intramural volleyball program. The participants were randomly selected and asked to complete a questionnaire designed to assess their motivation for participation in leisure activities and their self-esteem. The subjects were participants in three intramural volleyball leagues: highly competitive, low competitive, and recreational. Leisure motivation was assessed using the Leisure Motivation Scale.

An analysis of the leisure motivation score comparing gender and level of play displayed no significant differences for each main effect and the interaction of gender and level of play (Kanters & Forester, 1997). Males and females did not differ in their need for intellectual competency-mastery and social opportunities in recreation. Females did report a greater need than males for opportunities to escape or get away from stressful life situations. Males and females did not differ in their motives for participation. Given these results, sports administrators could expand mixed (co-ed) sport opportunities. This expansion would also facilitate participants need for social affiliations. This would also allow for greater opportunities for social interactions than single gender teams.

In contrast, Iso-Ahola and Allen (1982) reported that males and females differed significantly in their reported motivation for participation. Males expected the needs

addressed above to be met through competitive play. Females were more likely to receive the needs addressed above through recreational leagues (Kanters & Forester, 1997). Sports have long been praised for their contribution to personal health, enjoyment, social growth, and harmony (Kanters & Forester). This finding contradicted studies that have shown that females seem less oriented than males toward competing and winning in terms of interpersonal comparisons (Gil, Gross, & Huddleston, 1983). Wankel and Berger (1990) argued that sport, like any activity, is neither good nor bad but has the potential for producing both positive and negative consequences.

Although involvement in sport appears to have a positive effect on the participant's psychological well-being, physical health, and self-esteem, irrespective of gender, there are gender differences with regard to motivational orientation and perceived purposes of sport (Unger & Johnson, 1995, as cited in Turman, 2000; White, 1995, as cited in Turman, 2000). Gender differences are also evident in motivational orientations for exercise adherence with females showing more intrinsic motivation and males being more extrinsically motivated (Wankel & Berger, 1990).

Kovac and Beck (1997) used the Quality and Importance of Recreational Services survey (QIRS) to collect data at a medium-sized category 1 comprehensive research institution in the Pacific Northwest. It was administered to 246 students in laboratory sections of a core course that was considered representative of the undergraduate student population. The Kovac and Beck study "showed that females were generally more satisfied with their recreational experiences than their male counterparts. Females participate for a variety of reasons and view participation as providing individual as well as social benefits, whereas males tended to cluster around

benefits related to self” (Kovac & Beck, 1997, p.11). Females were also less likely to participate in activities they considered too competitive. Females instead choose to participate in recreational activities associated with social groups and family. Female recreational sports participation is characterized by involvement in structured group activities, which stress the social benefits of inclusion rather than a competitive environment.

#### *Ethnic Differences in the Benefits of Exercise and Competitive Sports*

Another study done on six college campuses examined the impact of campus recreational programs using the Quality and Importance of Recreational Services (QIRS). Developed for NIRSA by the Center for Assessment Research and Development, this questionnaire was designed to measure student perceptions of the importance of recreational sports, activities, and services. This questionnaire was administered to 2,000 students, of which 10% were identified as minority and divided into three groups (i.e., African-American, Asian, and other ethnic minorities) (Bradley, Phillipi, & Bryant, 1992). The study examined minority student responses and participation in recreational sports programs.

Minority students’ responses to the importance of campus recreational facilities and programs for their decision to attend and continue at their chosen institution suggested minority students were more likely than Caucasian students to consider recreational facilities and programs to be very important factors (Bradley et al., 1992). African-American students perceived 23% more benefit from participation in recreation programs than Caucasian students. African-Americans perceived 38% more opportunities for interaction with faculty during recreational participation than

expected, and minority students in general perceived more opportunities for interaction with campus administrators. Minority students perceived the greatest benefits from participating in the following areas: a feeling of physical well-being, stress reduction, respect for others, friendships, and self-confidence (Bradley et al., 1992).

Bryant et al. (1995) also found that African-American and Asian-American students perceived the greatest benefits from participating in recreation to be: self-confidence, sense of coordination, respect for others, friendships, problem-solving skills, and balance. Some other areas also received consistently higher ratings from minority students: stress management, time management skills, belonging/association, and physical well-being. This is an important finding if these results are combined with Astin's (1977) and Pascarella's (1980) studies which found that social interaction between faculty and students outside the classroom is a major factor in student retention.

Pascarella and Terenzini (2005) suggested that student contact with faculty members outside of the classroom appears consistently to promote student persistence, educational aspirations, and degree completion, even when other factors are taken into account. They also suggested that students' perceptions of faculty members' availability and interest may be enough to promote persistence (Pascarella & Terenzini, 2005). Recreational opportunities and involvement appear to assist in developing a positive self-concept and thus promote the integration process. As part of this survey, students were also asked if participating in recreational activities encouraged interaction with various campus segments; 15% indicated an increase in opportunities to interact (Bryant et al., 1995).

Minority students tended to associate benefits from participation in recreational sports with social and community-building benefits. They therefore participated in activities they consider too competitive less frequently than their Caucasian counterparts. Minority students also tended to define recreation in a broader sense, citing cultural and social reasons for participation and perceived benefits.

#### *Recreation and Effects on GPA*

Several studies have shown the effects of campus recreational facilities on retention rates. Churchill and Iwai (1981) found that students with low GPAs who persisted at a major western university were more likely to use campus facilities and services than students with low GPAs who dropped-out. It was further found that dropouts had a significantly lower mean use of facilities than all other groups. The study used questionnaires to collect information from dropouts (n=605) and persisters (n=1,231) who were enrolled at Arizona State University (ASU).

The withdrawers were undergraduate students who had enrolled at ASU during the first semester of 1975-1976 but did not return for a second semester. The groups were divided as follows: dropouts, defined as being dismissed for insufficient grades; low stopouts, defined as students who left voluntary but with a GPA below the midpoint between 4.0 and the lowest GPA required to stay in school; and high stopouts defined as students who left school voluntarily but with a GPA equal or greater than the cutoff points designated for each consecutive school year (Churchill & Iwai, 1981).

The low persisters, defined as students who stayed enrolled but with a GPA below the midpoint between 4.0 and the lowest GPA required to stay in school, used significantly more facilities than the low stopouts. However, the differences in service

use between the high stopouts and high persisters, defined as students who stayed in school with a GPA equal or greater than the cutoff points designated for each consecutive school year, between the low persisters and high persisters, and between the low stopouts and the high stopouts were not statistically significant (Churchill & Iwai, 1981). The results of this study suggested that at least for students with low GPAs, the use of campus facilities is correlated with continuance in school.

The group of students making the least use of the available facilities was the dropout group. The low stopouts, in turn, made significantly greater use of the facilities than dropouts, but less than comparable low persisters. This can be interpreted in two ways: 1) that the use of campus facilities promotes persistence in school, or 2) that persisters for some reason just use more services than students who leave school (Churchill & Iwai, 1981).

#### *Other Effects of Recreational Facilities*

A 1996 poll conducted at The Ohio State University (OSU) showed that 88.6% of undergraduates indicated that recreational sports and fitness activities were important to them (Haines, 2000). According to Haines, a feeling of physical well-being, sense of accomplishment, fitness, physical strength, and stress reduction were all benefits from participation in university recreational programs. Using the QIRS, Haines found that OSU students who participated in the campus recreational program gained competence and mastery of leadership skills, worked cooperatively in a group, were able to solve problems, achieved holistic wellness, enhanced their perceptions of diversity, and shaped their views that sports and fitness were extremely important to them after graduation.

Belch et al. (2001) examined the relationship of participation at the Student Recreation Complex (SRC) on persistence rates of freshmen at a large public university in the southwest. The results revealed that freshmen (n=11,076) who used the SRC persisted at a greater rate after one semester and after one year than their counterparts who did not use the SRC. Persistence rates for SRC users for one semester (92%) and one year (71%) clearly outpaced that of their nonuser counterparts (86% and 64% respectively). SRC users persisted at a greater rate, they earned slightly higher GPAs and also earned more credit hours at the end of the first year (Belch et al., 2001). Simple *t*-tests indicated that freshmen SRC users differed at statistically significant levels from their nonuser counterparts on first-semester GPA and cumulative earned hours at the end of the first year. Further, statistically significant differences were found on first-year cumulative GPAs comparing ethnic minority freshmen SRC visitors and nonvisitors particularly among American Indian and Hispanic freshmen visitors and nonvisitors (Belch et al., 2001).

Recreational sports programs, particularly intramural sports, provide a powerful medium for student interaction. This interaction may provide freshmen with the opportunity to informally develop support groups, find study partners, and seek advice from other students regarding the best classes or faculty. Faculty and staff are also a highly visible part of the membership of recreational sports facilities, which may provide ample opportunity for informal interaction with students. A recreational facility with diverse programmatic offerings based on student, faculty, and staff needs can serve as a dynamic community, and in so doing, establishes an expectation of engagement and belonging by students. This activity is symbolic of the individual student's ability to

connect to others in the environment and to the university community itself (Belch et al., 2001).

Research examining the levels of self-esteem in college students has shown that personal fitness is among the most prevalent factors found to influence the self-esteem of students (Griffore, Kallen, Popovich, & Powell, 1990). Studies indicate that students' emotional health and psychological well-being are positively correlated with the number of hours students spend participating in sports or exercise (Astin, 1993; Ragheb & McKinney, 1992). This is particularly important because the most notable declines observed during the college years are in the student's sense of psychological well-being (Astin, 1993). Additionally, depression in college students is negatively correlated with hours spent in sports or exercise and participation in intramural sports (Astin, 1993). Students' feelings of being overwhelmed also appear to be negatively correlated with hours spent in sports or exercise (Astin, 1993).

Frauman (2005) in a study at a southeastern university in the spring of 2001 found that involvement in campus recreation is not the only indicator of satisfaction with the overall college experience and questions associated with expectations and quality of campus life. It may be that other student services or academic-related activities (e.g., student clubs and organizations) influence overall college experience satisfaction. It could also be a combination of other types of extracurricular activity involvement which were outside the scope of his study.

### **Reasons for Not Using the Facilities**

With all the positive results that occur with being active, the literature does state some reasons for not being active. Among the most common reasons that were given

for nonparticipation were: lack of time due to coursework, unaware of what programs are offered, and programs offered at a bad time. Of these, the most common answer was lack of time due to coursework, which was stated by 82% of all respondents (Kovac & Beck, 1997).

Another study completed at the University of Oregon (n=150) examined participation barriers to the student population in recreational and intramural sports programs (Lankford, Rice, Chai, & Hisaka, 1993). The authors hypothesized that some of the reasons that would be listed would be related to actual services offered, poor marketing, poor instruction, or poor facilities. The authors found that the lack of time was the biggest barrier to participating, with lack of information as the next most prominent barrier. Child care and transportation also were barriers, especially for off campus students who seem to be having problems with time, information access, parking, and transportation. The general student body identified lack of time (25.0%), lack of information (18.0%), and time of programs as barriers (14.1%). Finally, females identified lack of time (33.4%), lack of information (23.0%), child care (9.0%), and transportation (7.0%) as issues more frequently than males (Lankford et al., 1993).

Another study using undergraduate students recruited from introductory psychology courses at a midwestern state university (n=398) studied the psychometric properties and relationship to physical activity levels of the Exercise Benefits/Barriers Scale (EBBS) among college students (Brown, 2005). Although rarely utilized, the EBBS is a standardized measure of perceived benefits and perceived barriers for physical activity (Brown). Despite research citing support that perceived benefits and perceived barriers account for variance in physical activity levels, the measurement of

these variables is not frequently standardized. That is, for each study, an untested customized measure of perceived benefits or perceived barriers is usually formulated. This practice raises serious concerns about the accuracy, reliability, and validity measurements of barriers and benefits.

Perceived barriers included insufficient time, lack of motivation, child care responsibilities, and lack of interest (Brown, 2005). One benefit was the opportunity for competition. Aside from age, it is important to note that in these studies significant differences between the sexes also emerged. The participants were measured in seven areas: physical performance, feel better, task improvement, fatigue, pleasurable activity, facility obstacles, and preventive health. Among the seven factors, differences between men and women were found for fatigue and pleasurable activity. Consistent with the hypothesis, greater endorsement of perceived benefits was associated with higher levels of physical activity. However, contrary to the hypothesis, the barriers scale was not significantly correlated with levels of physical activity (Brown, 2005). Specifically, given these differences, standardized instruments measuring barriers and benefits should be developed for a target population and their life stage (Brown, 2005).

College students have two advantages that should facilitate physical activity: 1) high potential to engage in vigorous physical activity, and 2) access and proximity to fitness facilities. Given the age of the traditional college student (18-24), these individuals have low rates of chronic disease. Therefore, compared to a general adult sample, a larger proportion of these individuals possess the ability to engage in vigorous exercise. In addition to the increased potential to engage in vigorous physical activity, college students have access to excellent fitness facilities and equipment, which is

usually included in their tuition or student fees. This distinction is important because recent and emerging research indicates that restricted access and low proximity to fitness facilities are associated with lower levels of physical activity (Brown, 2005).

One possible explanation for why people have difficulty initiating and maintaining a program of regular physical activity despite the inherent long-term advantages is that there are short-term costs associated with regular physical activity that loom larger than the long-term benefits when people make decisions about the behavior. Engaging in physical activity can be inconvenient, uncomfortable, and even embarrassing, especially for beginning exercisers (Hall & Fong, 2003). For example, those beginning exercisers who attempt fitness classes for the first time may be especially likely to feel self-conscious of their physical appearance, and are likely to experience pain and discomfort as a consequence of their initial efforts (Hall & Fong, 2003).

### **Theories of Engagement**

There are three theories which are particularly relevant to the topic of recreational sports and their influence on retention rates. The first is Tinto's Theory of Student Departure, the second is Astin's Theory of Involvement, and the third is Chickering's Seven Vectors of Student Development.

#### *Tinto's Theory of Student Departure*

Tinto has conducted in-depth analysis of the factors that are involved in choosing a college, persisting, or dropping-out. Tinto (1975) formulated a theoretical model that explains the processes of interaction between the individual and the institution that lead differing individuals to drop-out from institutions of higher

education, and that differentiates among those processes that result in different forms of dropout behavior (Hall, 2004).

Tinto (1975) identified the background issues that lead to a student's departure from an institution or program. Key among them was the student's level of academic and social integration into the institution of higher education. Additional issues that can impact the student attrition rate include parents' educational level, socioeconomic status of the family, race, the institution's distance from home, and organizational factors of the institution (Bean & Metzner, 1985). Tinto's (1993) model of student attrition suggested that institutional commitment may play an important role in student success. It appears that a combination of academic ability and personal characteristics may contribute to premature withdrawal from college (Daugherty & Lane, 1999).

Tinto (1975) distinguished between social and academic domains of the college, suggesting that students can be integrated in one area but not in the other. This theoretical model allowed other researchers and stakeholders in higher education to examine the importance of a student's integration into the social system of the university, not just the academic system of the university. Therefore, orientation programs, recruiting strategies, and retention programs now focus on a student's life outside of the classroom.

Pascarella and Terenzini (1977) conducted a study to assess the validity of Tinto's (1975) model of student attrition. In their study, they identified "social interaction" and "extracurricular activities" as critical pieces explaining students' perceptions and how they became socially integrated into the university. These "social interactions" or "extracurricular activities" included cultural events, exercise,

participation in recreation or intramurals, and informal social interaction with faculty outside the classroom (Hall, 2004).

Tinto (1975) theorized that students enter a college or university with a variety of patterns of personal, family, and academic characteristics and skills, including initial dispositions and intentions with respect to college attendance and personal goals. These intentions and commitments are subsequently modified and reformulated on a continuing basis through a longitudinal series of interactions between the individual and the structures and members of the academic and social systems of the institution (Pascarella & Terenzini, 2005). Rewarding encounters with the formal and informal academic and social systems of the institution presumably lead to greater student integration in these systems and thus to persistence (Pascarella & Terenzini, 2005).

Tinto's (1975) theory suggested students arrive at college with certain expectations and aspirations. The integration or lack thereof, into the college environment, affected students' outcomes. The influence of institutional variables, such as faculty-student interaction, peer group interaction, and extracurricular involvement, helped shape the students' progression through college (Metz, 2002).

Tinto's theory on retention is a three-stage process which results in varying degrees of academic and social integration, which determine whether or not students remain in college. Tinto's theory has been the subject of much revision and various debates that revolve around which element, social integration or academic integration, is more important for what types of students (Braxton, 2000), or whether today's students should be expected to achieve Tinto's three stages of a successful higher education career (i.e., separation, transition, and incorporation) (Barefoot, 2004).

The first area is the separation stage, in which the student is removed from their pre-college community. Separation can be quite difficult or merely an accepted part of the process of movement that most people are expected to make during their lives (Tinto, 1988). The separation process is somewhat stressful and may be at least temporarily disorienting. For some, it may actually constrain their college persistence, especially for those who for the first time, move away from their local high-school communities and families to live at a distant college or whose colleges are markedly different in social and intellectual orientation (Tinto, 1988). First-generation college students also reported that they received less support from their parents than did other college students (Elkins, Braxton, & James, 2000). According to Tinto (1988), students need to become leavers from their former communities in order to be successful at college, which may not apply to students who stay at home while attending college and creates other difficulties. They are unable to take full advantage of those communities for integration into the social and intellectual life of the college, which creates a situation in which the initial persistence may be easier and then become more difficult later (Tinto, 1988).

Tierney (1992) argued that it is both unrealistic and unreasonable to expect many of today's students to separate from their culture and families of origin in order to achieve incorporation into, or conformity with, college norms and expectations. But, despite its perceived flaws, Tinto's model has, through the years, encouraged educators to acknowledge the academic and social dimensions of success in higher education and the complexity of the retention problem (Barefoot, 2004).

The second area is the transition in which the individual interacts in new ways with members of the new environment. Milem and Berger (1997) claimed that students begin to engage in a variety of behaviors that represent different forms and types of involvement. The students at this time are neither bound strongly to the past, nor firmly tied to the future. The stress and sense of bewilderment can pose serious problems for the student attempting to persist (Tinto, 1988). Many withdraw very early in the academic year, and it is often not so much from an inability to become integrated in the social and academic communities as from an inability to withstand and cope with stresses that such transitions often include (Tinto, 1988). The fact is that some students will be unwilling to cope with the stresses because they are not sufficiently committed either to the goals of education or to the institution into which entry is made (Tinto, 1988).

Although this is a stressful time, it does not have to lead to leaving the institution. Because the students who will have the easiest time with the transition are the ones whose life experiences have best prepared them for college, persons with a minority backgrounds, poor students, older adults, and persons from very small rural areas are likely to have the most problems adjusting (Tinto, 1988), as well as for those living at home during college. They seek to avoid the pains of separation, and they actually fail to adjust to the new demands of college and fail to become involved in its ongoing intellectual and social life. As a result they may spend less time on campus which limits the interaction with other members of the campus community and leads to dropping-out (Tinto, 1988).

The transition phase also includes differences based on race. Liu and Liu (1999) reported that students of color have a more difficult time mainstreaming themselves into college culture. This often causes them to become alienated and unable to participate in the intellectual and social aspects of college. Asian-Americans have many of the same isolation issues that other students of color face.

The third area is incorporation, which involves becoming a member of this new community by adopting the ideals and behavior of the existing members of this particular society of higher education (Liu & Liu, 1999). This is based primarily on the degree to which students believe they are a part of the academic and social systems of the college or university (Milem & Berger, 1997). According to Tinto (1975), incorporation can be achieved through involvement in various activities on campus, student union activities, contact with faculty, intramural sports, and a variety of other activities (Milem & Berger, 1997). Not all students are able to make these contacts on their own. As a result, they do not become as well incorporated into the community of the college. Some individuals, after having established contact with other members of the campus community find that the social and intellectual communities of the college are not to their liking, which leads them to dropout (Tinto, 1988). Milem and Berger (1997), suggested that the incorporation of students, or lack thereof, into the college environment results from a series of interactions between their behaviors and perceptions.

Tinto's (1975) theory describes family background, personal disposition, and schooling interacting with one another to produce goal and institutional commitment. Tinto noted that goal commitment had a direct influence on academic performance

while intellectual development had an influence on academic integration. Tinto (1993) also supported the critical role of student involvement in positive educational outcomes for college students (Milem & Berger, 1997). Student involvement with the campus environment leads to perceptions of institutional and peer support. These perceptions affect the levels of subsequent involvement in the campus environments. These involvement behaviors affect subsequent levels of institutional commitment, which in turn affect student's departure decisions (Milem & Berger, 1997).

Tinto (1993) also suggested that social adjustment may be a more critical factor in the early part of a student's college experience (Woosley, 2003). Tinto's interactionist theory views retention as a function of the match between the student's academic capabilities and motivation and the institution's academic capabilities and motivation, and the institution's academic and social characteristics. That is to say, all things being equal, the fit between the individual's and the institution's characteristics strongly influence the student's goal commitment and institutional commitment (Berger & Braxton, 1998).

#### *Astin's Theory of Involvement*

Astin (1985) argued that the key to effective learning is student involvement. Students expand their educational experiences by studying with peers, interacting with faculty and peers outside the classroom, belonging to student organizations, and being on campus as much as possible. Astin challenged universities to create extracurricular opportunities for commuter students, creatively use campus residential facilities, expand Employment on Campus opportunities, and be more inclusive with orientation programs. Astin (1977) urged universities to encourage students to remain on campus

by developing and building recreational facilities, expanding cultural events and programs, and building more residence halls (Hall, 2004).

Astin (1985) also noted that the single most powerful source of influence on the undergraduate students' academic and personal development is their peer group. In particular, it was found that the amount of interaction among peers has far-reaching effects on nearly all areas of student learning and development. Astin noted that the measure of student-to-student interaction included items such as discussing course content with other students, tutoring other students, participating in intramural sports, being a member of a social fraternity or sorority, and hours per week spent in socializing or participating in student clubs or organizations.

Peer group involvement had a positive effect on leadership development, overall academic development, self-reported growth in problem-solving skills, critical-thinking skills, and cultural awareness. Peer group involvement also has a positive correlation with all satisfaction outcomes. Peer group involvement had negative effects on feeling depressed and on the beliefs that the individual cannot change society, and that the principal value of a college education is to increase one's earning power (Astin, 1993).

Astin (1985) also focused on establishing a foundation for future studies of variables affecting persistence in college. Astin suggested certain variables influence student persistence, notably various forms of financial aid, when packaged in a combination of loans, grants, scholarships and work-study awards, were not as effective a determiner of persistence as providing one single source of financial aid award, specifically work-study funds. A reliance on loans tended to influence persistence negatively for males, while scholarships and grants had little, if any, influence on

persistence. Astin suggested students become involved in college because the level and intensity of their involvement in the institutional environment affected students and their potential and willingness to persist.

Astin's (1993) work clearly established the relationship between participation in intramural sports and exercise with satisfaction and degree attainment. Physical health, alcohol consumption, degree attainment, satisfaction with college life, and leadership are positively affected by participation in intramural sports programs (Astin, 1993). Astin (1975) identified six factors in the college environment that significantly affect persistence in college. Astin's theory fits best in tying recreational sports and exercise to the area of effects of interactions with student peers.

*Place of residence.* Astin's (1993) findings have been consistent and show that living on campus was positively associated with satisfaction with college experience and retention. This pattern was the same regardless of sex, race, academic ability, or family background. Unlike commuter students, residential students exhibited greater involvement and attachment to undergraduate life. More important is the effect which living off campus has on peer influences and on integration into the college environment. Students who live on campus are predominantly exposed to other college students, are structurally integrated into college, and are relatively isolated from external influences. Those living at home with parents or in other off campus living arrangements are more likely to be exposed to nonstudents whose attitudes toward college are not favorable and are exposed to fewer integrating influences (Chickering, 1974).

*Effects of academic pursuits.* Students who were heavily involved in academics were less likely than average students to show changes in personality and behavior that normally result from college attendance. However, grades were virtually unrelated to extracurricular satisfactions. These findings supported the general conclusion that payoffs in the form of grades have an impact on one's evaluations of the academic side of college life but probably not on other aspects (Knox, Lindsay, & Kolb, 1992). College grades have more significant effects than other educational experience factors. It would be shocking if college grades were unrelated to academic satisfaction. They are highly positively associated with level of academic satisfaction. The higher one's college grades, the lower the odds of finding the courses harder than expected and the greater the odds of reporting that courses were interesting, that one performed well, that one learned a lot, and that one met interesting people (Knox et al., 1992).

*Effects of employment.* Astin (1975, 1993) reported that a student's chances of graduating from college were significantly influenced by the type and extent of involvement in employment. Full-time employment had negative outcomes, as did holding a job off campus. Holding a job on campus was positively associated with attainment of a bachelor's degree. As compared with students who worked off campus, students who were employed on campus had the possibility of more frequent contact with other students, faculty, and staff as well as a greater degree of immersion in the college environment.

*Effects of financial aid.* Astin (1975) supported the argument that student retention was enhanced by scholarships and work-study programs. Grants were associated with a small increase in persistence rates. The amount of grant support

appeared to be a factor in student persistence among African-American students. Participation in federal work-study programs was reported as enhancing student persistence among African-American and non-African-American women students. In general, any form of aid appeared to be most effective when it was not combined with other kinds of assistance. This was particularly true of work-study programs that tended to lose their beneficial impact when combined with grants or loans. The more rewarding student life is perceived to be, the greater, generally speaking, will be the person's willingness to withstand even great financial hardship.

*Effects of interactions with student peers.* This includes items such as discussion of class content with other students, working on class projects, tutoring other students, and participating in intramural sports, student clubs, organizations, and social fraternities and sororities. Positive benefits and overall college satisfaction were associated with frequent student interactions (Astin, 1975).

*Effects of counseling.* Career counseling was associated with self-reported student growth and high satisfaction. It was also positively associated with several behavioral outcomes such as being elected to student office and tutoring other students. In contrast, receiving psychological counseling was not associated with satisfaction.

Astin (1979) proposed that the quality or intensity of a student's college experience can be measured in terms of a "continuum of involvement". This involvement is defined as the time and effort expended by the student in college-related activities. Students at the low end of the continuum are those who "live off campus, who come only to attend classes, who devote minimum effort to their academic

activities, and whose lives are concerned primarily with persons and events outside the institution”(p. 21).

Berger and Milem (1999) conducted a study at a highly selective, private, residential research university in the southeast. Data were collected at three different times from first-time freshmen who entered in fall 1995. All first-time freshmen students (n=1,547) were administered the Student Information Form (SIF) at the end of freshman orientation. The Early Collegiate Experiences Survey (ECES) was administered in October 1995 to freshmen living in the residence halls. ECES was developed as an early assessment of student behaviors and perceptions concerning a wide range of issues directly and indirectly related to the process of college student persistence. A total of 1,237 questionnaires were returned (Berger & Milem, 1999). “A third questionnaire, the Freshman Year Survey (FYS), was administered in March 1996 in the same manner as the ECES. A total of 1,061 questionnaires were returned” (p. 645). Data from all three questionnaires were matched by social security number and merged into one data set. The result was a longitudinally constructed panel consisting of 718 individuals for whom data was collected at all three points (Berger & Milem, 1999). The results showed that early fall involvement was positively related to spring involvement and had significant indirect effects on social integration, academic integration, subsequent institutional commitment, and persistence. All three early involvement measures also had significant total effects on persistence (Berger & Milem, 1999). “Early peer involvement appeared to strengthen perceptions of institutional and social support and ultimately persistence” (Berger & Milem, 1999, p. 658). Compare this with the noninvolved students and the results showed that “they were less likely to

perceive the institution or their peers as supportive, less likely to become integrated, and as a result, less likely to persist” (Berger & Milem, 1999, p. 658). These results were similar to Tinto’s findings implying that the earlier students get involved the more likely they are to be retained. “These findings suggested that previous research on first-year retention has underestimated the role that involvement (or lack of involvement) plays in student persistence” (Berger & Milem, 1999, p. 659).

The findings from this study suggested that the students who are most likely to persist are those who have values, norms, and established patterns of behavior that are congruent with the dominant values, norms and established patterns of behavior that are already in existence on campus (Berger & Milem, 1999). For example, students who were least like the dominant peer group on campus, particularly with regard to race and political attitudes, were least likely to persist. Additionally, students with better high school GPAs and higher family incomes were more likely to be involved with peers, become socially integrated, and develop higher levels of subsequent institutional commitment (Berger & Milem, 1999).

#### *Chickering’s Seven Vectors of Student Development*

Chickering recognized the absence of any systematic framework for integrating or synthesizing the abundant empirical evidence on college students and based on his review of literature identified seven vectors of student development: 1) developing competence, 2) managing emotions, 3) moving through autonomy toward interdependence, 4) developing mature interpersonal relationships, 5) establishing identity, 6) developing purpose, and 7) developing integrity. (Chickering and Reisser, 1993)

A considerable body of research points to the influence of involvement, or student engagement in educationally purposeful activities, on student learning (Astin, 1993; Pascarella & Terenzini, 1991). Research on the importance of integrating diverse curricular experiences is less prevalent. Studies by Davis and Murrell (1993) and Pike (1995) provided indirect evidence of the importance of integration. These researchers found evidence of strong reciprocal relationships among different types of college experiences. Three recent studies using variations of Chickering's model suggested that involvement and integration constructs help to represent accurately the relationships among students' college experiences and learning outcomes (Pike, 1999, 2000; Pike & Killian, 2001).

Although it is reasonable to expect that perceptions of the college environment are related to involvement measures, it is not obvious that positive perceptions of the environment will contribute to greater integration of academic and social experiences. In fact, Chickering (1974) noted that it is the level of student effort, or involvement, which is the most influential factor in integration, not the college environment (Pike, Kuh, & Gonyea, 2003). Pike and Killian (2001) showed that integration is not directly related to perceptions of the college environment. Hence, the conceptual model does not hold that the college-environment construct will be related to integration (Pike et al.).

Chickering (1969) "has developed a model that recreational sports administrators can use to study and reflect on the issue of how a student's psychosocial development can be influenced by active involvement in a recreational sports program" (Todaro, 1993, p. 23). Chickering used existing empirical evidence to create the theoretical model that integrated the Seven Vectors of Student Development.

Chickering hypothesized “that the experiences to which a college student is exposed have the potential to have a substantial impact on that student’s overall development” (Todaro, 1993, p.23). Because many students claim that participating in a recreational sports program and recreational sports facilities is one of the reasons that they choose a certain institution such programs have the opportunity to influence the psychosocial development of students (Todaro, 1993).

*Developing Competence.* Chickering’s (1969) model described competence as the student begins to develop self-confidence and self-esteem. This is also when the student starts to trust their abilities and when success and failure have been experienced. (Todaro, 1993). Chickering stated that competence had three aspects intellectual, physical, and interpersonal competence. Recreational sports can help with this through participation and the positive effect it has on self-esteem. Recreational sports also has an impact on the participants’ interpersonal competence (Todaro, 1993).

*Managing Emotions.* Chickering’s (1969) model discussed managing emotions as the student’s ability to exert “emotional control that is appropriate for what the individual is becoming” (Todaro, 1993, p. 24). Chickering stated that recreational sports can influence this component by allowing the student who participates an “outlet for expressing aggression and emotions in an acceptable manner” (Todaro, 1993, p. 24).

*Moving through Autonomy toward Interdependence.* Chickering discussed autonomy as beginning to occur when a student no longer needs continuous reassurance, affection, or approval of others. It is further stated that the student begins to reach this level once the student can perform tasks and cope with problems without assistance from others. The intramural sports role in development of autonomy “is that

participation in team sports can help facilitate the process of a student disengaging from his or her parents. Participation in team sports can improve the ability of a student to effectively engage in group decision-making and problem-solving”(Todaro, 1993, p. 24).

*Developing Mature Interpersonal Relationships.* Chickering (1969) stated that mature interpersonal relationships start once the student is able “to see others as they are and to respond to them in an appropriate manner” (Todaro, 1993, p. 25). The student also develops respect for the backgrounds, appearances and habits of others (Todaro, 1993). The impact of recreational sports on this factor is that participation can help the student achieve team goals and also help to eliminate both social and racial barriers (Todaro, 1993).

*Establishing Identity.* Chickering (1969) model showed that identity begins to be established when the student has an idea of who he or she is. Once a student develops a heightened sense of balance and perspective toward himself or herself, they have started to achieve identity (Todaro, 1993). The impact of recreational sports on this factor is that participation has a positive effect on students’ awareness and appreciation of their bodies (Todaro, 1993).

*Developing Purpose.* Chickering (1969) stated that this area was reached once the student is able to set priorities and formulate plans. The student begins to develop a sense of self. “The impact of recreational sports on this factor is that participation can enhance goal-directed behavior by the student. Setting team or performance goals and persistently striving to accomplish these goals can enhance the ability to focus on purposeful behavior” (Todaro, 1993, p. 26).

*Developing Integrity.* Chickering (1969) stated that integrity reflects the ability of an individual to identify a set of beliefs that act as a guide to their behavior. This means there is agreement between the behavior and the values of the individual. By participating in recreational sports, the focus of the individual shifts from self to the team. “A recreational sports environment can incorporate its own behavior structures, norms, and situational variables, thereby reinforcing a personally held set of beliefs” (Todaro, 1993, p. 26).

### **Related Survey Research**

Most of the surveys that deal with the area of student retention do not ask questions that specifically address the area of recreational sports facilities or intramural sports and their effects on improving retention rates. Some of the surveys that address retention rates are the College Student Expectations Questionnaire (CSXQ), College Student Experiences Questionnaire (CSEQ), and the National Survey of Student Engagement (NSSE). QIRS questionnaire includes some of the same topics as the other surveys but also includes questions about recreational sports facilities and usage. NSSE asks only one “How often during the school year have you exercised or participated in physical fitness activities?” The CSXQ with its focus on studying how students believe they will spend their time on a college campus, asks two questions related to recreational facilities and exercise. “How often do you expect to use recreational facilities?”, and “how often do you plan on playing a team sport (intramural, club, intercollegiate)?” CSEQ which is often given as a follow-up to CSXQ asks the same two questions related to participation. These questionnaires, with the exception of the

QIRS, do not take advantage of the benefits that recreational sports have in the area of retention and do not measure it.

The QIRS is a questionnaire designed specifically to measure usage, satisfaction and outcomes before constructing a new recreational facility. This questionnaire measures overall satisfaction with the university and specifically addresses the importance of recreational sports facilities on a student's recruitment and retention. Students are also asked about their sports and fitness activity and their use of the recreational sports facilities and programs. Additionally, it examines the students' satisfaction with the sports facilities. The last area of the QIRS questionnaire asks about benefits from involvement.

There are inherent issues with the results of these questionnaires. The questionnaires are all based on student testimony. According to Kuh (2001), the NSSE has substantial face validity and many of the questions have been used for years in other college student questionnaires. A considerable body of social science research documents that self-reported information is likely to be valid if certain conditions are met, and NSSE was designed accordingly (Kuh, 2001). The questions are clearly worded and refer to recent activities with which students have first-hand experience. The questions do not intrude into private matters nor do they prompt socially desirable responses. Psychometric analyses produce acceptable levels of reliability and demonstrate reasonable response distributions for most items. It is also the case that student reports about certain matters are the only feasible, cost-effective source of this kind of information. For example, it would be prohibitively expensive to observe

directly how students at many institutions use their time and the extent to which they interact with peers and faculty members (Kuh, 2001).

Other issues with questionnaires include response rate and generalizability. Questionnaires are limited to results of the students who complete and return them. These students may not be representative of the entire student population at an institution. Another issue that can arise with questionnaires is that results from one institution might not have validity at another institution. If the institutions are not similar, results might not have any relevance somewhere else.

### **Technology Available in Recreational Sports Facilities**

Many recreational sports facilities are now using scanners that allow the workers to scan the student identification cards of the individuals using the facilities. These scanners allow the information to be stored where it can be used to study participation rates and other significant items. Some of the information that can be saved with these scanners are: 1) when the student enters the facility, 2) the name of the student, 3) tech id or a student identification number, 4) sex of the student, 5) year in school, and 6) possibly their major in school. Because most of this information is stored on the magnetic strip on the card, these scanners allow this information to be taken from the card and stored for informational purposes.

Hand scanners, electronic fingerprint readers, even retina scanners are becoming more commonplace. The technology is increasingly being used by colleges to allow students, professors, and staff members to gain access to dining halls, laboratories, gymnasiums, and other facilities on campus (Kiernan, 2005). The University of Georgia, among other universities, has gone one step further and installed hand sensors

to allow admission to campus recreation facilities, dining halls, laboratories, residence halls, and computer networks. The process, which measures the size and shape of the hand, only takes a few seconds. “No system is foolproof, but this is far more efficient for us than a photo-based system” says J. Michael Floyd, director of food services at the University of Georgia. The university is among the first to use the biometric technology widely, having relied on it in one form or another in its dining halls since 1974 (Kiernan, 2005, A 28).

## Chapter 3

### **Methodology**

The purpose of this study was to determine if the number of visits to the campus recreational facilities would predict the first-year retention rate of new entering freshmen (NEF) who enrolled in fall 2006. Additional purposes were to examine retention rates and number of visits to the campus recreational facilities by gender, ethnicity, fall 2006 place of residence, and if employed on campus fall 2006. Finally, the number of student visits to the campus recreational facilities, first-semester grade point average (GPA), first-semester credits earned, first-year GPA, and first-year credits earned were used to determine if differences existed between returning and nonreturning students. This chapter contains descriptions of the following sections: community overview, campus overview, campus recreational facilities overview, variables, data collection, data treatment, and data analysis.

### **Community Overview**

The comprehensive state university is located in a major regional center that has been designated as one of the Most Livable Micropolitan Cities in the Nation. The community has a population of 34,427 with a contiguous population of 46,173. There is a trade area population of more than 300,000 and there are 1.6 million people who live within 60 miles of the community. The city is renowned for great parks and trails. Rivers, lakes, ravines, bluffs, natural prairies, and forested areas offer breathtaking landscapes and provide a scenic backdrop for an area steeped in historic significance. At the same time, residents enjoy the peace of mind and quality of life often associated with smaller towns.

### **Campus Overview**

The comprehensive state university in this study is located in the Midwest. The study institution is a comprehensive university dedicated to excellence in academics and personal growth. The institution academically challenges students with over 150 programs. The institution is built on 277 acres of land, with many acres of open green space, sporting fields, ravines and parking lots. The core campus sits on 47 acres, containing 10 large academic buildings and 4 large residence halls. The institution has a student body of nearly 14,400 students from 47 states and 59 countries.

### **Campus Recreational Facilities Overview**

The centrally located campus recreational facilities were completed in September of 2005. The \$8.4 million renovation included a new wood gymnasium floor with three basketball or volleyball courts, a new three-lane walking or jogging track, a "TechRec" cardio area, a weight room, a central check-in point and equipment check-out desk, remodeled locker rooms, and a student lounge. Extensive remodeling of the adjoining swimming pool was part of the renovation project. The recreational facilities are open 7 days a week during the school year. Hours are Monday-Thursday 6:30 AM-11 PM, Friday 6:30 AM-9 PM, Saturday 9AM- 9 PM, and Sunday 11 AM-11 PM. For the purpose of this study, the hours between semesters, the summer hours, and use of the facilities during these periods were not included. Enrolled students may use the recreational facility and swimming pool free with their access cards.

## Description of Population

The target population was the full-time NEF cohort that enrolled at the comprehensive state university in fall 2006. The cohort group was established by using the institutional definition for NEF, and for fall 2006 there were 2,137 students. Demographic data collected in this study included gender, ethnicity, place of residence, and employment on campus. These demographic variables were collected because research has shown that these specific demographics have an effect on GPAs and retention rates. Table 1 summarizes the characteristics of NEF included in this research study. Approximately 47% of the participants were male (n=1,001) and 53% were female (n=1,136). In fall 2006, 89.1% of NEF (n=1,905) were Caucasian, 82% of NEF (n=1,750) lived on campus, and 18% (n=387) of NEF lived off campus. Only 14.6% (n=313) of NEF were employed on campus during fall 2006. Finally, 77.9% (n=1,665) of the NEF visited the campus recreational facilities.

Table 1

*Descriptive Characteristics of New Entering Freshmen, Fall 2006*

Variable	N	%
Gender	2,137	100.0
Female	1,136	53.2
Male	1,001	46.8
Ethnicity	2,137	100.0
African-American	62	2.9
American Indian	18	0.8
Asian-American	60	2.8
Caucasian	1,905	89.1
Hispanic	26	1.2
International	31	1.5
Unknown	35	1.6
Place of Residence	2,137	100.0
On Campus	1,750	81.9
Off Campus	387	18.1
Employment On campus	2,137	100.0
No	1,824	85.4
Yes	313	14.6
% NEF Who Visited Campus		
Recreational Facilities	2,137	100.0
Visited	1,665	77.9
Not Visited	472	22.1

Table 2 summarizes the retention rates at the comprehensive state university for the past 10 years. The numbers are fairly consistent for each of the years with a low in 2004 of 76.4% retained and a high of 79.8% in 2006. The retention rate for 2006 is the highest since 2001, which was 79.0%.

Table 2

*Retention Rates from Fall 1997 Through Fall 2006*

Fall Term	No. Initially Enrolled (Full-Time)	No. Enrolled 1 Year Later	First Year Retention
1997	1,669	1,295	77.6%
1998	1,823	1,411	77.4%
1999	1,958	1,536	78.4%
2000	2,038	1,586	77.8%
2001	2,113	1,669	79.0%
2002	2,049	1,592	77.7%
2003	2,274	1,764	77.6%
2004	2,135	1,631	76.4%
2005	2,230	1,732	77.7%
2006 <sup>a</sup>	2,137	1,705	79.8%
Total	20,426	15,921	77.9%

<sup>a</sup>2006 cohort retention as of September 24, 2007. Note that 2006 retention rate is the highest since 2001.

### Variables

This study analyzed information from two different sources. One source was the access card data base. For this study, the student identification number was used to compare a student's use of the campus recreational facilities with their academic achievement and retention rates. The data for the variables were from the student record system and included ethnicity, gender, place of residence, employment on campus, cumulative GPAs, cumulative credits earned, and retained or not. These variables were chosen because they are tracked by the university and also because several studies have

shown that these variables have an effect on retention. Each variable is briefly described following a rationale for the inclusion of the variable in the analysis.

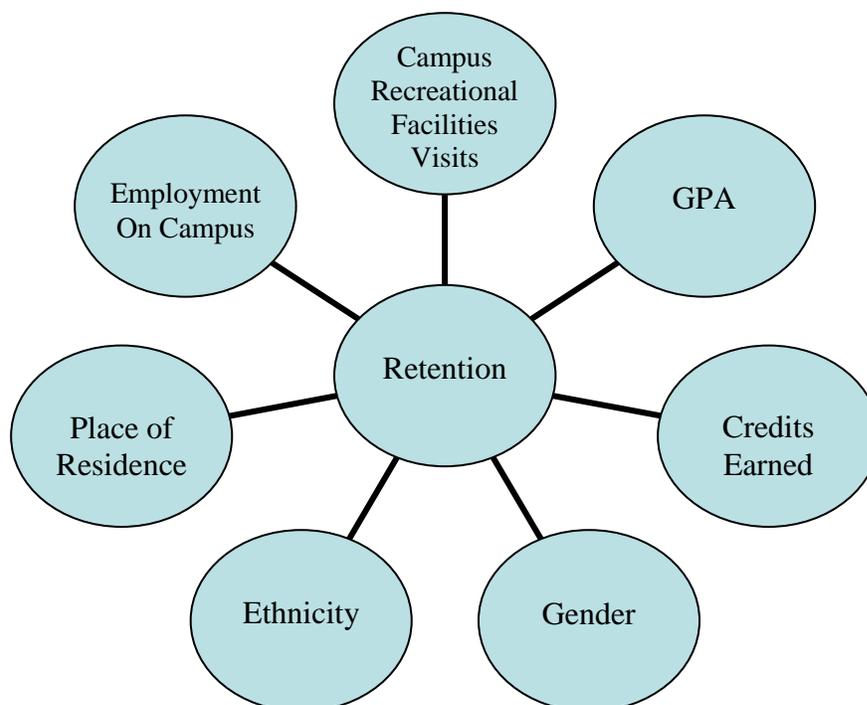


Figure 1. *Model Showing Variables that are Related to Retention*

Ethnicity has consistently shown to differentiate between Caucasians and non-Caucasians concerning the undergraduate student experience. Mallinckrodt and Sedlacek (1987) showed that for black students hours per week spent in a campus gymnasium was a predictor of retention. For nonblack students this was not the case. Sedlacek (1987) claimed that black students must deal with nonacademic considerations before they can concentrate on academic considerations. For African-American men, socioeconomic status and secondary school achievement had a direct effect on retention. Factors for African-American women were selectivity and prestige of the institution and college academic achievement. White male persistence seems to be more

related to family social status, secondary school academic achievement, and degree aspiration. The persistence of white females is related to factors such as family social status, degree aspiration, institutional selectivity and majoring in social sciences (Stocker, Pascarella, & Wolfe, 1988). Gallicki and McEwen (1989) found a difference in retention rates of African-American and white students. African-American students dropped out at a significantly higher rate than white students.

Tinto (1987) stressed that if students (especially minorities) feel that programs established for them are marginal to the institution, then their fit with that institution, and therefore their commitment to that institution, is lessened and the student is more likely to leave. Minority responses to the importance of recreational facilities and programs for their decision to attend and continue at their chosen university suggested that minority students were more likely than their Caucasian counterparts to consider recreational facilities and programs important to very important (Bradley et al., 1992).

The ethnicity data was regrouped as Caucasian and non-Caucasian, because some of the races had small numbers. African-Americans were approximately 3% of the cohort. Caucasians were approximately 89%. The other 8% were other ethnicities. Students who, according to university records, were Caucasian were coded as "0" while non-Caucasian students were coded "1".

Gender has been shown to be a statistical correlate of both first-semester GPA and first-semester academic warning (DeBerard et al., 2004). Studies done on the relationship of gender to persistence have shown conflicting results. Peltier, Laden, and Matranga (1999) reported findings that have been mixed with respect to gender with some support for higher persistence rates for females. Robertson (1991) found that

women experience significantly more breaks in college than men, but for men and women who had similar break patterns, differences in rates of progress were negligible. Christensen (1990) concluded that gender was strongly related to retention. Christensen reported a substantial difference based on gender, with 30% of the persisters being male and 70% female. Astin (1993), Gallicki and McEwen (1989), Lewallen (1993), Daly and Breegle (1989), and York, Bollar, and Schoob (1993) also reported higher completion rates for women. For this variable, males were coded as “0” and females were coded as “1”.

Place of residence was chosen as a variable because many studies have shown that residence has an impact on most variables concerning the undergraduate student experience. Blimling (1989) reported that students living in conventional residence halls outperformed those living in private, off campus quarters by a statistically significant but small margin. A growing body of research indicates that students’ interpersonal interactions with peers and faculty members shape a number of dimensions of cognitive growth (Baxter-Magolda, 1987, 1992; Pascarella & Terenzini, 1991; Perry, 1970), and that residence halls clearly afford more opportunities than other living arrangements for students to interact with peers and faculty members.

However, the effects of place of residence on cognitive outcomes other than academic achievement have received far less research attention (Pascarella, Bohr, Nora, Desler, & Zusman, 1994). Winter, McClelland, and Stewart (1981) reported that the level of involvement in residence hall activities had a statistically significant negative association with gains on a projective measure of critical thinking. These findings await replication, but they nevertheless suggested that residence halls may have an important

role to play in promoting dimensions of students' cognitive development that are not closely tied to coursework activities and experiences. Chickering (1974) concluded that even when background variables are taken into consideration, students living in residence halls exceeded the learning and personal development predicted when their advantages in ability, prior education, extracurricular activities, and community and family backgrounds were considered.

Astin (1977) found that the most important environmental characteristic associated with finishing college was living in a residence hall during freshman year. Those who lived off campus had a significantly lower rate of persistence. Some of the reasons for lower persistence by students living off campus are less interaction with their peer group in on campus settings, less involvement in on campus activities, and more involvement with peers who are not taking college classes.

The students were asked their place of residence which was then listed as either live on campus or do not live on campus. Since this data were collected at the beginning of fall 2006, those who stated they lived on campus at that time were considered as on campus. For this variable, on campus residents were coded as "0" and off campus residents were coded as "1".

Studies have shown that employment on campus has a positive effect on several variables that affect the undergraduate student experience. Astin (1975, 1993) reported that a student's chances of graduating are greatly increased by the type and extent of employment. Holding a job was positively associated with obtaining a bachelors degree. A reason for this increase was because of more frequent contact with other students, faculty, and staff that occurs when a student is employed on campus.

The students were asked if they were employed on campus or not. Because this data was collected at the beginning of fall 2006, those who stated they worked on campus were classified as working on campus for the entire year. For this variable, students not employed on campus were coded “0” while those employed on campus were coded as “1”

The final nominal variable was retention status. If a student returned for spring 2007, the student was given a “1”. If the student did not return for spring 2007, the student was given a “0”. Next, each student was given a second “1” or “0” to indicate if a student did or did not return for fall 2007.

Barcelona and Ross (2002) found that frequency of involvement in campus recreation did differentiate across gender, age, and place of residence. Males, students under the age of 22, and on campus students reported higher rates of participation than females, older students, and off campus residents. However, their study did not compare visitors of campus recreation programs and facilities to nonvisitors across varied demographic characteristics.

Information on total numbers of visits was collected because several studies (Astin, 1977; Churchill & Iwai 1981; Mueller & Reznik, 1979; Pascarella & Terenzini, 1991, 2005; Tinto, 1975) have shown that increased participation in recreational activities has an effect on a student’s academic success and retention. Activity participation has been positively linked to academic outcomes, including grades, test scores, school engagement, and educational aspirations (Cooper, Valentine, Nye, & Lindsey, 1999; Eccles & Barber, 1999; Marsh & Kleitman, 2002).

Studies have shown a positive relationship between involvement in out-of-classroom experiences including recreational sports and educational outcomes such as academic success, retention, and student satisfaction with their college experience (Kovac & Beck, 1997; Maas, 1998, 1999). Academic achievement and student attitudes have been the object of extensive research, much of it focusing on the relationship of grades and satisfaction to student persistence (Bean & Bradley, 1986; Kuh, Bean, Bradley, Coomes, & Hunter, 1986). Tinto (1975) argued that grades are the most important factor in the decision to drop out of college, and research tends to support this claim. At least four studies reported that grades are a primary factor in retention (Aitken, 1982; Munro, 1981; Pascarella & Chapman, 1983; Pascarella, Smart, & Ethington, 1986).

First-year NEF GPAs are included because there are several characteristics that freshmen have that affect college GPAs. Several studies have established a negative relationship between school performance and noncompletion. In other words the better the student did in their freshman year the more likely they were to return for a sophomore year. The lower their overall GPA was after the first year, the less likely the student was to return. (Astin, 1975; Astin, Korn, & Green, 1987). Braunstein and McGrath (1997) showed that SAT scores and first semester GPA were higher for students who were retained than for students not retained. In one particular analysis, the first semester GPA was the most significant predictor of retention. The average GPA for freshmen who returned was 2.76, while the average GPA for those who did not return was 1.88 (Braunstein & McGrath, 1997). Bank et al. (1990) reported that semester GPA can be conceptualized as a life event that intervenes between the declaration during a

fall semester of a persistence-related intention and persistence behavior defined in terms of enrolling for the following spring semester. Several studies further show that grades and satisfaction are strongly related to the decision to remain in college (Aitken, 1982; Bean, 1980; Munro, 1981; Pascarella & Chapman, 1983; Pascarella, Smart, & Ethington, 1986; Terenzini & Pascarella, 1977). The fall 2006 cumulative GPA and the spring 2007 cumulative GPA are two variables in the analysis.

Belch et al. (2001) showed the recreation center visitors earned higher first semester GPAs and first-year cumulative GPAs and accumulated slightly more earned hours both in the first-semester and at the end of the first year than nonvisitors. There was also a positive correlation between usage and persistence rates. A *t* test analysis indicated a significant difference in persistence rates for recreational center visitors and nonvisitors. The visitors returned at a one-semester rate of 92% and a one-year rate of 71%. Nonvisitors returned at a one-semester rate of at an 86% and a one-year rate of 64%.

Credits completed were included because several studies (Belch et al., 2001; Maas, 1998; Tinto, 1975) have shown that the number of credits completed during the first year has an effect on GPA and retention rates. Credit load has been found to have a nonlinear effect on retention: greater persistence rates are associated with increases at the lower rather than the upper end of credit load (Richards, 1989). Fall 2006 credits earned and the cumulative spring 2007 credits earned are two variables in the analysis.

### **Data Collection**

Internal Review Board (IRB) permission was sought from the comprehensive state university and the University of Minnesota prior to implementation of the study

and selecting the sample population. Upon IRB approval, participation in physical recreation activities at the campus recreational facilities was taken from student access card electronic scanning to verify memberships.

Students entering the recreational facilities have their student status verified by having their access card scanned electronically. The electronic scan of the student data base creates a date/time stamp each time a student accesses the campus recreational facilities. These stamps were used to determine the number of times each student entered the campus recreational facilities. The date/time records were used to sort the NEF into recreational facilities visitors and nonvisitors.

The scan card system was newly instituted on campus in fall 2006 having replaced a manual process that had been used previously. The system worked as expected through the first 14 weeks of fall 2006. The system malfunctioned after Thanksgiving and no further data was collected for fall 2006. The system was fully operational at the beginning of spring 2007. The analysis for both semesters used 14 weeks of data because only 14 weeks were available for fall semester.

The Office of Institutional Research took the campus recreational facilities visits data from the campus recreational facilities database and matched it with the data from the NEF cohort group for fall 2006. The cohort group was examined for consecutive semester enrollment at the comprehensive state university. These records were used to identify recreational facilities visitors among the NEF cohort and the number of visits each NEF made during fall 2006 and spring 2007.

Due to a processing error in the access card system only the first 14 weeks of visits data was available for fall 2006. This eliminated the last week of classes and

finals week for fall 2006. For consistency, the last two weeks of spring 2007 were not included in the study.

### **Data Treatment**

To facilitate the analysis of the data, some of the responses were grouped to yield larger categories. The previously noted Table 1 includes the number of NEF for each category of each demographic variable. Because 89.1% of NEF were Caucasian, all the international students and minority students were categorized into one group. No adjustments were made to the gender, place of residence, and employment on campus variables.

There was a wide range in the number of visits to the campus recreational facilities. For fall 2006, 472 (22.1%) of the NEF did not visit the campus recreational facilities. The range in the number of visits was 1 to 106, with a mean of 11.82 visits. Using 12 as a break point, those with 12 or fewer visits were split into two groups, and those with more than 12 visits were split into two groups. The groups were applied to the fall 2006 and spring 2007 number of visits. The nonvisitors were in a separate group.

Similarly, there was a wide range of credits earned. Some of the NEF had PSEO credits, which were included in the total credits earned at the end of each semester. To group the NEF by credits earned, credit hours were grouped in intervals of 16. For fall 2006, the intervals were 1-16, 17-32, and 33 or more. For spring 2007, the intervals were 1-32, 33-48, and 49 or more. These intervals were used because 16 credits is the number of credits needed each semester to graduate in four years. Those who earned zero credits were in a separate group.

While the range of GPAs is narrow (0-4), many different GPAs were earned, with the average GPA increasing from 2.82 for fall 2006 to 2.97 for fall 2007. The GPAs were grouped into five intervals: .01 to .99, 1.00 to 1.99, 2.00 to 2.99, 3.00 to 3.49, and 3.50 to 4.00. Those students with a GPA of .00 were in a separate group.

### **Data Analysis**

After the data was collected and entered into an SPSS file, statistical analyses were performed. First, frequency counts were generated on the nominal data (gender, ethnicity, place of residence, employment on campus, and retention). For the continuous data (number of campus recreational facilities, fall 2006 GPA, spring 2007 GPA, fall 2007 GPA, cumulative fall 2006 credits earned, cumulative spring 2007 credits earned, and cumulative fall 2007 credits earned), general descriptive statistics were calculated including mean, standard deviation, and range.

After the variables were grouped into adequate and reasonably equal cell sizes, a series of nonparametric and parametric statistical tests were processed using academic performance and retention. First, a series of chi-square tests was done to determine if there was a significant difference in retention status between genders, places of residence, employment on campus, and ethnicities, for spring 2007 and fall 2007. Next, a series of *t* tests was conducted to determine if there was a significant difference in cumulative fall 2006 credits earned, cumulative spring 2007 credits earned, cumulative fall 2007 credits earned, fall 2006 GPA, spring 2007 GPA, and fall 2007 GPA, between genders, places of residence, employment on campus ethnicities and retention status.

Another analysis was a one-way analysis of variance (ANOVA). The number of campus recreational facilities visits was split into five groups and was the independent

variable. The dependent variables were the cumulative GPA and credits earned after fall 2006, spring 2007 and fall 2007. The purpose was to determine if GPA and credits earned increased or decreased as the number of campus recreational facilities visits increased.

The last analysis was a regression analysis that was performed on research question five. Both linear and logistic regression analyses were performed to predict retention based on demographic variables that included gender, ethnicity, place of residence, employment on campus, and campus recreational facilities visits. These variables were used in addition to fall 2006 GPA, spring 2007 GPA, and cumulative fall 2006 and spring 2007 credits earned to predict retention.

## Chapter 4

### **Results**

The purpose of this study was to determine if the number of visits to the campus recreational facilities would predict the first-year retention rate of new entering freshmen (NEF) who enrolled in fall 2006. Additional purposes were to examine retention rates and number of visits to the campus recreational facilities by gender, ethnicity, fall 2006 place of residence, and if employed on campus fall 2006. Finally, the number of student visits to the campus recreational facilities, first-semester grade point average (GPA), first-semester credits earned, first-year GPA, and first-year credits earned were used to determine if differences existed between returning and nonreturning students.

This chapter reports the results from the data that was analyzed. The first series of analysis was completed on usage data. After the usage data was analyzed, the academic success indicators were analyzed. After the academic success indicators were analyzed, each of the research questions was addressed and the results were reported.

### **Overview**

The presentation of the results begins with an overview of the campus recreational facilities data. Figures 2 and 3 show the number of campus recreational facilities visits for fall 2006 and spring 2007 for all students and the number of visits for fall 2006 and spring 2007 for NEF. Figures 4 and 5 show the number of campus recreational facilities visits by NEF as a percentage of all campus recreational facilities visits for fall 2006 and spring 2007. This section ends with Tables 3, 4, and 5 showing

the number of NEF in categories based on number of campus recreational facilities visits, GPA, and credits earned.

#### *Visits by All Students*

Students' access cards were scanned before entering the campus recreational facilities. Figure 2 shows the number of weekly campus recreational facilities visits (N= 86,193) by all students for fall 2006 and the number of weekly campus recreational facilities visits (N= 92,871) by all students for spring 2007. There is a fairly consistent number of visits throughout each semester, with 6,678 more visits (a 7.7% increase) in spring 2007 compared to fall 2006. The drop during week 13 for fall 2006 is related to the Thanksgiving holiday. The facilities were only open Sunday through Wednesday afternoon. The drop in week nine for spring 2007 is related to spring break. Although the facilities were open, because no classes were scheduled, many students left campus leading to fewer campus recreational facilities visits.

It should be noted that the campus recreational facilities are used for some classes. In fall 2006, there were 343 students registered for classes that were scheduled to meet in the campus recreational facilities. These classes met twice a week for 686 visits to the campus recreational facilities. This accounted for .8% of the total number of visits for fall 2006. In spring 2007, there were 460 students registered for classes that were scheduled to meet twice a week for 920 visits to the campus recreational facilities. This accounted for 1% of the total number of visits for spring 2007.

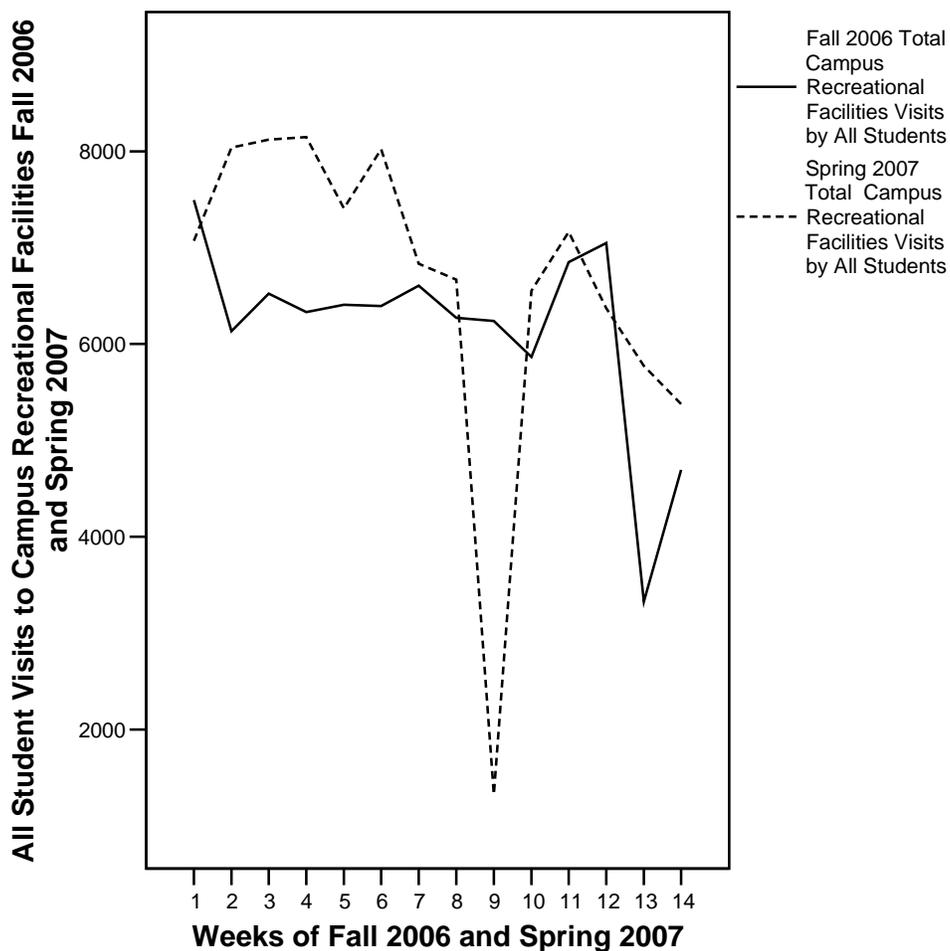


Figure 2. *Number of Visits to the Campus Recreational Facilities for All Students by Term and Week*

Figure 3 shows the total number of weekly campus recreational facilities visits (n=31,196) by NEF for fall 2006 and the total number of weekly campus recreational facilities visits (n=24,654) by NEF for spring 2007. There is a fairly consistent number of visits throughout the semester, with 6,542 fewer NEF visits (a 21% decrease) in spring compared to fall. Some of this decrease can be attributed to the 143 NEF who did not return spring semester.

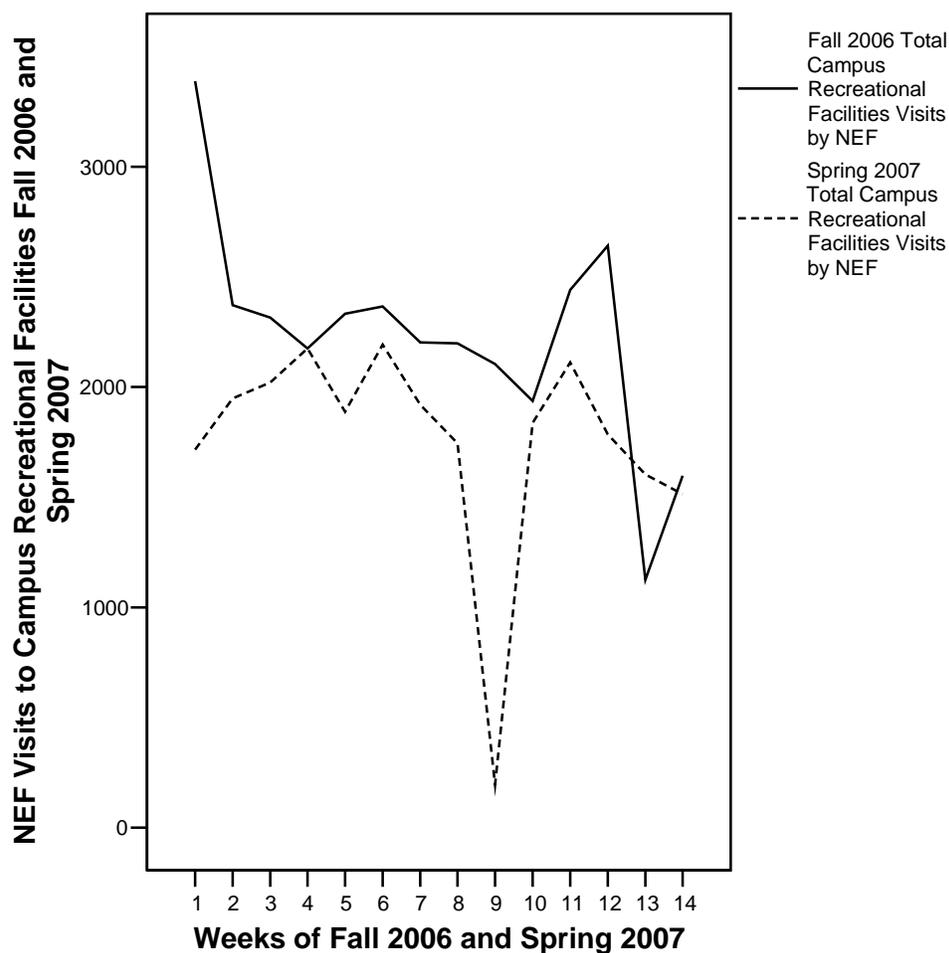


Figure 3. *Number of Visits to the Campus Recreational Facilities for Fall 2006 NEF by Term and Week*

The large number of visits ( $n=3,389$ ) by NEF during week 1 of fall 2006 is easily explained. The campus recreational facilities opened the Sunday before classes began. The residence halls opened Wednesday and many students, particularly NEF, came to campus. With no classes to attend, the campus recreational facilities were visited frequently by NEF.

Figures 4 and 5 portray the weekly number of visits by NEF for fall 2006 and spring 2007. Each bar represents the percentage that the number of NEF visits was of

the total number of all student visits. For example, for the first week of fall 2006, there were 3,389 NEF visits and 7,494 total student visits. The NEF visits were 45.2% of all student visits.

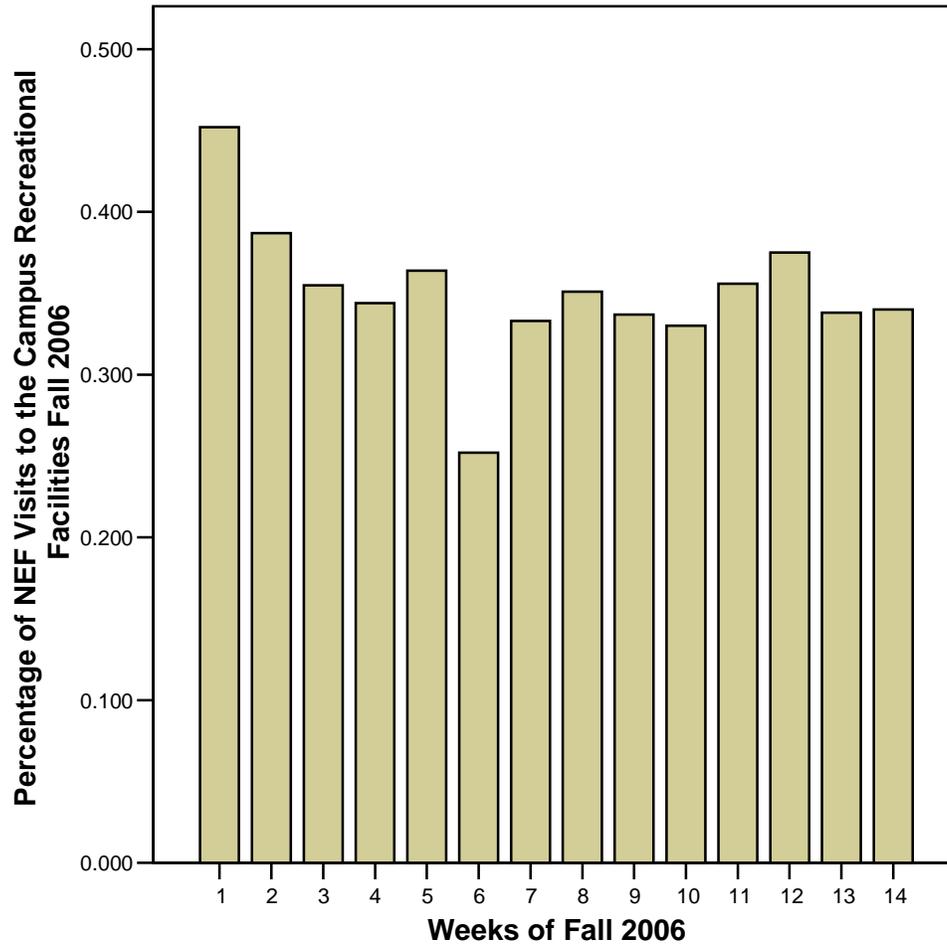


Figure 4. *Percentage of Fall 2006 NEF Visits to the Campus Recreational Facilities During Fall 2006 by Week*

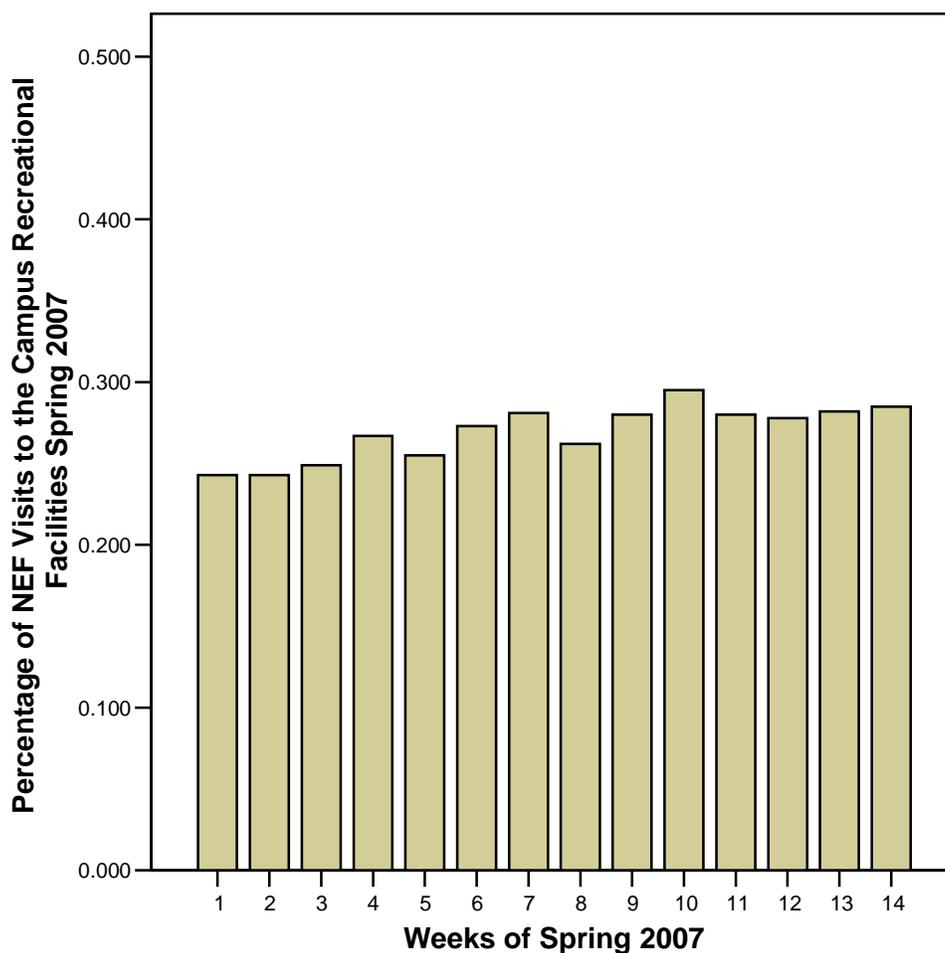


Figure 5. *Percentage of Fall 2006 NEF Visits to the Campus Recreational Facilities During Spring 2007 by Week*

Table 3 shows the number of NEF visits to the campus recreational facilities for fall 2006 and spring 2007. The NEF visits were divided into reasonably equal-sized groups. The first group was individuals who did not visit the campus recreational facilities during the semester. During the fall 2006, 22.1% (n=472) of the NEF did not visit the campus recreational facilities. During the spring 2007, 25.8% (n=515) of the NEF did not visit the campus recreational facilities. There were a slightly higher mean number of visits in spring 2007 compared to fall 2006. Means were 11.82 visits per

NEF for fall 2006 ( $SD=15.26$ ) compared to 13.53 visits per NEF in the spring 2007 ( $SD=17.95$ ). For spring 2007 the total is 1,994 because the NEF who did not return were not included.

Table 3

*Average Number of Campus Recreational Facilities Visits of NEF for Fall 2006 and Spring 2007*

Term	Number of Visits	N	%	Ave. No. Of Visits	SD
Fall 2006	0	472	22.1	.00	15.26
	1-4	482	22.6	2.28	
	5-12	496	23.2	7.85	
	13-22	290	13.6	17.27	
	23-106	397	18.6	38.41	
	Total	2,137	100.0	11.82	
Spring 2007	0	515	25.8	.00	17.95
	1-4	385	19.3	2.23	
	5-12	382	19.2	8.24	
	13-22	242	12.1	17.13	
	23-143	470	23.6	40.07	
	Total	1,994	100.0	13.53	

*Academic Success Indicators*

Table 4 shows the number of NEF who had GPAs in the different categories after fall 2006, spring 2007, and fall 2007. The totals for spring 2007 ( $n=1,994$ ) and fall 2007 ( $n=1,706$ ) represent the students who returned for these semesters. NEF who were enrolled but received a GPA of 0.00 were counted separately from those who did not enroll. The mean cumulative GPA increased each term from 2.82 ( $SD=.91$ ) after fall 2006, to 2.87 ( $SD=.81$ ) after spring 2007, to 2.97 ( $SD=.66$ ) after fall 2007.

Table 4

*Mean GPAs of NEF for Fall 2006, Spring 2007, and Fall 2007*

Term	GPA	N	%	Mean	SD
Fall 2006	0.00	53	2.5	.00	
	.01-0.99	56	2.6	.59	
	1.00-1.99	199	9.3	1.57	
	2.00-2.99	701	32.8	2.52	
	3.00-3.49	589	27.6	3.21	
	3.50-4.00	539	25.2	3.78	
	Total	2,137	100.0	2.82	.91
Spring 2007	0.00	12	0.6	.00	
	.01-0.99	52	2.6	.53	
	1.00-1.99	192	9.6	1.61	
	2.00-2.99	725	36.4	2.56	
	3.00-3.49	529	26.5	3.23	
	3.50-4.00	484	24.3	3.75	
	Total	1,994	100.0	2.87	.81
Fall 2007	0.00	1	0.1	.00	
	.01-0.99	16	0.9	.53	
	1.00-1.99	105	6.2	1.66	
	2.00-2.99	682	40.0	2.58	
	3.00-3.49	498	29.2	3.23	
	3.50-4.00	404	23.7	3.73	
	Total	1,706	100.0	2.97	.66

Table 5 shows the cumulative number of credits earned after fall 2006, spring 2007, and fall 2007. Results are again divided into groups with the lowest group being zero credits earned. The total remains 2,137 because if zero credits were earned, the NEF was placed into the zero credits earned category, regardless of whether the NEF was enrolled and earned zero credits or not enrolled and earned zero credits.

Table 5

*Credits Earned by NEF for Fall 2006, Spring 2007, and Fall 2007*

Term	Credits Earned	N	%	Mean	SD
Fall 2006	0	52	2.4	.00	
	1-16	1,437	67.2	13.29	
	17-32	475	22.2	22.04	
	33+	173	8.1	43.86	
	Total	2,137	100.0	17.39	10.06
Spring 2007	0	46	2.2	.00	
	1-32	1,441	67.4	25.41	
	33-48	501	23.4	37.98	
	49+	149	7.0	59.80	
	Total	2,137	100.0	30.21	12.54
Fall 2007	0	45	2.1	.00	
	1-48	1,482	69.3	35.67	
	49-64	470	22.0	54.12	
	65+	140	6.6	76.01	
	Total	2,137	100.0	41.62	16.84

### **Research Question 1**

The first research question addressed the number of visits to the campus recreational facilities throughout the academic year for NEF based on gender, ethnicity, place of residence, and employment on campus. Each of these demographic variables is dichotomous and is the independent variable in a *t* test with number of visits as the dependent variable. The results of the *t* tests are presented in the following paragraphs and associated tables.

*Gender*

Table 6 shows that for both semesters, NEF males had, on average, two more campus recreational facilities visits than NEF females, and the difference was statistically significant at the .01 level. The results also show that the average number of spring 2007 visits was approximately 1.7 more than fall 2006 visits for both males and females.

Table 6

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Gender for NEF for Fall 2006 and Spring 2007*

Term	Gender	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Male	1,001	12.91	15.90	3.12	2,135	0.002
	Female	1,136	10.85	14.62			
Spring 2007							
	Male	935	14.66	19.05	2.64	1,992	0.008
	Female	1,059	12.54	16.85			

Table 7 presents the same analysis but eliminates all students who did not visit the campus recreational facilities in fall 2006 or spring 2007. This comparison was performed to determine if there was a significant difference in the number of visits if the nonvisitors were removed because there were more nonvisiting females which could have an effect on the results. As expected, the average number of visits by gender increased with the males having more visits. For fall 2006, the males had 1.5 more visits

than females, while for spring 2007, the males had 2.3 more visits than females. The differences were statistically significant for both semesters.

Table 7

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Gender for NEF Without Nonvisitors for Fall 2006 and Spring 2007*

Term	Gender	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Male	810	15.95	16.24	1.99	1,663	0.047
	Female	855	14.42	15.25			
Spring 2007							
	Male	705	19.44	19.71	2.36	1,477	0.018
	Female	774	17.15	17.59			

### *Ethnicity*

Table 8 compares the number of campus recreational facilities visits between Caucasians and non-Caucasians. The average number of visits for Caucasians in fall 2006 was 11.73 ( $SD=15.13$ ), while for non-Caucasians the average number of visits was 12.49 ( $SD=16.29$ ). In spring 2007 the average number of visits for the Caucasian group was 13.25 ( $SD=17.69$ ), while for non-Caucasians the average number of visits was 15.82 ( $SD=19.78$ ). The non-Caucasians had a higher average number of visits both semesters; however, only for spring 2007 was the difference statistically significant.

Table 8

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Ethnicity for NEF for Fall 2006 and Spring 2007*

Term	Ethnicity	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Caucasian	1,905	11.73	15.13			
	Non Caucasian	232	12.49	16.29	-0.71	2,135	0.478
Spring 2007							
	Caucasian	1,774	13.25	17.69			
	Non Caucasian	220	15.82	19.78	-2.01	1,992	0.045

Table 9 compares the number of visits to the campus recreational facilities of the Caucasians to the non-Caucasians after removing nonvisitors. The results were similar, with the non-Caucasian group having a higher average number of visits both fall 2006 and spring 2007. However, there was no statistically significant difference for either fall 2006 or spring 2007.

Table 9

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Ethnicity for NEF Without Nonvisitors for Fall 2006 and Spring 2007*

Term	Ethnicity	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Caucasian	1,482	15.08	15.62			
	Non Caucasian	183	15.83	16.84	-0.61	1,663	0.545
Spring 2007							
	Caucasian	1,308	17.97	18.43			
	Non Caucasian	171	20.36	20.28	-1.58	1,477	0.115

#### *Place of Residence*

Table 10 shows the average number of campus recreational facilities visits for NEF who lived on campus versus those who lived off campus. The results indicate that there is a statistically significant difference in the number of visits between NEF living on campus and NEF living off campus. For each semester, the on campus NEF averaged 10 more visits than the off campus NEF.

Table 10

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Place of Residence for NEF for Fall 2006 and Spring 2007*

Term	Place of Residence	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	On Campus	1,750	13.65	15.75	12.20	2,135	0.000
	Off Campus	387	3.53	8.97			
Spring 2007							
	On Campus	1,652	15.36	18.60	10.23	1,992	0.000
	Off Campus	342	4.37	10.63			

Table 11 presents the results by place of residence after removing the nonvisitors. The average number of visits increased by 2 for on campus NEF during fall 2006 and by 3.5 for on campus NEF during spring 2007. For the off campus NEF, the number of visits increased by almost 6 for fall 2006 and by 7 for spring 2007. With the nonvisitors removed, the difference in the average number of visits is still statistically significant.

Table 11

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Place of Residence for NEF Without Nonvisitors for Fall 2006 and Spring 2007*

Term	Place of Residence	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	On Campus	1,517	15.74	15.92	4.28	1,663	0.000
	Off Campus	148	9.24	12.57			
Spring 2007							
	On Campus	1,340	18.93	18.60	4.42	1,447	0.000
	Off Campus	139	11.36	14.08			

#### *Employment On Campus*

The last variable in research question 1 is employment on campus. Table 12 compares employment on campus status and the number of campus recreational facilities visits. In both semesters, the NEF employed on campus had statistically significantly more visits than those NEF not working on campus. For fall 2006, those NEF employed on campus visited 14.73 times, while those not employed on campus visited 11.31 times. For the spring 2007, the NEF employed on campus visited the campus recreational facilities an average of 15.93 times, while those not employed on campus visited 13.11 times.

Table 12

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Employment On Campus Status for NEF for Fall 2006 and Spring 2007*

Term	Employed On Campus	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Yes	313	14.73	19.01	3.67	2,135	0.000
	No	1,824	11.31	14.47			
Spring 2007							
	Yes	297	15.93	20.29	2.50	1,992	0.013
	No	1,697	13.11	17.18			

Table 13 compares the number of visits by employment on campus status after removing the nonvisitors. When the nonvisitors are removed, the average number of visits by all NEF increases from fall 2006 to spring 2007 and those employed on campus have more visits than those not employed on campus. However, the spring 2007 results are not statistically significant.

Table 13

*T-tests Showing Number of Visits to the Campus Recreational Facilities by Employment On Campus Status for NEF Without Nonvisitors for Fall 2006 and Spring 2007*

Term	Employed On Campus	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Yes	259	17.81	19.56	2.94	1,663	0.003
	No	1,406	14.68	14.90			
Spring 2007							
	Yes	237	19.96	20.86	1.55	1,477	0.122
	No	1,242	17.92	18.20			

#### *Summary of Analysis of Research Question 1*

The results of research question 1 indicated that NEF males were more likely to visit the campus recreational facilities than were NEF females. The difference was statistically significant. Second, non-Caucasians had more campus recreational facilities visits than Caucasians, but only in spring 2007 was the difference statistically significant. Third, NEF who lived on campus had statistically significant more campus recreational facilities visits than NEF who lived off campus. Finally, employment on campus was statistically significant for fall 2006. Those employed on campus had more visits than those not employed on campus.

#### **Research Question 2**

The second research question examines the relationship between number of visits to the campus recreational facilities and GPA and the number of credits earned

each semester. The first analysis is a  $t$  test comparing the GPAs by term (the dependent variable) for fall 2006 campus recreational facilities visitors and nonvisitors (the independent variable). The second analysis divides the number of visits into five groups and uses one-way ANOVA to compare the GPAs for each term. These two analyses were repeated using number of credits earned after each semester. All four analyses are repeated using the number of visits for spring 2007 as the independent variable, and GPA and number of credits earned spring 2007 as the dependent variables.

#### *GPA by Fall 2006 Campus Recreational Facilities Visits*

The first analyses compared the GPAs by term based on whether the student visited or did not visit the campus recreational facilities during fall 2006 and how many times the student visited. Table 14 shows the average cumulative GPA of visitors and nonvisitors increased in all three semesters, though the cumulative GPA of the visitors increased only .09 from 2.91 to 3.00 over the three semesters while the cumulative GPA of nonvisitors increased .32 from 2.51 to 2.83. For each semester the difference in cumulative GPAs between visitors and nonvisitors was statistically significant.

Table 15 has the average GPA by categories of the number of visits during fall 2006. The GPA increases as the number of visits increases for each semester. The GPA also increases within each category of the number of visits across the semesters. In other words, the highest GPAs are in the bottom row (most visits) and in the last column (fall 2007).

Table 14

*T-tests of GPAs for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 Visitors and Nonvisitors of Campus Recreational Facilities by Fall 2006 NEF*

Term	Visited	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	No	472	2.51	1.12	-8.66	2,135	0.000
	Yes	1,665	2.91	.82			
Spring 2007							
	No	412	2.62	.95	-7.02	1,992	0.000
	Yes	1,582	2.93	.76			
Fall 2007							
	No	331	2.83	.75	-4.28	1,704	0.000
	Yes	1,375	3.00	.63			

Table 15

*Average GPA for Fall 2006, Spring 2007, and Fall 2007 by Number of Visits to Campus Recreational Facilities in Fall 2006 by Fall 2006 NEF*

Number of Visits Fall 2006	Fall 2006		Spring 2007		Fall 2007	
	N	Mean GPA	N	Mean GPA	N	Mean GPA
0	472	2.51	412	2.62	331	2.83
1-4	482	2.71	443	2.72	374	2.88
5-12	496	2.89	477	2.90	410	2.94
13-22	290	2.98	283	3.02	261	3.04
23-106	397	3.14	379	3.14	330	3.17
Total	2,137	2.82	1,994	2.87	1,706	2.97

Tables 16-19 present the results of a one-way ANOVA with a Scheffe *post hoc* test. For each semester the GPA for each pair of number of visits is compared. Because of the large sample sizes, most pairs of GPAs are statistically significantly different. The results show nonvisitors and visitors with 1-4 visits during fall 2006 generally had statistically significantly lower GPAs than groups with more visits.

Table 16

*One-Way ANOVA of Average GPA for Fall 2006, Spring 2007, and Fall 2007 by Number of Visits to Campus Recreational Facilities in Fall 2006 by Fall 2006 NEF*

Term	Source of Variance	SS	df	MS	F	p
Fall 2006	Between Groups	100.35	4	25.09	32.13	.000
	Within Groups	1664.55	2,132	.781		
	Totals	1764.90	2,136			
Spring 2007	Between Groups	70.00	4	17.50	28.25	.000
	Within Groups	1231.89	1,989	.619		
	Totals	1301.89	1,993			
Fall 2007	Between Groups	25.05	4	6.26	14.85	.000
	Within Groups	717.41	1,701	.422		
	Totals	742.45	1,705			

Table 17

*Scheffe Pairwise Comparisons of Fall 2006 GPA by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

Number of Visits					
	0	1-4	5-12	13-22	23-106
0		.013*	.000**	.000**	.000**
1-4			.052	.002**	.000**
5-12				.716	.002**
13-22					.280

\*p < .05 \*\* p < .01

Table 18

*Scheffe Pairwise Comparisons of Spring 2007 GPA by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

Number of Visits					
	0	1-4	5-12	13-22	23-106
0		.453	.000**	.000**	.000**
1-4			.019*	.000**	.000**
5-12				.430	.001**
13-22					.399

\*p < .05 \*\* p < .01

Table 19

*Scheffe Pairwise Comparisons of Fall 2007 GPA by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

		Number of Visits				
		0	1-4	5-12	13-22	23-106
0			.895	.211	.003**	.000**
1-4				.745	.048*	.000**
5-12					.462	.000**
13-22						.198

\*p < .05 \*\* p < .01

*Credits Earned by Fall 2006 Campus Recreational Facilities Visits*

The second analyses compared the credits earned by term based on whether the student visited or did not visit the campus recreational facilities during fall 2006 and how many times the student visited. Table 20 shows the average number of credits earned of visitors and nonvisitors in all three semesters. Though the average number of credits earned by both the visitors and nonvisitors increased over the three semesters, the difference in credits earned between visitors and nonvisitors was less than one credit. For all three semesters the difference in credits earned between visitors and nonvisitors was not statistically significant.

Table 21 reports the average credits earned by categories of the number of visits. In general, the average number of credits earned increases as the number of visits increases for each semester. The last category, which is the highest number of visits, has a slightly lower average credits earned than the category directly before it for fall 2007.

There is also a difference in fall 2006 credits earned. The nonvisitor category has a slightly higher average credits earned than the 1-4 visits category.

Table 20

*T-tests of Credits Earned for Fall 2006, Spring 2007, and Fall 2007 by Fall 2006 Visitors and Nonvisitors of Campus Recreational Facilities by Fall 2006 NEF*

Term	Visited	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	No	472	17.29	13.68	-.23	2,135	0.817
	Yes	1,665	17.41	8.77			
Spring 2007							
	No	412	30.56	15.72	-1.91	1,992	0.056
	Yes	1,582	31.78	10.15			
Fall 2007							
	No	331	47.15	17.18	.16	1,704	0.875
	Yes	1,375	47.02	11.31			

Table 21

*Average Credits Earned through Fall 2006, Spring 2007, and Fall 2007 by Number of Visits to Campus Recreational Facilities in Fall 2006 by Fall 2006 NEF*

Number of Visits Fall 2006	N	Ave. Credits Earned Through Fall 2006	N	Ave. Credits Earned Through Spring 2007	N	Ave. Credits Earned Through Fall 2007
0	472	17.29	412	27.81	331	37.56
1-4	482	16.47	443	28.85	374	39.57
5-12	496	17.46	477	31.10	410	42.89
13-22	290	17.77	283	32.06	261	45.36
23-106	397	18.24	379	32.23	330	44.60
Total	2,137	17.39	1,994	30.21	1,706	41.62

Tables 22-25 present the results of a one-way ANOVA with a Scheffe *post hoc* test. Table 22 shows the credits earned were statistically significantly different for spring 2007. For each semester, the credits earned for each pair of number of visits is compared. For each pairwise number of visits to the campus recreational facilities, few of the credits earned are significantly different. The number of spring 2007 credits earned is statistically significantly different between campus recreational facilities visitors with 1-4 visits and those with 23-106 visits.

Table 22

*One-Way ANOVA of Average Credits Earned for Fall 2006, Spring 2007, and Fall 2007 by Number of Visits to Campus Recreational Facilities in Fall 2006 by Fall 2006 NEF*

Term	Source of Variance	SS	df	MS	F	p
Fall 2006	Between Groups	739.78	4	184.95	1.83	.120
	Within Groups	215508.36	2,132	101.08		
	Totals	216248.14	2,136			
Spring 2007	Between Groups	2266.39	4	566.60	4.30	.002
	Within Groups	262589.40	1,989	132.02		
	Totals	264855.80	1,993			
Fall 2007	Between Groups	1390.95	4	347.74	2.18	.069
	Within Groups	271557.20	1,701	159.65		
	Totals	272948.15	1,705			

Table 23

*Scheffe Pairwise Comparisons of Fall 2006 Credits Earned by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

	Number of Visits				
	0	1-4	5-12	13-22	23-106
0		.811	.999	.982	.753
1-4			.667	.558	.152
5-12				.997	.860
13-22					.985

\*p < .05 \*\* p < .01

Table 24

*Scheffe Pairwise Comparisons of Spring 2007 Credits Earned by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

Number of Visits					
	0	1-4	5-12	13-22	23-106
0		.993	.505	.342	.082
1-4			.228	.149	.020*
5-12				.990	.838
13-22					.991

\*p < .05 \*\* p < .01

Table 25

*Scheffe Pairwise Comparisons of Fall 2007 Credits Earned by Number of Fall 2006 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

Number of Visits					
	0	1-4	5-12	13-22	23-106
0		.540	1.000	.995	.925
1-4			.444	.840	.112
5-12				.996	.929
13-22					.996

\*p < .05 \*\* p < .01

*GPA by Spring 2007 Campus Recreational Facilities Visits*

The next analyses compared the GPAs by term based on whether the NEF visited or did not visit the campus recreational facilities during spring 2007 and based on how many times the NEF visited. Table 26 shows the average GPA of visitors and nonvisitors increased from spring 2007 to fall 2007 though the GPA of the visitors increased only .06 from 2.96 to 3.02 while the GPA of nonvisitors increased .19 from 2.60 to 2.79. For each semester, the difference in GPAs between visitors and nonvisitors was statistically significant.

Table 26

*T-tests of GPAs for Spring 2007 and Fall 2007 of Spring 2007 Visitors and Nonvisitors of Campus Recreational Facilities by Fall 2006 NEF*

Term	Visited	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Spring 2007							
	No	515	2.60	.98	-8.960	1,992	0.000
	Yes	1,479	2.96	.74			
Fall 2007							
	No	412	2.79	.74	-6.232	1,704	0.000
	Yes	1,294	3.02	.62			

Table 27 has the average GPA by categories of the number of visits during spring 2007. The GPA increases as the number of visits increases for each semester. The GPA also increases within each category of the number of visits across the

semesters. In other words, the highest GPAs are in the bottom row (most visits) and in the last column (fall 2007).

Table 27

*Average GPA for Spring 2007 and Fall 2007 by Number of Visits to Campus Recreational Facilities in Spring 2007 by Fall 2006 NEF*

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Number of Visits Spring 2007	Spring 2007		Fall 2007	
	N	Mean GPA	N	Mean GPA
0	515	2.60	412	2.79
1-4	385	2.78	328	2.93
5-12	382	2.90	351	2.95
13-22	242	2.98	207	3.03
23-143	470	3.13	408	3.15
Total	1,994	2.87	1,706	2.97

---

Tables 28-30 report the results of a one-way ANOVA with a Scheffe *post hoc* test. Because of the large sample sizes, most pairs of GPAs are statistically significantly different. With one exception, Tables 29 and 30 show that adjacent pairs of GPAs are not significantly different, and with two exceptions, nonadjacent pairs are statistically significantly different.

Table 28

*One-Way ANOVA of Average GPA for Spring 2007 and Fall 2007 by Number of Visits to Campus Recreational Facilities in Spring 2007 by Fall 2006 NEF*

Term	Source of Variance	SS	df	MS	F	p
Spring 2007	Between Groups	77.92	4	19.48	31.66	.000
	Within Groups	1223.97	1,989	.615		
	Totals	1301.89	1,993			
Fall 2007	Between Groups	27.92	4	6.98	16.62	.000
	Within Groups	714.53	1,701	.420		
	Totals	742.45	1,705			

Table 29

*Scheffe Pairwise Comparisons of Spring 2007 GPA by Number of Spring 2007 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

	Number of Visits				
	0	1-4	5-12	13-22	23-143
0		.013*	.000**	.000**	.000**
1-4			.344	.055	.000**
5-12				.847	.001**
13-22					.187

\*p < .05 \*\* p < .01

Table 30

*Scheffe Pairwise Comparisons of Fall 2007 GPA by Number of Spring 2007 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

		Number of Visits				
		0	1-4	5-12	13-22	23-143
0			.077	.025*	.001**	.000**
1-4				.998	.524	.000**
5-12					.695	.000**
13-22						.347

\*p < .05 \*\* p < .01

*Credits Earned by Spring 2007 Campus Recreational Facilities Visits*

The final analyses compared the credits earned based on whether the NEF visited or did not visit the campus recreational facilities during spring 2007 and based on how many times the NEF visited. Table 31 shows the credits earned of visitors and nonvisitors and that there is a difference in credits earned for both semesters when comparing visitors and nonvisitors. In spring 2007 visitors had statistically significantly more credits than nonvisitors (32.18 versus 29.65). In fall 2007 the difference was not statistically different with the visitors averaging 47.37 credits and the nonvisitors averaging 46.03.

Table 31

*T-tests of Spring Credits Earned for 2007 and Fall 2007 by Spring 2007 Visitors and Nonvisitors of Campus Recreational Facilities by Fall 2006 NEF*

Term	Visited	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Spring 2007							
	No	515	29.65	13.98	-4.314	1,992	0.000
	Yes	1,479	32.18	10.47			
Fall 2007							
	No	412	46.03	15.79	-1.880	1,704	0.060
	Yes	1,294	47.37	11.47			

Table 32 shows the average credits earned by categories of the number of visits during spring 2007. The credits earned increased as the number of visits increases for each semester, with the exception of one category in the fall of 2007, where the non-visitor category has slightly more average credits than the 1-4 visits category.

Table 32

*Average Credits Earned for Spring 2007 and Fall 2007 by Number of Visits to Campus Recreational Facilities in Spring 2007 by Fall 2006 NEF*

---

Number of Visits Spring 2007	Ave. Credits Earned Through Spring 2007		Ave. Credits Earned Through Fall 2007	
	N		N	
0	515	29.65	412	46.03
1-4	385	30.42	328	45.77
5-12	382	32.25	351	47.50
13-22	242	32.72	207	47.95
23-143	470	33.29	408	48.26
Total	1,994	31.53	1,706	47.05

---

Tables 33-35 report the results of a one-way ANOVA with a Scheffe *post hoc* test. Because of the large sample sizes, both spring 2007 and fall 2007 show a statistically significant difference. Table 34 shows significant differences between the nonvisitors and the visitors who visited more than five times. Table 35 shows the fall 2007 analyses in which none of the pairs are statistically significant.

Table 33

*One-Way ANOVA of Credits Earned for Spring 2007 and Fall 2007 by Number of Visits to Campus Recreational Facilities in Spring 2007 by Fall 2006 NEF*

Term	Source of Variance	SS	df	MS	F	p
Spring 2007	Between Groups	4297.95	4	1074.49	8.20	.000
	Within Groups	260557.90	1,989	148.42		
	Totals	264855.80	1,993			
Fall 2007	Between Groups	1802.15	4	450.54	2.83	.024
	Within Groups	271146.00	1,701	159.40		
	Totals	272948.20	1,705			

Table 34

*Scheffe Pairwise Comparisons of Spring 2007 Credits Earned by Number of Spring 2007 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

Number of Visits					
	0	1-4	5-12	13-22	23-143
0		.910	.023*	.019*	.000**
1-4			.295	.199	.010**
5-12				.993	.786
13-22					.983

\*p < .05 \*\* p < .01

Table 35

*Scheffe Pairwise Comparisons of Fall 2007 Credits Earned by Number of Spring 2007 Campus Recreational Facilities Visits in Groups by Fall 2006 NEF*

		Number of Visits				
		0	1-4	5-12	13-22	23-143
0			.999	.633	.525	.171
1-4				.531	.436	.133
5-12					.997	.953
13-22						.999

\*p < .05 \*\* p < .01

*Possible Negative Effects of Very High Usage*

Given that 383 NEF visited the campus recreational facilities during fall 2006 and 447 NEF visited the campus recreational facilities during spring 2007 more than twice a week, were they spending too much time recreating and not enough time studying? To answer the question, the average GPA by number of visits for the highest frequency visitor groups was recalculated using smaller intervals. In this case 20-visit intervals were used as opposed to the larger intervals that were used for fall and spring visits (23-106 and 23-143).

The results of the one-way ANOVAs are shown in Tables 36 and 37. Among the most frequent campus recreational facilities visitors during fall 2006, those fall 2006 NEF with the most visits (63-106) had the lowest average GPA for fall 2006. Among the most frequent campus recreational facilities visitors during spring 2007, those fall 2006 NEF who returned spring 2007 and had the most visits (83-143) also had the

highest average GPA for spring 2007. The results of the analysis of a relationship between a high number of campus recreational facilities visits and GPA is inconclusive. No significant difference was found for fall 2006 or for spring 2007.

Table 36

*Average GPA of Frequent Fall 2006 NEF Campus Recreational Facilities Visitors for Fall 2006*

Number of Visits	N	Average GPA	Spring 2007 Nonreturners	
			N	%
23-42	286	3.11	13	.00
43-62	85	3.23	1	1.18
63-106	26	3.07	4	15.38

Table 37

*Average GPA of Frequent NEF Campus Recreational Facilities Visitors for Spring 2007*

Number of Visits	N	Average GPA	Fall 2007 Nonreturners	
			N	%
43-62	106	3.22	12	.00
63-82	31	3.09	4	12.90
83-143	14	3.45	2	14.29

The fourth column of Tables 36 and 37 is the number of nonreturners for spring 2007 and fall 2007 for the most frequent visitor categories. Table 38 shows the GPA and number of visits for the 11 NEF with the highest number of visits who did not return for the succeeding semester. When the NEF with the four highest GPAs,

including a 3.94 GPA, and the four lowest GPAs among the most frequent visitor groups did not return, it is not clear that a relationship can be established.

Table 38

*GPA and Number of Campus Recreational Facilities Visits of Fall 2006 NEF Who Did Not Return Spring 2007 and Fall 2007*

Did Not Return Spring 2007		Did Not Return Fall 2007	
GPA	# of Visits	GPA	# of Visits
1.10	100	.37	70
2.56	55	.83	69
2.80	64	1.92	134
2.92	95	3.50	71
3.11	69	3.80	65
		3.94	101

Tables 39 and 40 show the average GPA of the most frequent visitor groups for all fall 2006 NEF and with the nonreturners removed for each semester. For each frequency of visits group, the average GPA increased when the nonreturners were removed. The increases ranged from .01 to .14. Among the fall 2007 nonreturnees, the NEF with the two lowest GPAs and the NEF with two of the three highest GPAs also had an equal number of visits to the campus recreational facilities. Again, it is not clear there is a relationship between GPA and number of visits.

Table 39

*Fall 2006 Average GPA of All Fall 2006 NEF and with Spring 2007 Nonreturners Removed in the Most Frequent Visitor Groups*

Fall 2006 NEF			Nonreturners Removed		
Number of Visits	N	Average GPA	N	Average GPA	
23-42	286	3.11	273	3.12	
43-62	85	3.23	84	3.24	
63-106	26	3.07	22	3.18	

Table 40

*Spring 2007 Average GPA of All Fall 2006 NEF and with Fall 2007 Nonreturners Removed in the Most Frequent Visitor Groups*

Fall 2006 NEF			Nonreturners Removed		
Number of Visits	N	Average GPA	N	Average GPA	
43-62	106	3.22	94	3.24	
63-82	31	3.09	27	3.23	
83-143	14	3.45	12	3.53	

*Summary of Analysis of Research Question 2*

GPA increased fall 2006, spring 2007, and fall 2007 for both visitors and nonvisitors to the campus recreational facilities. Visitor GPAs increased by .09, while nonvisitor GPAs increased by .31. The visitors' mean GPA for each semester was statistically significantly higher than the nonvisitors. The results showed that as the number of visits increased, the mean GPA increased. This was also significant across all

semesters when using fall semester visitor data. Most of the pairs of GPAs were statistically significant especially the nonvisitors or NEF with very few visits when compared to NEF with more visits. In most of the cases there was a higher number of credits earned by the students who had more visits. For spring 2007 and fall 2007, there is a positive relationship between the number of visits, and the numbers of credits earned and GPAs.

The last analysis examined the effect of a high number of visits on GPA. As Tables 39 and 40 show, fall 2006 NEF in the most frequent visitors groups had high average GPAs. Table 38 shows the 11 dropouts with many visits (55-134) had a wide range of GPAs (.37-3.94). The results examining diminishing returns were inconclusive. Too many campus recreational facilities visits do not necessarily produce a lower GPA.

### **Research Question 3**

Research question 3 addresses the issue of differences in GPAs and credits earned during the freshmen year based on ethnicity, gender, place of residence, and employment on campus of fall 2006 NEF. An independent sample *t* test was done with the cumulative GPA and credits earned after each semester as the dependent variable and the demographic variables as the independent variables. Research has shown that these demographic variables have an effect on GPA and credits earned.

#### *GPA Based on Ethnicity*

Table 41 shows GPA between NEF Caucasians and NEF non-Caucasians. The differences of .03, .05, and .09 for fall 2006, spring 2007, and fall 2007 respectively were not statistically significant. For each semester, the Caucasians had slightly higher GPAs.

Table 41

*T-tests of GPA By Ethnicity for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Ethnicity	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Caucasian	1,905	2.83	.91	3.96	2,135	0.692
	Non Caucasian	232	2.80	.63			
Spring 2007							
	Caucasian	1,774	2.87	.81	.79	1,992	0.429
	Non Caucasian	220	2.82	.80			
Fall 2007							
	Caucasian	1,515	2.98	.66	1.78	1,704	0.076
	Non Caucasian	191	2.89	.66			

#### *GPA By Gender*

Table 42 demonstrates that NEF females have a higher mean GPA in all three semesters than NEF males, and the difference is the same for all three terms. Table 42 also shows that there is a statistically significant difference for all three semesters. This corresponds to research showing that females, on average, are likely to have higher GPAs than their male counterparts.

Table 42

*T- tests of GPA By Gender for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Gender	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Male	1,001	2.66	.92	-7.97	2,135	0.000
	Female	1,136	2.97	.87			
Spring 2007							
	Male	935	2.70	.83	-8.96	1,992	0.000
	Female	1,059	3.01	.76			
Fall 2007							
	Male	809	2.80	.68	-10.18	1,704	0.000
	Female	897	3.12	.60			

*GPA By Place of Residence*

Table 43 shows that NEF living on campus have a significantly higher GPA in each semester than NEF living off campus. The results are statistically significant at the .05 level, a finding which corresponds to prior research. The results also show that the GPAs for both groups increase each semester.

Table 43

*T-tests of GPA By Place of Residence for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Place of Residence	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	On Campus	1,750	2.87	.87	7.974	2,135	0.000
	Off Campus	387	2.60	1.06			
Spring 2007							
	On Campus	1,652	2.90	.78	8.960	1,992	0.000
	Off Campus	342	2.68	.92			
Fall 2007							
	On Campus	1,436	2.98	.65	10.181	1,704	0.000
	Off Campus	270	2.89	.72			

*GPA by Employment On Campus*

Table 44 shows that NEF who are employed on campus fall 2006 have a statistically significantly higher GPA than NEF who are not employed on campus. Again, this supports research showing NEF who are employed on campus have higher GPAs. It should be noted that the GPAs of both groups increase through the three semesters though the increases are small for both groups.

Table 44

*T-tests of GPA By Employment On Campus for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Employed On Campus	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Yes	313	3.10	.78	5.946	2,135	0.000
	No	1,824	2.78	.92			
Spring 2007							
	Yes	297	3.15	.62	6.642	1,992	0.000
	No	1,697	2.82	.83			
Fall 2007							
	Yes	272	3.15	.60	4.921	1,704	0.000
	No	1,434	2.93	.67			

*Cumulative Credits Earned By Ethnicity*

Table 45 shows cumulative credits earned by NEF Caucasians and NEF non-Caucasians. For all three semesters, Caucasians have a statistically significantly higher mean number of cumulative credits earned compared to the non-Caucasian group. Additionally, the difference in the number of cumulative credits earned increases from 1.42 credits after fall 2006 to 2.51 credits after fall 2007.

Table 45

*T-tests of Cumulative Credits Based on Ethnicity for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Ethnicity	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Caucasian	1,905	17.54	10.34			
	Non Caucasian	232	16.12	7.27	2.04	2,135	0.042
Spring 2007							
	Caucasian	1,774	31.76	11.71			
	Non Caucasian	220	29.63	9.75	2.60	1,992	0.010
Fall 2007							
	Caucasian	1,515	47.33	12.80			
	Non Caucasian	191	44.82	11.23	2.58	1,704	0.010

*Cumulative Credits Earned By Gender*

Table 46 shows NEF females have statistically significantly more cumulative credits earned for all three semesters than NEF males. The results show that the difference between males and females increased from 2.94 for fall 2006 to 4.73 for fall 2007. This means that the females took at least one more course. These results support prior research showing females have more earned credits than males.

Table 46

*T-tests of Cumulative Credits Earned By Gender for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Gender	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Male	1,001	15.82	8.63			
	Female	1,136	18.76	10.99	-3.08	2,135	0.002
Spring 2007							
	Male	935	29.85	10.52			
	Female	1,059	33.01	12.16	-6.17	1,992	0.000
Fall 2007							
	Male	809	44.56	11.93			
	Female	897	49.29	12.88	-7.84	1,704	0.000

*Cumulative Credits Earned By Place of Residence*

Table 47 shows that NEF living off campus have more cumulative credits earned for all three semesters. The difference between the two groups grew from .94 credits after fall 2006 to 1.86 credits after fall 2007. The results are statistically significant at the .05 level for both of the fall semesters, but are not statistically significant for spring 2007.

Table 47

*T-tests of Cumulative Credits Earned By Place of Residence for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Place of Residence	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	On Campus	1,750	17.87	8.76			
	Off Campus	387	18.81	14.48			
					-3.08	2,315	0.002
Spring 2007							
	On Campus	1,652	31.47	10.18			
	Off Campus	342	31.81	16.58			
					-.50	1,992	0.620
Fall 2007							
	On Campus	1,436	46.75	11.46			
	Off Campus	270	48.61	17.64			
					-5.29	1,704	0.000

*Cumulative Credits Earned By Employment On Campus*

Table 48 shows that the NEF employed on campus fall 2006 have statistically significantly more cumulative earned credits than NEF not employed on campus. The NEF employed on campus took one course beyond the 16-hour credit load during fall 2006. The NEF not employed on campus took at least one credit less than the 16-hour credit load during spring 2007. These results support prior research that shows NEF employed on campus have more earned credits.

Table 48

*T-tests of Cumulative Credits Earned By Employment On Campus for Fall 2006, Spring 2007, and Fall 2007 of Fall 2006 NEF*

Term	Employed On Campus	N	Mean	Std. Dev.	<i>t</i> value	<i>df</i>	<i>p</i>
Fall 2006							
	Yes	313	20.15	9.77	5.30	2,135	0.000
	No	1,824	16.91	11.22			
Spring 2007							
	Yes	297	35.29	11.41	6.15	1,992	0.000
	No	1,697	30.87	11.47			
Fall 2007							
	Yes	272	50.74	12.97	5.29	1,704	0.000
	No	1,434	46.35	12.47			

### *Summary of Analysis of Research Question 3*

Research question 3 found that there are differences in GPAs and cumulative credits earned among NEF based on ethnicity, gender, place of residence, and employment on campus. When comparing ethnicity, Caucasians have higher mean GPAs over all three semesters, but the difference was not statistically significant. When comparing genders, females, on average, have a statistically significant higher mean GPA. Next, there was a statistically significant difference in GPAs between NEF living on campus and NEF living off campus. In all three semesters those who lived on campus had a higher mean GPA. The last GPA comparison was between those NEF

employed on campus fall 2006 and those not employed on campus. In findings that are again consistent with the literature, for all three semesters those students who were employed on campus fall 2006 have a statistically significantly higher GPA than those not employed on campus.

The second series of results in research question 3 deals with the same demographic variables and cumulative credits earned. Caucasians showed a statistically significantly higher number of cumulative credits earned compared to non-Caucasians. When comparing genders, females have a statistically significantly higher mean number of credits earned each semester. NEF living off campus earned more credits on average than their on campus counterparts. For two of the three semesters, these results were statistically significant. Finally, for all three semesters those NEF employed on campus fall 2006 had a significantly higher number of credits earned than those who were not employed on campus.

#### **Research Question 4**

Research question 4 addressed the difference in retention rates of NEF based on gender, ethnicity, place of residence, fall 2006 campus recreational facilities visits, and employment on campus. For each demographic variable, the retention rate was calculated using fall 2006 to spring 2007 data and using fall 2006 to fall 2007 data. A series of chi-square tests was performed to determine if the differences were statistically significant.

*Retention by Gender*

Tables 49 and 50 show the retention percentages of NEF by gender for spring 2007 and fall 2007. The chi-square statistic for spring 2007 is .029 ( $p=.865$ ), and for fall 2007 the chi-square statistic is 1.141 ( $p=.285$ ), which indicate no difference in retention between genders. Tables 49 and 50 clearly show that the percentages of males and females returning are almost equal.

Table 49

*Fall 2006 to Spring 2007 Retention by Gender*

	Not Return	Return	
Female	77 (6.8%)	1,059 (93.2%)	1,136
Male	66 (6.6%)	935 (93.4%)	1,001
	<b>143</b> <b>(6.7%)</b>	<b>1,994</b> <b>(93.3%)</b>	<b>2,137</b>

Table 50

*Fall 2006 to Fall 2007 Retention by Gender*

	<i>Not Return</i>	<i>Return</i>	
Female	239 (21.0%)	897 (79.0%)	1,136
Male	192 (19.2%)	809 (80.8%)	1,001
	<b>431</b> <b>(20.2%)</b>	<b>1,706</b> <b>(79.8%)</b>	<b>2,137</b>

*Retention by Ethnicity*

Tables 51 and 52 show the retention percentages of NEF by ethnicity for spring 2007 and fall 2007. For spring 2007, the chi-square statistic is .962 ( $p=.327$ ), while for

fall 2007 the chi-square is 1.007 ( $p=.316$ ), which indicate no difference in retention based on ethnicity. Tables 51 and 52 clearly show that the percentages of Caucasians and non-Caucasians returning are almost equal.

Table 51

*Fall 2006 to Spring 2007 Retention by Ethnicity*

	<i>Not Return</i>	<i>Return</i>	
Caucasian	131 (6.9%)	1,774 (93.1%)	1,905
Non-Caucasian	12 (5.2%)	220 (94.8%)	232
	<b>143</b> <b>(6.7%)</b>	<b>1,994</b> <b>(93.3%)</b>	<b>2,137</b>

Table 52

*Fall 2006 to Fall 2007 Retention by Ethnicity*

	<i>Not Return</i>	<i>Return</i>	
Caucasian	390 (20.5%)	1,515 (79.5%)	1,905
Non-Caucasian	41 (17.7%)	191 (82.3%)	232
	<b>431</b> <b>(20.2%)</b>	<b>1,706</b> <b>(79.8%)</b>	<b>2,137</b>

*Retention by Place of Residence*

Tables 53 and 54 compare the retention percentages of NEF by place of residence for spring 2007 and fall 2007. For spring 2007, the chi-square statistic is 18.443 ( $p=.000$ ), while for fall 2007 the chi-square is 29.729 ( $p=.000$ ), which indicate a statistically significant difference in retention based on place of residence. The tables

clearly show on campus NEF returned at a higher rate (94.4%) than off campus NEF (88.4%) for spring 2007. Similarly, for fall 2007 on campus NEF returned at a higher rate (82.1%) than off campus NEF (69.8%). As the literature has stated, on campus NEF are more likely to return than off campus NEF.

Table 53

*Fall 2006 to Spring 2007 Retention by Place of Residence*

	<i>Not Return</i>	<i>Return</i>	
On Campus	98 (5.6%)	1,652 (94.4%)	1,750
Off campus	45 (11.6%)	342 (88.4%)	387
	<b>143</b> <b>(6.7%)</b>	<b>1,994</b> <b>(93.3%)</b>	<b>2,137</b>

Table 54

*Fall 2006 to Fall 2007 Retention by Place of Residence*

	<i>Not Return</i>	<i>Return</i>	
On Campus	314 (17.9%)	1,436 (82.1%)	1,750
Off campus	117 (30.2%)	270 (69.8%)	387
	<b>431</b> <b>(20.2%)</b>	<b>1,706</b> <b>(79.8%)</b>	<b>2,137</b>

*Retention by Fall 2006 & Spring 2007 Campus Recreational Facilities Visits*

Tables 55 and 56 show that there is a significant difference in retention of NEF for spring 2007 and fall 2007 based on visiting the campus recreational facilities during fall 2006. Visiting the campus recreational facilities is defined as entering the campus recreational facilities at least once during the semester. Based on fall 2006 visits, for

spring 2007 the chi-square statistic is 35.165 ( $p=.000$ ), while for fall 2007 the chi-square statistic is 35.434 ( $p=.000$ ). Table 57 shows the effect of spring 2007 campus recreational facilities visits on fall 2007 retention rates. For fall 2007 the chi-square statistic is 21.657 ( $p=.000$ ). All three tables show that campus recreational facilities visitors returned at a statistically significantly higher rate than nonvisitors.

Table 55

*Fall 2006 to Spring 2007 Retention by Fall 2006 Campus Recreational Facilities Visits*

	<i>Not Return</i>	<i>Return</i>	
Fall 2006 Not Used	60 (12.7%)	412 (87.3%)	472
Fall 2006 Used	83 (5.0%)	1,582 (95.0%)	1,665
	<b>143</b> <b>(6.7%)</b>	<b>1,994</b> <b>(93.3%)</b>	<b>2,137</b>

Table 56

*Fall 2006 to Fall 2007 Retention by Fall 2006 Campus Recreational Facilities Visits*

	<i>Not Return</i>	<i>Return</i>	
Fall 2006 Not Used	141 (29.9%)	331 (70.1%)	472
Fall 2006 Used	290 (17.4%)	1,375 (82.6%)	1,665
	<b>431</b> <b>(20.2%)</b>	<b>1,706</b> <b>(79.8%)</b>	<b>2,137</b>

Table 57

*Spring 2007 to Fall 2007 Retention by Spring 2007 Campus Recreational Facilities Visits*

	<i>Not Return</i>	<i>Return</i>	
Spring 2007 Not Used	110 (21.4%)	405 (78.6%)	515
Spring 2007 Used	190 (12.8%)	1,289 (87.2%)	1,479
	<b>300</b> <b>(15.0%)</b>	<b>1,694</b> <b>(85.0%)</b>	<b>1,994</b>

*Retention by Employment On campus*

The last chi-square analysis shows that there is a statistically significant difference in retention of NEF for fall 2007 based on employment on campus during fall 2006. There is not a significant difference for spring 2007. The chi-square statistic for spring 2007 is 1.466 ( $p=.226$ ), while for fall 2007 the chi-square statistic is 11.383 ( $p=.001$ ). Tables 58 and 59 show that students employed on campus returned at a higher rate than those not employed on campus.

Table 58

*Fall 2006 to Spring 2007 Retention by Fall 2006 Employment On Campus*

	<i>Not Return</i>	<i>Return</i>	
Employed	16 (5.1%)	297 (94.9%)	313
Not Employed	127 (7.0%)	1,697 (93.0%)	1,824
	<b>143</b> <b>(6.7%)</b>	<b>1,994</b> <b>(93.3%)</b>	<b>2,137</b>

Table 59

*Fall 2006 to Fall 2007 Retention by Fall 2006 Employment On Campus*

	Not Return	Return	
Employed	41 (13.1%)	272 (86.9%)	313
Not Employed	390 (21.4%)	1,434 (78.6%)	1,824
	<b>431</b> <b>(20.2%)</b>	<b>1,706</b> <b>(79.8%)</b>	<b>2,137</b>

*Summary of Analysis of Research Question 4*

These chi-square analyses show that some variables affect retention of NEF and some do not. For gender and ethnicity, there is no difference in the retention rates between males and females and between Caucasians and non-Caucasians for either semester. For both spring 2007 and fall 2007, the NEF living on campus returned at statistically significantly higher rates than NEF living off campus. Similarly, NEF who visited campus recreational facilities in fall 2006 or spring 2007 returned at statistically significantly higher rates than NEF who did not visit the campus recreational facilities. There was also shown to be a difference in retention rates of NEF employed on campus compared with NEF not employed on campus. However, only for fall 2007 was the difference statistically significant.

**Research Question 5**

The final research question examines academic success and retention based on demographic data and campus recreational facilities visits. The analysis used gender, ethnicity, place of residence, employment on-campus, and number of campus

recreational facilities visits as the independent variables, and GPA, cumulative credits earned, and retention into the second year as the dependent variables. The semester's number of campus recreational facilities visits is a continuous variable, while the other independent variables are dichotomous and are coded 0 or 1. Specific coding procedures were described in chapter 3.

The aforementioned variables were used in linear regression and logistic regression models to predict academic success and retention, respectively. Two regression analyses predicted fall 2006 GPA and credits earned using the number of fall 2006 campus recreational facilities visits and the four dichotomous variables. Two other analyses predicted spring 2007 GPA and credits earned using the number of spring 2007 campus recreational facilities visits and the four dichotomous variables. The variables were added to the model using stepwise linear regression. The stepwise logistic regression models used all of these variables as independent variables to predict the retention of fall 2006 NEF for spring 2007 and fall 2007.

#### *Linear Regression*

Tables 60 and 61 present the results of stepwise linear regression to predict fall 2006 GPA and spring 2007 GPA. Both predictions required four steps to complete the model and neither analysis included ethnicity in the final model. In both predictions, the variables entered in the same order: number of campus recreational facilities visits, gender, employment on campus, and place of residence. Table 60 shows that the explained variation in the GPAs increases from 4.0% to 8.7% as the variables enter the model to predict fall 2006 GPA. Table 61 shows that the explained variation in the

GPA's increased from 4.7% to 10.9% as the variables entered the model to predict spring 2007 GPA.

The final step of each linear regression model predicting fall 2006 GPA and spring 2007 GPA has the same variables. In each model the beta weight for the number of campus recreational facilities visits is small because some NEF had more than 100 visits. The contribution is .1 or less to the GPA. Being female adds .32 to the GPA each term and employment on campus adds approximately .25 to the GPA. The GPA of NEF who lived off campus was reduced by .16 or .13 respectively for fall 2006 and spring 2007. This lower GPA is supported by Table 43 which showed that off campus NEF had statistically significant lower GPAs than on campus NEF.

Table 60

*Stepwise Linear Regression Statistics for Fall 2006 GPA Using Gender, Ethnicity, Place of Residence, Employment On Campus, and Fall 2006 Campus Recreational Facilities Visits*

Variable	<i>b</i>	S.E.	Sig.	R	R Squared
Step # 1				.200	.040
Fall 2006 Visits	.012	.001	.000		
Constant	2.683	.024	.000		
Step # 2				.272	.074
Fall 2006 Visits	.013	.001	.000		
Gender	.336	.038	.000		
Constant	2.496	.032	.000		
Step # 3				.288	.083
Fall 2006 Visits	.012	.001	.000		
Gender	.320	.038	.000		
Employed On Campus	.249	.054	.000		
Constant	2.474	.032	.000		
Step # 4				.296	.087
Fall 2006 Visits	.011	.001	.000		
Gender	.322	.038	.000		
Employed On Campus	.244	.054	.000		
Place of Residence	-.162	.051	.001		
Constant	2.515	.035	.000		

Table 61

*Stepwise Linear Regression Statistics for Spring 2007 GPA Using Gender, Ethnicity, Place of Residence, Employment On Campus, and Spring 2007 Campus Recreational Facilities Visits*

Variable	<i>b</i>	S.E.	Sig.	R	R Squared
Step # 1				.217	.047
Spring 2007 Visits	.010	.001	.000		
Constant	2.733	.022	.000		
Step # 2				.302	.091
Spring 2007 Visits	.010	.001	.000		
Gender	.341	.035	.000		
Constant	2.544	.029	.000		
Step # 3				.324	.105
Spring 2007 Visits	.010	.001	.000		
Gender	.324	.035	.000		
Employed On Campus	.267	.048	.000		
Constant	2.518	.029	.000		
Step # 4				.330	.109
Spring 2007 Visits	.009	.001	.000		
Gender	.326	.034	.000		
Employed On Campus	.263	.048	.000		
Place of Residence	-.130	.047	.005		
Constant	2.548	.031	.000		

Tables 62 and 63 present the results of the stepwise linear regression to predict fall 2006 credits earned and spring 2007 credits earned. The model to predict fall 2006 credits earned required five steps (see Table 62). The number of fall 2006 campus recreational facilities visits did not enter the model until the fourth step and only adds

.004 to the explained variation in the credits earned. The model to predict spring 2007 credits earned required four steps (see Table 63). The number of spring 2007 campus recreational facilities visits is the first variable to enter the model and explains 2.6% of the variations in credits earned. Place of residence did not enter the model, while it entered in the third step in the model to predict fall 2006 credits earned.

The final step of each linear regression model predicting fall 2006 credits earned and spring 2007 credits earned has the same variables with the exception of fall 2006 which includes place of residence. In each model the beta weight for the number of campus recreational facilities visits is small because some NEF had more than 100 visits. The contribution is .1 or less to the GPA. Being female adds 2.75 to the credits earned for fall 2006 and 3.04 to credits earned for spring 2007. Employment on campus adds 2.94 for fall 2006 and 4.19 to the credits earned for spring 2007. Being non-Caucasian subtracts 1.58 for fall 2006 and 2.16 for spring 2007 credits earned. The final variable included for fall 2006 is living on campus which adds 2.33 credits to the fall total.

Table 62

*Stepwise Linear Regression Statistics for Fall 2006 Credits Earned Using Gender, Ethnicity, Place of Residence, Employment On Campus, and Fall 2006 Campus Recreational Facilities Visits*

Variable	<i>b</i>	S.E.	Sig.	R	R Squared
Step # 1				.146	.021
Gender	2.944	.432	.000		
Constant	15.821	.315	.000		
Step # 2				.178	.032
Gender	2.771	.431	.000		
Employed On Campus	2.915	.608	.000		
Constant	15.486	.321	.000		
Step # 3				.191	.036
Gender	2.725	.430	.000		
Employed On Campus	3.010	.608	.000		
Place of Residence	1.764	.556	.002		
Constant	15.177	.335	.000		
Step # 4				.201	.040
Gender	2.814	.430	.000		
Employed On Campus	2.871	.608	.000		
Place of Residence	2.201	.573	.000		
Fall 2006 Visits	.044	.015	.002		
Constant	14.549	.393	.000		
Step #5				.207	.043
Gender	2.749	.431	.000		
Employed On Campus	2.935	.608	.000		
Place of Residence	2.331	.576	.000		
Fall 2006 Visits	.045	.015	.002		
Ethnicity	-1.575	.691	.023		
Constant	14.709	.399	.000		

Table 63

*Stepwise Linear Regression Statistics for Spring 2007 Credits Earned Using Gender, Ethnicity, Place of Residence, Employment On Campus, and Spring 2007 Campus Recreational Facilities Visits*

Variable	<i>b</i>	S.E.	Sig.	R	R Squared
Step # 1				.160	.026
Spring 2007 Visits	.114	.329	.000		
Constant	28.772	.015	.000		
Step # 2				.209	.044
Spring 2007 Visits	.119	.015	.000		
Gender	3.375	.533	.000		
Constant	26.910	.439	.000		
Step # 3				.238	.057
Spring 2007 Visits	.114	.015	.000		
Gender	3.120	.531	.000		
Employed On Campus	4.113	.750	.000		
Constant	26.509	.443	.000		
Step # 4				.244	.060
Spring 2007 Visits	.115	.015	.000		
Gender	3.036	.532	.000		
Employed On Campus	4.191	.750	.000		
Ethnicity	-2.160	.850	.011		
Constant	26.757	.453	.000		

#### *Binomial Logistic Regression*

The final analyses was a forward stepwise binomial logistic regression process which examined the set of independent variables as they contributed to the prediction of retention into spring 2007 (one semester after initial enrollment) and into fall 2007 (two

semesters after enrollment). The independent variables were the dichotomous variables gender, ethnicity, place of residence, and employment on campus, while the continuous variables were GPA, total credits earned, and number of campus recreational facilities visits.

Table 64 shows the stepwise binomial logistic regression model to predict spring 2007 retention for the fall 2006 NEF. The model was complete after two steps and included only fall 2006 GPA and place of residence. The model accurately predicted the spring 2007 retention status of 93.9% of the fall 2006 NEF.

Table 65 shows the stepwise binomial logistic regression to predict fall 2007 retention for the fall 2006 NEF. The model required five steps to completion. The number of spring 2007 campus recreational facilities visits entered the model at the fifth step and added .1% to the accuracy of the model. The model accurately predicted the fall 2007 retention status of 87.6% of the fall 2006 NEF.

Table 64

*Stepwise Binomial Logistic Regression Model to Predict Retention for Spring 2007*

Variable	<i>b</i>	S.E.	Sig. Ratio	% Predicted
Step # 1				93.3%
GPA Fall 2006	1.049	.082	.000	
Constant	.121	.187	.515	
Step # 2				93.9%
Place of Residence	-.465	.209	.026	
Fall 2006 GPA	1.021	.083	.000	
Constant	.293	.204	.151	

Table 65

*Stepwise Binomial Logistic Regression Model to Predict Retention for Fall 2007*

Variable	<i>b</i>	S.E.	Sig. Ratio	% Predicted
Step # 1				87.2%
Spring 2007 GPA	1.125	.079	.000	
Constant	-1.227	.205	.000	
Step # 2				86.9%
Gender	-.554	.141	.000	
Spring 2007 GPA	1.191	.082	.000	
Constant	-1.103	.208	.000	
Step # 3				87.4%
Gender	-.561	.142	.000	
Spring 2007 Credits	.037	.010	.000	
Spring 2007 GPA	.882	.113	.000	
Constant	-1.365	.225	.000	
Step # 4				87.5%
Gender	-.534	.143	.000	
Place of Residence	-.398	.167	.000	
Spring 2007 Credits	.037	.010	.000	
Spring 2007 GPA	.862	.113	.000	
Constant	-1.237	.231	.000	
Step # 5				87.6%
Gender	-.583	.145	.000	
Place of Residence	-.501	.173	.000	
Spring 2007 Credits	.037	.010	.000	
Spring 2007 GPA	.915	.115	.000	
Spring 2007 Visits	-.011	.004	.006	
Constant	-1.198	.232	.000	

The binomial logistic regression was used to predict whether a student would return or not return. For spring 2007 and fall 2007, the cumulative GPA had the largest beta weight and the NEF who lived off campus were penalized .465 and .501 respectively. For fall 2007 the number of campus recreational facilities visits is a potential subtraction of .1. This would not adversely affect the prediction because NEF with many visits had higher GPAs than NEF with fewer visits (see Table 27). Similarly, fall 2007 female NEF and NEF who lived off campus lose .583 and .501, respectively. This does not adversely affect the prediction because female NEF had higher GPAs than male NEF (see Table 42) and NEF who lived off campus earned more credits (see Table 47) to offset the place of residence penalty.

In spring 2007 retention was predicted by GPA and place of residence. The results show that living on campus and having a higher GPA were likely to lead to better retention. This model was able to predict the retention status of 93.9% of the 2006 NEF. In fall 2007 retention was predicted by gender, place of residence, cumulative credits earned, cumulative GPA as of spring 2007, and spring 2007 campus recreational facilities visits. The results show that being male, living on campus, having a higher number of cumulative credits, higher GPA, and fewer campus recreational facilities visits lead to higher retention. This model was able to predict retention status with 87.6% accuracy. For both semesters according to the models, number of campus recreational facility visits is not a good indicator of retention compared to credits earned or GPA. In fact for fall of 2007 higher number visits actually led to less retention.

*Summary of Analysis of Research Question 5*

In the linear regression analysis attempting to predict GPA for both fall and spring semester, results showed the same four variables as having the greatest ability to predict GPAs in NEF. These four variables were: campus recreational facilities visits, gender, employment on campus, and place of residence. Like most of the research on this subject matter, these results are consistent with prior research and show that more visits, being female, employed on campus, and living on campus are related to predictability of GPAs. The same results were shown for spring 2007 with the exception being campus recreational facilities visits which used spring 2007 visits instead of fall 2006 visits.

In the second part of the linear regression credits earned were predicted. In this analysis a five-step regression is used for fall 2006 to predict credits earned. The five variables that showed the greatest predictability for credits earned were: gender, employed on campus, place of residence, ethnicity, and fall 2006 campus recreational facilities visits. The results showed that students who were female, employed on campus, lived off campus, were non-Caucasian and visited the campus recreational facilities earned more credits. In the spring 2007 analysis the model was a four-step process using the same variables as fall 2006 omitting place of residence.

In the logistic regression mode for spring 2007, two steps were required to find variables to predict retention. The variables used were: place of residence and fall 2006 GPA. It was shown that living on campus and higher GPAs were able to predict retention or no retention with 93.9% accuracy. In predicting fall 2007 retention, a five-step model was used including these variables: place of residence, spring 2007 GPA,

gender, spring 2007 credits earned, and spring 2007 campus recreational facilities visits.

In this model being male, living on campus, having a higher number of credits earned, having a higher GPA, and having fewer visits to the campus recreational facilities were shown to have the greatest ability to predict retention. These five variables predicted retained or not retained with 87.6% accuracy.

## Chapter 5

### **Discussion and Conclusions**

Based on the literature, it was hypothesized that more campus recreational facilities visits would increase GPAs, credits earned, and retention rates of the NEF cohort. It was further hypothesized that certain demographic characteristics would influence the number of visits. The study also investigated the relationship between number of visits, and GPAs and credits earned. The third research question examined certain demographic characteristics and their effect on GPAs and credits earned. The fourth research question examined the retention rate based on demographic characteristics and whether the NEF visited the campus recreational facilities. The final research question used various combinations of the variables to predict the retention rate of the NEF cohort.

### **Discussion**

#### *Research Question 1*

The results of an independent sample *t* test showed that males were more likely to visit the campus recreational facilities. Other studies (e.g., Frauman, 2005; Maas, 1998) showed similar results. Maas showed that males (4,147 of 5,371 or 77%) were slightly more likely to use the recreational facilities than females (3,961 of 5,705 or 69%). Frauman similarly found that males were slightly more likely than females to use the recreational sports facilities, 50.8% to 49.2% respectively, but were much less likely to be non-participants, 41.4% to 58.6% respectively.

In examining the visits by ethnicity, both semesters showed a slightly higher number of visits by non-Caucasians. In comparison to the Maas study (1998), which

used seven groups for ethnicity (whites, internationals, minorities, African-Americans, American Indians, Asian-Americans, and Hispanics) to two groups in this study (Caucasians and non-Caucasians), international students and African-Americans showed more visits than Caucasians. Maas showed American Indians, Asian-Americans, and Hispanics had fewer visits than Caucasians. Frauman (2005) showed that 82.2% of the campus recreational facilities visitors were Caucasians while 78.6% of the nonvisitors were Caucasians.

Bryant et al. (1995) examined the effect recreational center visits had on minority students. Their study showed that minority students were much more likely than Caucasians to consider recreational facilities as important in their enrollment decisions. Furthermore, their results showed that African-Americans reported a 23% greater benefit in recreational center usage compared to Caucasians. Kovac and Beck (1997) also examined the benefits of participation in recreational sports. Their study showed that minority students tended to associate benefits with social and community-building. They also showed that minorities were less likely to be satisfied with their overall results.

When comparing place of residence with usage patterns, this study showed that NEF living on campus visited the campus recreational facilities statistically significantly more frequently than NEF living off campus. Maas (1998) showed that students who lived closer to campus were more likely to use the facility. Maas compared residents of Arizona to nonresidents of Arizona and found higher usage among nonresidents. The nonresidents tended to live closer to campus. Overall, findings in this study were consistent with results by Maas, and Barcelona and Ross (2002).

The last comparison examined those employed on campus versus those not employed on campus. The on campus workers had statistically significantly more visits, 14.73 versus 11.31 for fall 2006 and 15.93 versus 13.11 for spring 2007, to the campus recreational facilities than those who did not work on campus. Few previous studies have examined this area. Frauman (2005) found that 18.7% of the visitors to the campus recreational facilities were employed on campus while 8.6% of the nonvisitors to the campus recreational facilities were employed on campus.

### *Research Question 2*

The results of an independent sample *t* test showed that GPAs of both visitors and nonvisitors increased for all three semesters. For each semester, the visitor group had a higher mean GPA, and as the number of visits increased, the average GPA increased. Several studies showed similar results. Fenzel (2001) showed that GPAs for nonparticipators was 3.03 compared to 3.21 for participators. Griffore et al. (1990) reported that exposure to intramural sports helps develop self-esteem. According to Chickering and Reisser (1993), the college years lead to increased competence in intellectual areas, physical and manual skills, and interpersonal relationships. Increases in intellectual competence are particularly important and involve knowledge acquisition, increased aesthetic and cultural sophistication, and development of higher-order cognitive skills.

Astin (1985) showed that effective learning and involvement with any type of campus activity (e.g., clubs, sororities, fraternities, etc.) were related. Astin suggested that universities should create more opportunities to encourage students to remain on campus by developing and building recreational facilities. Berger and Milem (1999)

showed that early involvement in campus activities had an effect on retention in the fall semester and also predicted spring involvement in campus activities which had an effect on academic integration. Other studies (Astin, 1993; Pascarella & Terenzini, 1991) examined involvement and the effect it had on campus life. There are also recent studies (Pike, 1999, 2000; Pike & Killian, 2001) that build on Chickering's (1969) model that suggested involvement had an impact on learning outcomes. While none of these studies specifically examined just the campus recreational facilities visits as a determining factor in academic success, all of these studies showed that involvement in campus activities led to a better chance of academic success. The results of this study support the prior research on the importance of on campus involvement.

The second half of the research question dealt with the number of visits and credits earned. Again, there were few studies that addressed the specific impact of visits to recreational facilities on credits earned. This study showed that in most cases, as the number of visits increased the number of credits earned increased. This research supported several studies that linked usage with academic outcomes including studies by Cooper et al. (1999), Eccles and Barber (1999), and Marsh and Kleitman (2002). Belch et al. (2001) found that recreational center visitors had higher first semester GPAs and more credits earned than nonvisitors.

### *Research Question 3*

The analysis included a series of independent sample *t* tests comparing demographic variables with GPAs and credits earned. The demographic variables chosen were ethnicity, gender, place of residence, and employment on campus.

Caucasians had higher but not significantly higher GPAs and earned statistically significantly more credits than non-Caucasians.

There are a few studies in this area that showed similar results, and some that showed different results. Many of the studies that are referenced discussed ethnicity and usage and how they affect GPAs. Mallinckrodt and Sedlacek (1987) reported that non-Caucasians had to deal with nonacademic considerations before they were able to deal with academics. Tinto (1987) stressed that background variables such as ethnicity are related to retention. Several studies showed that grades and satisfaction are related to the decision to remain in college for all students (Pascarella & Chapman, 1983; Pascarella et al., 1986; Terenzini & Pascarella, 1977). It would seem that race and ethnicity have a fundamental impact on how college is experienced by minority students and therefore their adjustment process cannot be assumed to be the same as that of majority students.

An independent sample *t* test showed the females have a higher GPA and more credits earned than males. DeBerard et al. (2004) found that females had a higher overall first semester GPA than males. Pascarella and Terenzini (2005), Astin (1993), and Tinto (1987) found similar results. Many of these studies showed an increased number of credits earned by females compared to males.

The next independent sample *t* test showed that for all three semesters, the NEF who lived on campus had a statistically significantly higher GPAs than NEF who lived off campus. This is similar to other studies that have examined this factor. Blimling (1989) showed that students living on campus outperformed those living off campus by a statistically significant margin. Other studies reported the cognitive growth advantage

of living on campus (Baxter-Magolda, 1987, 1992; Pascarella & Terenzini, 1991; Perry, 1970). Pascarella et al. (1993) showed significantly larger gains in critical thinking and larger but only somewhat significant gains in reading. Different results were found in the study when comparing credits earned. In all three semesters, the numbers of credits earned were lower for the individuals who lived on campus compared with those living off campus.

The last independent sample *t* test showed that the NEF employed on campus had a statistically significantly higher number of credits earned and GPAs than NEF not employed on campus. This finding is similar to other studies that have been conducted on these factors. Astin (1975) reported that having a job on campus has a significant effect on a student's graduation chances. Astin (1975) also reported that students who were employed off campus or were employed full-time had a lower chance of persisting to graduation. Much of this effect is related to more frequent contact with other students, faculty, and staff as well as a greater degree of immersion in the college environment (Astin, 1975).

#### *Research Question 4*

For the fourth research question, a series of chi square analysis was done to determine if there was a difference in retention rates based on gender, ethnicity, place of residence, fall 2006 number of campus recreational facilities visits, and employment on campus. The results showed that retention rates by gender were basically the same. For spring 2007, 93.2% of females returned and 93.4% of males returned. Similar results were found for fall 2007, when 79.0% of females and 80.8% of males returned. Neither of these results was statistically significant. Several studies (Astin, 1993; Daly &

Breegle, 1989; Gallicki & McEwen, 1989; Lewallen, 1993; York et al., 1993) have suggested females have higher retention rates than males.

Part 2 of question 4 showed very little difference in retention based on ethnicity. For spring 2007, 93.1% of Caucasians returned and 94.8% of non-Caucasians returned. In the fall of 2007, 79.5% of Caucasians returned compared with 82.3% of non-Caucasians. Neither of these results was statistically significant. Some of the literature dealt with ethnicity and persistence (e.g. Gallicki & McEwen, 1989; Tinto, 1987). Other studies by Bryant et al. (1995), Astin (1977), Pascarella (1980), and Pascarella and Terenzini (2005) described African-Americans and Asian-Americans as having better stress management, time management, belonging, and association skills. The studies mentioned previously showed these skills have been shown to improve retention rates.

Part 3 of question 4 dealt with retention rates based on place of residence. Those students living on campus fall 2006 returned in spring 2007 at a 94.4% rate, while those living off campus fall 2006 returned at an 88.4% rate. Similarly, for fall 2007 retention, those living on campus fall 2006 returned at an 82.1% rate, while those living off campus fall 2006 returned at a 69.8% rate. The results for both semesters are statistically significant. Similar results have been shown in several studies. Chickering (1974) suggested that students living on campus have a positive association with satisfaction and college retention. Chickering further showed that students who lived off campus were more likely to be exposed to nonstudents whose attitudes toward college were not favorable.

The next part of question 4 dealt with number of campus recreational facilities visits and its effect on retention. In this analysis, there were considerable differences

based on visits to the campus recreational facilities. Fall 2006 visitors returned in the spring of 2007 at a 95.0% rate, while nonvisitors returned at an 87.3% rate. Similar results were found for retention in fall 2007 with 82.6% of visitors returning and 70.1% of nonvisitors returning. This finding is similar to several prior studies. Berger and Milem (1999) discussed the role of involvement in retention and how early involvement leads to retention. The study showed that the earlier the NEF gets involved after arriving on campus, the more likely the student is to be retained. Kovac and Beck (1997) compared visitors and nonvisitors, and their results were the same as this study. Pascarella and Terenzini (2005) reported that extracurricular involvement had an effect on persistence and educational attainment. Several studies, including Pascarella and Terenzini (1991, 2005), Mueller and Reznik (1979), Churchill and Iwai (1981), Astin (1977), and Tinto (1975), found that increased participation in recreational activities has an effect on a student's academic success and retention. Activity participation has been positively linked to academic outcomes, including grades, test scores, school engagement, and educational aspirations (Cooper et al., 1999; Eccles & Barber, 1999; Marsh & Kleitman, 2002).

The final part of question 4 dealt with employment on campus and its effect on retention rates. In this analysis, those who were employed on campus during fall 2006 had a statistically significantly higher retention rate than those not employed on campus. These results are similar to what is found in the literature. Astin (1975, 1993) reported that a student's chances of graduating are greatly increased by the type and extent of employment. Holding a job was positively associated with obtaining a bachelors degree.

*Research Question 5*

The final research question used regression techniques to predict academic success. Part 1 of research question 5 used a stepwise linear regression analysis to develop a model to predict GPAs and credits earned for fall 2006, spring 2007, and fall 2007. Models were run to examine the contribution of demographic variables and visits to the campus recreational facilities in predicting credits earned and GPA for spring 2007 and fall 2007. Part 2 of research question 5 used stepwise logistic regression to predict retention for spring 2007 and fall 2007. Models were run to examine the contribution of demographic variables, GPA, cumulative credits earned, and campus recreational facilities visits in predicting retention for fall 2006, spring 2007, and fall 2007. The stepwise process allowed for the identification of unique contributions within a set of variables.

The results from the stepwise linear regression showed that to predict GPAs for fall 2006 the model used four steps. The four variables that were included in this model were the number of fall 2006 campus recreational facilities visits, gender, employment on campus, and place of residence. The results concur with the research that showed students who visit the campus recreational facilities more often, females, students employed on campus, and those students who live on campus were likely to have higher GPAs. Studies conducted by Pascarella and Terenzini (1991, 2005), Astin (1977), Tinto (1975), Mueller and Reznik (1979), and Churchill and Iwai (1981) all showed that campus recreational facilities usage is related to higher GPAs. DeBerard et al. (2004), Pascarella and Terenzini (1991, 2005), Astin (1977), Tinto (1975) showed that females were likely to have higher GPAs than their male counterparts. Astin (1975, 1993)

showed that being employed on campus was likely to lead to higher GPAs. Astin (1993), Blimling (1989), and Pascarella et al. (1994) showed that living on campus led to higher GPAs. The same linear regression was run on spring 2007 GPAs with the same steps in the model and same variables being significant. For fall 2006 the explained variance was 8.7%, while for spring 2007 the explained variance was 10.9%.

The same linear regression was used to predict credits earned for fall 2006 and spring 2007. For fall 2006 the same variables were included in the model with the addition of a fifth step that added ethnicity. Ethnicity was included because the number of credits earned is statistically significantly different between Caucasians and non-Caucasians (see Table 45). In this analysis, place of residence showed that those living off campus had more credits earned than those living on campus. This is different from the results in the previously cited studies (Baxter-Magolda, 1987, 1992; Pascarella & Terenzini, 1991; Perry, 1970). The reason for this could be that a student who has a number of PSEO credits could be classified as a NEF but still be living at home. Due to the fact that a number of the PSEO students come from local high schools, a number of them may live at home during their first year of college. There is also a possibility that a student had originally planned to live off campus but moved into a residence hall. Because a student is only classified once, any movement would not be noted and the place of residence would not be changed. For fall 2006 the explained variance was 4.3%.

A similar model was run using spring 2007 credits earned. In this analysis, the model used four steps to enter the variables. In this model, the same variables were included: the number of fall 2006 campus recreational facilities visits, gender,

employment on campus, and ethnicity. Place of residence was not included. For spring 2007, the explained variance was 6.0%.

The second half of research question 5 used logistic regression to predict retention for spring 2007 and fall 2007. The variables were added in a stepwise binomial procedure. The variables that were used to predict retention were the demographic variables, campus recreational facilities visits, cumulative GPA, and cumulative credits earned.

For spring 2007 the model used for prediction had two steps which included place of residence and fall 2006 cumulative GPA. The results of this study showed that living on campus and having a higher cumulative GPA led to a greater chance of retention. These results match similar studies. Place of residence has a positive effect on retention according to Astin (1977, 1979) and Chickering (1974). The effect of a higher cumulative GPA on retention was shown by Aitken (1982), Bean (1980), Munro (1981), Pascarella and Chapman (1983), Pascarella et al. (1986), Terenzini and Pascarella (1977), and Pascarella and Terenzini (1991, 2005). The model in this study was able to predict returning or nonreturning students with 93.9% accuracy.

In the final analysis, a stepwise logistic regression was used to predict retention for fall 2007. The five variables that were included in this model were the two from the previous model plus gender, spring 2007 cumulative credits, and spring 2007 campus recreational facilities visits. This model showed different results from many of the previous studies. This study showed being male, living on campus, having more cumulative credits earned for spring 2007, a higher cumulative GPA for spring 2007,

and fewer visits to the campus recreational facilities were likely to lead to better retention.

The final variable of this model was campus recreational facilities visits for spring 2007. Pascarella and Terenzini (1991, 2005), Mueller and Reznik (1979), Churchill and Iwai (1981), Astin (1977), and Tinto (1975) showed results that more visits were related to higher retention rates. This study showed that fewer visits lead to higher retention. A couple of reasons that can help explain why campus recreational facilities visits may be inversely related to retention rates. First, because there is a large difference in the number of visits, if a student who had a large number of visits and did not return, there could be an effect. If several students with many recreational facilities visits did not return, it could have an effect on this variable. It could also be argued that students who are not visiting the campus recreational facilities are still involved in other campus activities that lead to retention. The model for fall 2007 was able to predict returning or nonreturning students with 87.6% accuracy.

### **Summary**

In general, this study produced results that were similar to much of the prior research on retention and the effect that campus recreational facilities visits have on retention. Similar things can be said about the effects of demographic variables on GPA and credits earned.

The first analysis dealt with total overall campus recreational facilities visits. For fall 2006, there were 86,193 student visits to the campus recreational facilities. Of these visits, 31,196 were by NEF which was 36.1% of all visits to the campus recreational

facilities. In the spring of 2007, there were 92,871 overall visits and 24,654 NEF visits.

For spring 2007, NEF had 26.5% of all visits.

In the second part of the first analysis, results showed that NEF visits to the campus recreational facilities for the first week of fall 2006 were 45.2% of all student visits. It was also shown that for fall 2006, 77.9% of NEF visited the campus recreational facilities. In spring 2007, 74.2% of NEF visited the campus recreational facilities. It was also shown that mean number of visits in fall 2006 was 11.82 compared with 13.53 in spring 2007. The difference in NEF visits between fall 2006 and spring 2007 was 6,542 for a decrease of 21%.

Research question 1 dealing with usage patterns showed that males, non-Caucasians, living on campus, and employment on campus were more likely to lead to more campus recreational facilities visits.

Research question 2 showed the results of visits to the campus recreational facilities and the effect the number of visits had on GPAs and credits earned. As has been previously shown and discussed, GPAs were higher for visitors to the campus recreational facilities. The results also showed that GPAs increased for both visitors and nonvisitors, but the visitors had higher GPAs. The results for cumulative credits earned were the same. Those who visited the facilities were more likely to have a higher number of cumulative credits earned than nonvisitors.

Research question 3 showed the influence of demographic variables on GPAs and credits earned. These results showed that Caucasians, females, those living on campus, and those employed on campus were more likely to have higher GPAs. When the results were studied for cumulative credits earned, the results were the same except

for those living off campus who earned more cumulative credits than those living on campus.

Research question 4 showed retention rates based on demographic variables and visits to the campus recreational facilities. There was no effect on retention based on gender or ethnicity. Those who were living on campus, those who had more campus recreational facilities visits, and those who were employed on campus all showed a higher rate of retention than others.

Research question 5 showed predictability of GPA and cumulative credits earned for the first part of the question and retention for the second part of the question. The results predicting GPA showed similar results to research question 3. Females, living on campus, employment on campus, and total number of visits to the campus recreational facilities were the best predictors. When predicting cumulative credits earned, the results were again similar to those in question 3. The results for predicting credits earned included these variables: being female, employment on campus, living off campus, being non-Caucasian, and number of visits to the campus recreational facilities.

The second part of this question dealt with predicting retention for spring 2007 and fall 2007. For spring 2007, living on campus and GPA were the best predictors of retention. For fall 2007, being male, living on campus, credits earned, GPA, and fewer campus recreational facilities visits were used to predict retention. However, NEF with more campus recreational facilities visits had higher GPAs so the subtraction is minor relative to the high GPAs that the NEF had. The logistic regression accurately predicted

spring 2007 retention status 93.9% of the time and fall 2007 retention status 87.6% of the time.

### **Limitations**

1. The major limitation of this study was its use of one comprehensive state university in the Midwest. While the study captures data from all NEF from fall 2006, it may not be generalizable to other universities. The other studies that were similar used institutions in the southeastern United States for the Frauman (2005) study, while the Maas (1998, 1999) study was conducted at Arizona State University. In examining the two similar studies, it is obvious that they were in different locations in the country and certainly have a much different student population. Many of the results were the same for the two studies, but considering the different institutions and geographic locations, they may not be generalizable from one institution to another.
2. A second limitation of this study was that it was only done for a one-year period from fall 2006 through fall 2007. If the summer was included, different results may occur and a better overall usage pattern may be shown.
3. A third limitation was the study was only able to access the main campus recreational facility and the swimming pool. Because these facilities are the only recreational facilities on campus that use the access card technology, the study was only able to access information from these sites. This might have had an effect on gender results because all of the aerobics classes are held in different facilities that do not require an access card. Because aerobic classes are usually much more female attended, some of the results may be skewed.

4. A fourth limitation was no attempt was made to determine the length of time in the facilities or what was done in the facility.
5. A fifth limitation was that due to a lack of diversity on the campus used for the study, the ethnicity was divided into only two groups, Caucasians and non-Caucasians. These divisions are vague and may cause some difficulty in generalizing the ethnicity results for another university attempting to replicate this study.
6. The last limitation is that the scan card system is only in place in the main campus recreational facilities. The field house, outdoor activities, racquetball courts, and aerobic classes users are not included in the visitor data. In order for a more accurate description of visitors to the facilities to occur, the ability to count visitors at these locations must be a vital part of any future study.

### **Recommendations for Future Research**

1. Although the present study examined the unique effects of recreational facilities visits in the context of two other campus life variables (i.e., living on campus and employment on campus), there are other campus life experiences that could be included in a more comprehensive examination of the unique contributions of campus life in the context of other variables. These activities include athletics, music and theater groups, Greek organizations, campus newspaper, student government, clubs associated with each major, etc. None of this information is centrally collected, so collecting it would be labor intensive and cost prohibitive.
2. A second suggestion for future research concerns the need for more specific indices of the particular nature of the usage variable. In the current study, which is one of the limitations of this study, the access card system tracked only entrance into the

facility and there was no way to determine either the particular activity in which the student was engaged nor the duration of the activity. Although an overwhelming majority of the visits are likely to be related to exercise per se, some of the visits may not have been directly related to physical activity. As such, it is impossible to determine the physiological underpinning of the recreational usage variable. Most of the literature on the benefits of physical activity is related to the physiological effects rather than the social effects of being with others, being engaged in a group activity, and being part of a campus activity.

3. A third suggestion for future research would be to examine some further demographic variables to determine their impact on number of visits, GPA, and credits earned. These variables include the major of the student, distance the student lives from campus, whether the student is employed off campus, parent's educational level, socioeconomic status, and student's financial aid status. These variables were not used in this study because they were not available but have been shown to have an effect on GPA and credits earned.

4. Other issues to include in future retention studies include universities having higher admissions standards, higher percentage of students working, students spending more time playing video games and spending time on the computer, and more universities having on-line courses are all factors that may influence grades and credits earned that were not investigated by this study.

5. Examine the number of visitors by time of day. Do the hours need to be extended? Does the facility need to be expanded?

### **Implications**

It seems possible that the use of this type of information may aid a university to better understand its campus recreational facilities visitors and nonvisitors as well as provide information for a division of student affairs to assist in better understanding the relationship between student involvement in recreational activities and the overall college experience. It would also seem to be helpful for student affairs as a way to sell the campus, or at least another tool, to help sell the campus to prospective students.

From the results of this study, it would appear that having an introduction to campus recreational facilities as part of the welcome week or orientation would be a great idea. As was shown, during the first week of fall 2006, 45.2% of all visitors to the campus recreational facilities were NEF. The study seems to show that for NEF arriving on campus and looking for a way to spend some free time and meet some people, the campus recreational facilities were the choice for many NEF. The fact that it is free to enter, it is open late in the day, and it is a good chance that many NEF are exercising on a regular basis makes this a great spot for NEF to congregate when arriving on campus. An orientation as part of welcome week makes this an option for NEF because they are somewhat familiar with the environment.

The study also showed that those who lived on campus, were males, were non-Caucasian, and were employed on campus were more likely to be users. An implication for student affairs or recreational sports might be to try and find a way to get the groups that do not frequent the campus recreational facilities as much to visit more often. Because the study showed that retention on average increases with the number of visits to the campus recreational facilities, getting those students more involved should help

retain them. This is especially an issue with those who are not on-campus residents because it is known that students living off campus are retained at a lower rate than those living on campus. If visiting the campus recreational facilities can help with retention, the students who are not visiting the facilities may need a reason to visit the facility more frequently.

### **Conclusions**

In several research questions addressed by this study, the topic of campus recreational facilities visits arose. In attempting to address the relative value of campus recreational facilities, there are a few things that need to be stated. First, looking at retention between fall 2006 and spring 2007, 95.0% of campus recreational facilities visitors returned compared with 87.3% of the nonvisitors. This is a difference of 7.7%. If you examine retention for fall 2007, those numbers show an even greater difference. For fall 2007, 87.0% of visitors to the campus recreational facilities returned compared with 63.5% of nonvisitors. This is a difference of 23.5%. The study also showed that GPA was higher in those students who visited the campus recreational facilities and that those students also generally earned more credits than the nonvisitors.

As the results of this and other studies have shown, there is an improvement in retention rates, GPA, and credits earned when students visit the campus recreational facilities. This would seem to tell administrators and students that campus recreational facilities serve a purpose for everyone on campus and should be funded like any other campus activity.

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