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Michael J. Foster

*Eastern Illinois University*

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The Physical Activity Levels of College Age Sorority Members

Compared to Non-Sorority Members

(TITLE)

BY

Michael J. Foster

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

Master of Science in Physical Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
CHARLESTON, ILLINOIS

2008

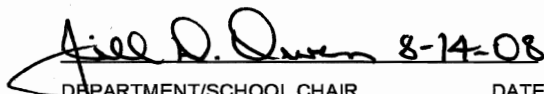
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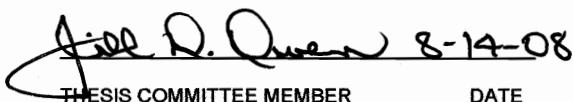
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## Abstract

**Objectives.** The current study compared the physical activity levels of college undergraduates who were members of a sorority with non-sorority members. Behavioral practices that may influence physical activity were also examined.

**Method.** A sample of 300 was taken from 4,823 female undergraduates at a midwestern university. The instrument was a two-part questionnaire that first obtained information pertaining to the subject's demographics, academics, and unhealthy behaviors. The second part of the questionnaire was an attached seven-day physical activity recall survey that was developed by Sallis et al.

(1985). Physical activity was assessed by total METs expended per day.

It was hypothesized that non-sorority members would be more physically active than sorority members.

**Results.** There was no significant difference ( $p = 0.615$ ) between sorority members and non-sorority members in total METs expended per day (sorority members =  $40.99 \pm 8.33$  vs. non-sorority members =  $41.49 \pm 8.90$ ). Non-sorority members participated in significantly ( $p = 0.008$ ) more weekend moderate activity (sorority members =  $2.18 \pm 2.57$  vs. non-sorority members =  $3.25 \pm 4.15$ ) and worked significantly ( $p = 0.019$ ) more hours per week than sorority members (sorority members =  $3.57 \pm 6.45$  vs. non-sorority members =  $5.72 \pm 8.99$ ).

Sorority members were found to have participated in a significantly ( $p = 0.00$ ) greater number of intramural sports per semester than non-members (sorority members =  $1.44 \pm 1.65$  vs. non-sorority members =  $0.26 \pm 0.58$ ) and they consumed alcohol on significantly ( $p = 0.022$ ) more occasions within the previous

seven days than non-sorority members (sorority members =  $1.89 \pm 1.17$  vs. non-sorority members =  $1.53 \pm 1.55$ ).

Correlations in sorority members demonstrate a relationship between the increase in the number of intramural sports participated in per semester with the increase in total METs expended per day ( $p = 0.000$ ), the increase in the total credit hours enrolled in with the increase in total METs expended per day ( $p = 0.026$ ), and the increase in the number of occasions alcohol was consumed within the previous seven days with the decrease of total METs expended per day ( $p = 0.026$ ). Also, a correlation in non-sorority members demonstrated a relationship between the increase in the number of hours worked per week while in college with the increase in total METs expended per day ( $p = 0.004$ ).

**Conclusion.** It was concluded the physical activity levels of sorority members and non-sorority members as determined by total METs expended per day was similar despite certain negative behaviors. Sorority members appeared to have received great amounts of physical activity through intramural sports, while non-sorority members received great amounts of physical activity through work.

**Dedication**

In loving memory of Joshua M. Foster, who will forever be in our hearts.

(February 4, 1994 – March 8, 2006)

## **Acknowledgments**

To Dr. Emmett, Dr. Owen, and Dr. Croisant, who went well beyond their duties as committee members to assist me on my thesis. I want to thank you for taking the time out of your busy lives to help. I honestly appreciate all you have done.

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## CHAPTER I

### INTRODUCTION

Physical activity is beneficial to people of all ages. To participate in physical activities one does not need special training or skills, yet 62% of college age people 18-24 years still do not regularly participate in leisure-time physical activity (Dinger & Behrens, 2005). The physical activities performed do not need to be strenuous because moderate activity is just as beneficial to healthy living and preventing obesity as intense training (Surgeon General, 1999). In spite of this, the lack of physical activity continues to be a growing concern for Americans.

Physical activity can be obtained by performing any activity using large muscle groups continuously, such as hiking, stair climbing, cross-country skiing, jumping rope, and swimming. However, low intensity activities need to be performed for a longer duration than high intensity activities in order to achieve similar results. These types of activities are considered hobbies and fun activities for many, but still there is a lack of effort being put towards healthy living.

The Surgeon General (2007) reports involvement in physical activity dramatically decreases as age and grade in school increases. These statistics are surprising because age itself is not a limiting factor to exercise; therefore, age alone does not explain this trend of diminishing activity from grade school to college (Pollock et al., 1998).

Previous research has shown that fraternity and sorority members living in Greek housing participate in more vigorous physical activity than non-members and that non-members living in on-campus housing participated in more moderate physical activity than residents of fraternity and sorority housing (Dinger, 1999). Staten, Miller, Noland, and Rayens (2005) determined that fraternity and sorority members participated in moderate physical activity more often than non-members. These results included males, which may have altered the data for the sorority members because males tend to participate in more physical activity and exercise than females (Dinger & Behrens, 2005; Daskapan, Tuzun, & Eker, 2006). From these studies one cannot determine conclusively whether sorority members are more physically active than non-members.

The previous research has examined groups combining all college students or fraternity and sorority members without targeting the specific group of female college undergraduates. An array of research has been found examining college age subjects and physical activity barriers, perceptions, attitudes, knowledge, and beliefs; however, no previous research could be located that focused on regular exercise habits of sorority members compared with non-members to determine which group is more physically active. This knowledge will aid in the understanding of what is affecting female physical activity, which cannot be done when males are included in the study. The intent of the present study was to compare the physical activity levels of sorority members to non-sorority members. The importance of this study was to determine if being a member of a sorority has a positive or negative affect on physical activity levels

when compared to counterparts who are not members of a sorority. The findings from this study may change the way physical activity is promoted to college age females because it can provide further information on female undergraduate physical activity and what personal behaviors are affecting their physical activity patterns.

In addition to determining which group is more physically active, this current study also had the objective of obtaining further information related to factors that influence the physical activity levels of college sorority members and non-members.

### **Purpose**

The purpose of this study was to determine whether females who are not in a sorority are more physically active than females who are members of a sorority. An additional objective of the study was to determine whether there was a relationship for physical activity with demographic factors or unhealthy lifestyle behaviors. Lifestyle behaviors and demographic factors that were examined included age, type of residence, intramural involvement, academics factors, number of hours worked per week, alcohol consumption, cigarette smoking, how the subjects rate their diet, and how concerned the subjects were with eating healthy. These factors were then assessed to determine whether they were associated with the subject's physical activity levels or differed between groups.

## Hypotheses

It was hypothesized that non-members would be more physically active than sorority members. Previous research has shown that non-fraternity and non-sorority members performed moderate physical activity more than fraternity and sorority members (Dinger, 1999). Dinger (1999) also determined that vigorous physical activity was performed more frequently by fraternity or sorority members living in Greek housing than non-fraternity or non-sorority members living in residence halls. Although fraternity and sorority members participate in more vigorous physical activity, moderate physical activity is easier to accumulate than vigorous physical activity. Moderate physical activity can be achieved by performing many activities of daily living, whereas vigorous physical activity usually is achieved only through planned, higher intensity exercise or strenuous occupational activities (Blair et al., 2006). These findings aided in the development of the hypothesis.

Research by McCabe, Schulenberg, Johnston, O'Malley, Bachman, and Kloska (2005) determined that fraternity and sorority members have elevated levels of alcohol and cigarette use compared to non-members. Lo and Globetti (1995) found sorority members to be almost five times more likely than non-members to increase their alcohol consumption from low-frequency while in high school to high-frequency consumption while in college. The lifestyles that fraternity and sorority members live lead to missing class, poor grades, unprotected sex, violence, and even death (Caron, Moskey, & Hovey, 2004). It



was also hypothesized that the elevated levels of alcohol consumption in sorority members will lead to a decrease in their physical activity.

### **LIMITATIONS**

1. The sample was one of convenience and selection was based upon those willing to volunteer their participation, therefore, the findings of this study may not represent the practices of all college age females.
2. Physical activity and lifestyle behavior data were self-reported; subjects may have misrepresented the physical activity levels and behavior patterns.

### **DELIMITATIONS**

1. The subjects came from one midwestern university, which may not truly represent all sorority members and non-members.
2. The time of year the study was conducted could have influenced the amount of physical activity in which the subjects were participating.
3. The weather during the week the questionnaires were administered may have influenced the amount of physical activity the subjects engaged in.
4. Members of a sorority may have special competitions or events that non-members did not have an opportunity to participate in. This would allow sorority members a chance to engage in more physical activity than non-members while training for or participating in these events.

## **DEFINITION OF TERMS**

Body Mass Index (BMI): an equation used to assess body weight by dividing weight in kilograms by height in meters squared (Wilmore & Costill, 1999).

MET or Metabolic Equivalent: this unit of measurement is used to estimate the amount of oxygen the body uses during physical activity. One MET (approximately 3.5 ml O<sub>2</sub>/kg/min.) is equal to the energy used by the body while performing little to no activity; for example, reading a book or talking on the phone (National Center for Chronic Disease Prevention and Health Promotion, 2007).

Moderate Physical Activity: requires an energy expenditure of 3 to 6 METs, or 3.5 to 7 kcal/minute (National Center for Chronic Disease Prevention and Health Promotion, 2007).

Obesity: excessive body fat of more than 25% body weight in men and more than 35% body weight in women. Often categorized by a BMI  $\geq 30$  kg/M<sup>2</sup> (Wilmore & Costill, 1999).

Physical Activity: is bodily movement produced by skeletal muscles resulting in an expenditure of energy, which benefits overall health and develops or

maintains physical fitness (National Center for Chronic Disease Prevention and Health Promotion, 2007).

Vigorous Physical Activity: requires an energy expenditure of greater than 6 METs or more that 7 kcal/min (National Center for Chronic Disease Prevention and Health Promotion, 2007).

## CHAPTER II

### REVIEW OF RELATED LITERATURE

It was the purpose of this study to determine whether females who were not members of a sorority were more physically active than females who were sorority members. An additional objective of the study was to determine whether there was a relationship for physical activity with demographic factors or unhealthy lifestyle behaviors. It was hypothesized that non-members would participate in more physical activity than sorority member measured by total MET expenditure per day. It was also hypothesized that sorority member's alcohol consumption would decrease the amount of physical activity they participated in.

This chapter will review the pertinent literature related to this study. The sections presented in this review are: Unhealthy Behaviors of College Students, Health and Social Desirability, The Physical Activity of College Students, and Physical Activity Assessment. Previous research has been conducted comparing the physical activity levels of males to females and fraternity members to sorority members, but none were identified that compared females in a sorority to non-sorority members.

#### **Unhealthy Behaviors of College Students**

In 1995, a survey was distributed to US college undergraduates that monitored their health risk behaviors (Douglas & Collins, 1995). The authors separated the health risk behaviors into six different categories: (1) behaviors

that contribute to unintentional and intentional injuries; (2) tobacco use; (3) alcohol and other drug use; (4) sexual behaviors that contribute to unintended pregnancy and STDs; (5) unhealthy dietary behaviors; and (6) physical inactivity. Four thousand six hundred and nine (4,609) undergraduate students at 2-year and 4-year universities completed the questionnaires, 55.5% of the participants were female. Vigorous physical activity was reported by 37.6% of the undergraduates with male students participating in more vigorous physical activities and 19.5% of the respondents reported participating in walking or biking (moderate physical activity). Vigorous physical activity was defined as “physical activity that made you sweat and breathe hard for at least 20 minutes on 3 or more of the 7 days preceding the survey” and moderate physical activity examples were walking or biking at least 30 minutes 5 or more of the 7 days prior to the survey. There was no difference in participation by gender for moderate physical activity (Douglas & Collins, 1995). This study showed that a low percentage of college undergraduates participate in moderate physical activity, even though most college students have the resources to participate in physical activity because they are within walking distances of recreation centers and other facilities.

A study by Patrick, Covin, Fulop, Calfas, and Lovato (1997) examined what health risk behaviors college students in California were involved in. There were 3,810 students who participated in the survey from 29 different universities. Of those 3,810 students: 36.7% reported binge drinking at least once, 25.3% had driven after consuming alcohol, 32% had been in a car with a driver who had

consumed alcohol, 17.6% had used marijuana, and 6% had carried a knife, gun, or club (Patrick et al., 1997). Forty-four percent of the subjects (49.2% of men and 40.3% of women) reported aerobic physical activity on three or more of the past seven days (Patrick, Covin, Fulop, Calfas, & Lovato, 1997), which is consistent with previous studies where men were more physically active than women. Aerobic activity was defined as 20 minutes or more of activity that increased breathing and caused sweating. Only 31.3% of the subjects (20.2% of women and 16.1% of men) participated in stretching (Patrick, Covin, Fulop, Calfas, & Lovato, 1997). Negative behaviors are common among college campuses and should be targeted to promote healthy lifestyles.

Wechsler, Dowdall, Davenport, and Castillo (1995) researched binge drinking in college students. One hundred forty colleges across the country agreed to participate in the study, with 17,592 students participating. The researchers found that 39% of the women and 50% of the men reported binge drinking, which was defined as five or more drinks for men and four or more drinks for women in the past two weeks on one or more occasions. Results indicated that living in Greek housing was associated with binge drinking (Wechsler, Dowdall, Davenport, & Castillo, 1995). With Greek housing leading to unhealthy behaviors, one might predict that the binge drinking would lead to lower physical activity levels.

Vickers, Patten, Bronars, Lane, Stevens, Croghan, Schroeder, and Clark (2004) conducted a study focusing on binge drinking in female college students and found that binge drinking was associated with weight concerns. There were

412 college women that participated in the study and 61% of them reported binge drinking within the last 2 weeks (Vickers et al., 2004). Results from the study showed that females who participated in low levels of physical activity were least likely to report binge drinking (Vickers et al., 2004), which goes against the trend of unhealthy behaviors leading to sedentary lifestyles. The researchers did report that the cross-sectional nature of the study could have altered the data that compared physical activity and binge drinking because they were unable to explore any relationships (Vickers et al., 2004). Further studies need to be conducted to examine the effects of binge drinking on the lifestyles of female college students because not enough useful data was collected in this study.

While a significant amount of research has been conducted on Greek members and NCAA athletes, little research has been done to determine if belonging to other organizations leads to the participation in unhealthy lifestyle behaviors. Ward and Gryczynski (2007) analyzed secondary data from a school wide Web-based alcohol-use survey that was administered in 2004. After receiving this data, the researchers mailed 1,000 surveys to current students of this university and had a response rate of 55% with 7.5% of the respondents being Greek members. This study determined that 86.9% of all subjects consumed alcohol before the survey and that 22.2% were considered heavy drinkers. Also, the subjects consumed approximately 3 alcoholic drinks on a day they consumed alcohol, which was at a lower rate than shown in a previous study (Ward & Gryczynski, 2007). The findings in this study were consistent with other studies determining that Greek members consumed more alcoholic drinks

per night than non-members ( $4.12 \pm 2.66$  alcoholic drinks vs.  $2.67 \pm 2.28$  alcoholic drinks) (Ward & Gryczynski, 2007). Though the findings were consistent with other studies, they were limited in their external validity because of the small percentage of subjects being Greek.

McCabe, Schulenberg, Johnston, O'Malley, Bachman, and Kloska (2005) conducted a study from 1988-2001 surveying high school seniors, then distributed follow-up surveys during their first and second years in college. The data collected from the study indicated that fraternity and sorority members reported high levels of substance use prior to college (McCabe et al., 2005).

The lifestyles that many fraternity and sorority members engage in put them at risk for missing class, poor grades, unprotected sex, violence, and even death (Caron, Moskey, & Hovey, 2004). This study compared data from Greek members at a university from 1994 and 2000 to determine commonalities and differences that occurred over time (Caron, Moskey, & Hovey, 2004). A sample of 508 Greek members completed a 32-item questionnaire, with 303 (142 fraternity members and 161 sorority members) respondents from the year 1994 and 205 (89 fraternity members and 116 sorority members) respondents from the year 2000. The sample from the year 2000 reported drinking less alcohol in high school (68.6%) compared to the sample from the year 1994 (77.9%) (Caron, Moskey, & Hovey, 2004). When all subjects were asked about drinking habits since entering college, 65% of the subjects reported an increase in their drinking while approximately 95% felt no pressure to drink since rushing a fraternity or sorority; (Caron, Moskey, & Hovey, 2004). The results from this study indicate



that fraternity and sorority members had a high rate of alcohol consumption. It also determined that the majority of subjects in this study reported drinking two or more times a week, while consuming at least four or more drinks in an evening (Caron, Moskey, Hovey, 2004). There were limitations to this study including that the data came from only one university, a low response rate (54%), self-reporting of drinking habits, and the majority of the subjects were under the legal age to consume alcohol (Caron, Moskey, Hovey, 2004). This study demonstrates that there is a need for universities to control alcohol use in Greek organizations, but also brings attention to alcohol consumption in high school students as well. Further research would need to be conducted to determine if high school students who drank alcohol were more likely to join a Greek organization compared to high school students who did not drink.

An article written by Brehm (2004) discusses the sedentary activities of college life, such as: studying, reading, and writing. Brehm (2004) hypothesized that as the majority of the college lifestyle is based around studying, reading, and writing, these sedentary practices could be a factor that leads to weight gain. Brehm (2004) also relates the fluctuation in weight for college students to growing, added stress, fatigue, diet, and social eating.

### **Health and Social Desirability**

A study by Grieve, Wann, Henson, and Ford (2006) examined the weight management practices of college men and women while also assessing their exercise behaviors. There were 284 undergraduates participating in the study,

100 males and 184 females. Grieve, Wann, Henson, and Ford (2006) found that 45% of the females in the study were dissatisfied with their appearance and the findings suggested that females were more likely to participate in weight loss practices. The results also suggested that body shape is important to both college-age males and females. The fact that women perform more aerobic activities than males (Pinto & Marcus, 1995) could be because of the large numbers of women dissatisfied with their appearance (Grieve, Wann, Henson, and Ford, 2006). Aerobic activities are used to maintain good health, but also are related to weight loss. This suggests that female's participation in more aerobic activities than males is linked with a greater number of females being dissatisfied with their appearance.

Another study distributed 525 questionnaires to college undergraduates that focused on body shape and eating. Lofton and Bungum (2000) found that women who were underweight did not view themselves that way, but rather perceived themselves as overweight. Also, the women who viewed themselves as normal weight wanted to be thinner (Lofton & Bungum, 2000). If a large number of women are rarely satisfied with their bodies, it may in part cause women to participate in more weight loss practices.

With self-reporting of physical activity, there is a chance for error. Social desirability and social approval have been linked with misreporting of subject diets, while underreporting of fat and total energy intake is associated with higher scores on social desirability scales (Adams et al., 2005). Misreported diets are more common with females than males. These findings are what led

researchers to further investigate self-report of physical activity errors. The researchers compared three self-report physical activity assessments to test for errors associated with social desirability or social approval (Adams et al., 2005). These researchers recruited 81 subjects to maintain their usual dietary and activity patterns for 2-weeks, while wearing ActiGraph accelerometers. Adams et al. (2005) determined that social desirability influenced self-reports of physical activity on both 7-day physical activity recall questionnaires, while social approval did not have as much of an impact.

### **The Physical Activity of College Students**

Pinto and Marcus (1995) collected data from 217 students using a 7-page questionnaire to examine physical activity behaviors among college students. Of the 217 participants, 51% were female and 69% of those surveyed were undergraduates. Pinto and Marcus (1995) classified subjects into stages of behavioral change based upon their reported activity level. These levels were precontemplation/contemplation, preparation, and action. "Precontemplation" was classified as individuals that did not respond to the physical activity question and were grouped with the "contemplators" who were classified as exercising three times per month (Pinto & Marcus, 1995). "Preparation" was classified as individuals participating in exercise up to twice per week and action individuals participated in exercise three or more times per week. The results demonstrated females to be more likely to participate in physical activities such as aerobics and walking compared to males who participated more in weight lifting (Pinto &

Marcus, 1995). Pinto and Marcus (1995) found that 18% of the students were classified in the “precontemplation/contemplation” stage, 28% in the “preparation” stage, and 54% in the “action” stage with the most frequently endorsed physical activities being jogging/running (29%), weight lifting (24%), cycling (16%), swimming/water polo (15%), and aerobics (11%). Other findings were that 42% of males and 50% of females reported not meeting the recommended exercise frequency of three to four times per week. The data showing 54% of the students being in the action stage is an encouraging statistic, but one would still hope for the percentage of students in the action group to be higher.

A study by Pinto, Cherico, Szymanski, and Marcus (1998) examined the changes in exercise participation in college students over their first two years of college. In the first year of the study there were 332 subjects and for the second year the number of subjects dropped to 242 students. The samples were divided into two groups, an active group and a sedentary group. Subjects who met the recommendations of physical activity by the Centers for Disease Control and Prevention were placed in the active group, while the subjects not meeting the recommendations were placed in the sedentary group (Pinto, Cherico, Szymanski, & Marcus, 1998). Results from the study showed no significant reductions in minutes of exercise participation over the first two years of college. However, 42% of the students sampled were considered sedentary the first year and 36% of the students considered sedentary the second year. The decrease in sedentary behaviors did show satisfying results, but still a sizable portion of the subjects remained inactive. However, the decrease in sedentary behaviors could

have been because more of the subjects that dropped out in the second year were classified as sedentary. The data determined that a large number of college students are classified as sedentary.

Barriers to physical activity for college undergraduates were examined in a study conducted by Daskapan, Tuzun, and Eker (2006). The study issued a questionnaire to 303 students and of that number 222 were females. Students who performed moderate to vigorous physical activity three or more times per week were classified as active and the remaining students were classified as inactive. Those students classified as inactive had their perceived barriers to physical activity evaluated. The questionnaire consisted of 12 questions based on a 5-point Likert Scale. Two categories were formed to describe perceived barriers: internal barriers and external barriers. In these two groups three subcategories were formed in each. For internal barriers the subcategories were lack of energy, lack of motivation, and lack of self-efficacy. Subcategories for the external barriers were lack of resources, lack of social support, and lack of time. Daskapan, Tuzun, and Eker (2006) discovered that not having enough time to participate in physical activity was the number one barrier. Of the 303 participants, 219 (72.3%) were grouped into the inactive category and females were found to have a lower rate of regular exercise (Daskapan, Tuzun, & Eker, 2006). Seventy-two percent of the subjects in the study being classified as inactive shows that there is a serious problem with sedentary lifestyle for college aged students.

Another study assessed the physical activity levels of college age students using accelerometers. The study performed by Dinger and Behrens (2005) confirmed that males are more physically active than female students (Dinger & Behrens, 2005; Douglas & Collins, 1995; Daskapan, Tuzun, & Eker, 2006). The study also established that both genders perform more physical activity on weekdays compared to weekends. It was expected that the subjects would perform more physical activity on weekdays because of the large campus where the data was collected and that most students walk to class (Dinger & Behrens, 2005). Of the 454 participants only 53% engaged in sufficient amounts of moderate physical activity and only 4.6% of the participants engaged in vigorous physical activity (Dinger & Behrens, 2005).

Staten, Miller, Noland, and Rayens (2005) identified that college students have ecological factors that impact their physical activity. The identification of this problem led them to examine the environmental and institutional factors that have an affect on physical activity behaviors of college students. They intended for their research to determine how much physical activity college students participate in, what kind of physical activity college students participate in, the environmental and institutional factors affecting physical activity, and what institutional and environmental factors to change in order to support physical activity. The instrument used was a modified survey from the Centers for Disease Control and Prevention National College Health Risk Behavior (1997), which entailed 83 questions pertaining to physical activity, dietary habits, health behaviors, and demographics (Staten, Miller, Noland, & Rayens, 2005). The

survey was completed by 531 subjects, with 16% (85/531) of the sample being a member of a fraternity or sorority. In the study moderate activity was defined as “walking or bicycling for at least 30 minutes at a time” and vigorous activity was defined as activity engaged in for 20 minutes or more that “made you sweat or breathe hard” (Staten, Miller, Noland, & Rayens, 2005). Thirty-nine percent of the subjects from the study participated in vigorous physical activity, while 41% of the subjects participated in moderate activity. Post-hoc analyses determined that subjects who lived on campus significantly participated in moderate activity more frequently than subjects living off-campus ( $p = 0.007$ ) or with their parents ( $p = 0.04$ ) (Staten, Miller, Noland, & Rayens, 2005). Also, fraternity and sorority members were found to have significantly participated in moderate activity more often than non-members ( $p = 0.02$ ) (Staten, Miller, Noland, & Rayens, 2005). Though the study found Greek members to have participated in more moderate activity than non-members, the results are not reliable because of the small sample of fraternity and sorority members and the vague definition of vigorous activity. There are a number of activities that can make someone “sweat” or “breathe hard,” which does not leave a clear definition for the subjects to compare their activities with. Also, a less intense activity can make a person who is not in good shape breathe hard or sweat and a person who is in good shape may not break a sweat or breathe hard after a more intense activity. According to the definition of the study the less intense activity would be considered vigorous activity when it may very well be of low intensity.

Physical activity gradually decreases as adolescents become older, which could be associated with growing responsibility and the impact that newfound freedom has on their lives. The highest rate of decline in physical activity occurs between ages of 18 and 24 (Grubbs & Carter, 2002), which are the college years for many. This led the authors to examine the benefits and barriers to exercise behaviors in college undergraduates. They used the health promotion model developed by Pender (1996) to determine the characteristics that motivate undergraduates to participate in healthy behaviors. This instrument uses a 4-point Likert scale to show the subjects agreement with the statements. There was a sample of 147 college undergraduates (82% female) who were recruited to participate in the study by completing a questionnaire inquiring about demographics, current exercise routines, benefits/barriers, and open-ended questions to explain their beliefs about exercise. The overall participation in regular physical activity (68.8%) reported in their study was higher than other studies. Physical performance ( $M= 3.55$ ,  $SD = 0.51$ ), appearance ( $M=3.53$ ,  $SD=0.54$ ), and personal accomplishment ( $M=3.45$ ,  $SD=0.63$ ) were strongly associated with perceived benefits of regular exercise, while exercise being tiring ( $M=2.49$ ,  $SD=0.69$ ), hard work ( $M=2.58$ ,  $SD=0.79$ ), and fatigue ( $M=2.71$ ,  $SD=0.67$ ) were associated with potential barriers (Grubbs & Carter, 2002). Just as previous studies have indicated, male subjects reported higher levels of regular physical activity habits than female subjects (92% vs. 63.8% respectively), but the small number of male subjects ( $n=26$ ) may not represent the full population (Grubbs & Carter, 2002). The findings from this study may



provide some explanation for the decrease of physical activity in college undergraduates. The leading perceived benefit from physical activity was physical performance while the leading barriers were being tiring, hard work, and fatigue. The subjects may have knowledge of the benefits of physical activity, but are not willing to put in the time and effort. The subjects may be getting discouraged early in their exercise routines because they do not see immediate results and discontinue their routines.

With physical inactivity common in 18-24 year olds, Behrens and Dinger (2003) examined the physical activity patterns of college students. They recruited 31 subjects to participate in their study, 13 (42%) females (age:  $23.07 \pm 3.3$  years, BMI:  $25.83 \pm 5.09$ ) and 18 (58%) males (age:  $23.83 \pm 3.16$  years, BMI:  $25.67 \pm 3.77$ ). The independent variables used in the study were day of the week and gender, with the dependent variable being the number of steps accumulated throughout the day. The subjects wore pedometers for seven consecutive days and kept a log of the number of steps for each day. The subjects in this study took a mean  $9,932 \pm 2,680.71$  steps per day during the seven day period, with females being more active on Thursday ( $11,887 \pm 4,760.7$  steps) and males being more active on Friday ( $11,854 \pm 3,984.8$ ) (Behrens & Dinger, 2003). However, this study did not discover any significant differences between the genders in physical activity during the seven-day period (Behrens & Dinger, 2003). The findings from this study were that college students were more active on weekdays opposed to weekends and that participation in ambulatory physical activity was no different between genders

(Behrens & Dinger, 2003). The findings from this study are interesting because there was no significant difference in the number of steps taken by males compared to females. This is contrary to the many studies that have reported that males are more physically active than females (Dinger & Behrens, 2005; Daskapan, Tuzun, & Eker, 2006). While males might participate in planned or organized physical activity more often, it may be that females remain active by participating in regular everyday activities. To definitively determine if there is no significant difference between men and women in the number of steps taken per week, a larger sample needs to be examined.

A survey was completed by 1772 (38% men, 62% women) college students, which obtained information about the subject's physical activity. The survey focused on whether or not the subjects participated in at least 30 minutes of moderate physical activity five or more days per week and if the subjects participated in regular strength developing activities (George, 2000). The subjects were also asked to provide the physical activities they performed during the previous seven days. The results determined that 32% of the men and 22% of the women participated in moderate physical activity for at least 30 minutes five or more days per week (George, 2000). Also, it was concluded that 22% of men and 13% of women participated in vigorous physical activity five or more days in the last seven days, while 77% of men and 60% of women reported vigorous activity of at least 30 minutes or more (George, 2000). Non-Hispanic white female students were found to spend significantly ( $p < .05$ ) more time in vigorous physical activity than other ethnic groups (George, 2000). The majority

of the students surveyed in this study did not report levels of physical activity, which met the new requirements. The latest physical activity recommendations require more days of moderate physical activity which is not being met by a large proportion of both male and female college students.

A study conducted by Nelson, Gortmaker, Subramanian, and Wechsler (2007) examined vigorous physical activity in college students by subgroups. The subgroups used were gender, race/ethnicity, SEP, year in school, and participation in organized athletics during high school and college. The study used data collected from the 2001 Harvard School of Public Health College Alcohol Study to examine physical activity. There were 10,437 college students who participated in the College Alcohol Study. It was determined that 47.6% of all college students in the United States met the recommended amounts of vigorous physical activity compared to 70.7% of high school students having met vigorous physical activity recommendations (Nelson, Gortmaker, Subramanian, & Wechsler, 2007). Also, 23.2% of college students participated in no vigorous activity, while only 13.2% of high school students reported no participation in vigorous activity (Nelson, Gortmaker, Subramanian, & Wechsler, 2007).

Previous research by the U.S. Public Health Service suggested that college campuses present a setting for students to be reached through health promotion interventions. The researchers designed a study that would contrast variables by student-alumni status and stage of change to determine the needs and preferences for each subgroup (Calfas, Sallis, Lovato, & Campbell, 1994). The stages of change were precontemplator, contemplator, active, maintenance,

and relapse. Junior and senior college students were recruited to participate in the study resulting in 194 valid student surveys, while 204 valid surveys were collected from alumni. Three percent of the entire sample was classified as “precontemplators,” 18% were classified as “contemplators,” 22% were classified as “actives,” 43% were classified as “maintainers,” and 14% were classified as “relapsers” (Calfas, Sallis, Lovato, & Campbell, 1994). The researchers also found that males reported significantly more previous physical activity than females, while vigorous physical activity in both groups declined from high school to college.

In a study conducted by Dinger (1999), physical activity among college students was examined. The independent variables in this study were gender, fraternity or sorority membership, residence in a fraternity or sorority housing, nutrition and/or physical activity information received from a campus resource, and residence hall wellness center membership. The dependent variables were the number of days per week that the subjects engaged in vigorous physical activity, moderate physical activity, flexibility activities, and muscular strength and/or endurance activities. The total number of surveys distributed was 1,075 with 743 of the returned surveys being deemed usable. Two hundred and six subjects were members of a fraternity or sorority, while 507 were non-members. Greek members (2.75 days per week) living in Greek housing performed vigorous physical activity significantly ( $p = 0.0001$ ) more than students in residence halls and non-fraternity or non-sorority members (2.23 days per week) (Dinger, 1999). Fraternity and sorority members tend to participate in more

intramural sports, which could explain the frequent participation in vigorous physical activity. However, the study found that moderate physical activity was performed more frequently by non-Greek members living in residence halls (2.89 days per week) than Greek members living in Greek housing (2.00 days per week) (Dinger, 1999). The lack of participation of fraternity and sorority members in moderate physical activity could be explained by their more frequent participation in vigorous physical activity.

A study by Malinauskas, Cucchiara, Aeby, and Bruening (2007) examined physical activity, body composition, and psychological eating disorder risk among college females. The purpose of the study was to determine if any differences in physical activity between athletes and non-athletes existed, if physical activity demonstrates a relationship based on athlete or non-athlete classification, and if psychological variables exist between athletes and non-athletes. In the study 115 (68 athletes and 47 non-athletes) female undergraduates participated by attending two sessions where they were to record their physical activity for a full 24 hours on two weekdays and one weekend day. The subject's physical activity levels were then labeled as low physical activity, moderate physical activity, or high physical activity. Information relating to demographics, attitude towards physical activity, history of organized sport participation, and eating disorders were also collected. Malinauskas, Cucchiara, Aeby, & Bruening, (2007) found that 32% of the athletes participated in high physical activity, 51% in moderate physical activity, and 16% in low physical activity, while 13% of non-athletes participated in high physical activity, 49% in moderate physical activity, and 38%

in low physical activity. Both athletes and non-athletes produced similar results in anthropometric and psychological measurements for high physical activity.

A study conducted by Horn, O'Neill, Pfeiffer, Dowda, and Pate (2008) examined the physical activity in females following graduation from high school. This study used data that was collected during the Lifestyle Education for Activity Program (LEAP). A three-day physical activity recall instrument was used to assess the physical activity in 12<sup>th</sup> grade females. The subjects reported activity in 30-minute blocks, using a list of 59 light, moderate, hard, or very hard intensity activities. A seven-day physical activity recall questionnaire was used to assess the postgraduate physical activity because the three-day physical activity recall instrument was deemed inappropriate to assess postgraduate physical activity. The subjects were then classified as either "high-active" or "low-active." There were a total of 305 females that provided valid physical activity data in 12<sup>th</sup> grade and at postgraduation to be used in the study. The mean age of the female subjects postgraduation was 18.9 ( $\pm$  0.6) years. Females who reported sports participation (41.7%) in the 12<sup>th</sup> grade were more likely to be in the "high-active" groups compared to the subjects who did not participate (25.4) in 12<sup>th</sup> grade sports (Horn et al., 2008). This shows a trend of subjects who were active in high school staying more active during postgraduation.

A study by Leith and Shaw (1997) sampled of physically inactive undergraduate females to examine their lifestyle behaviors. The researchers had 148 subjects complete a screening survey and found 59 female respondents interested in participating in the study. Only 16 females met the physical

inactivity criteria and the final sample size for the study was 12. A consistent finding from the study was that females did not associate physical activity with leisure experiences (Leith & Shaw, 1997). A factor that emerged to explain the negative attitudes of inactive females toward physical activity was past experiences with physical activities, particularly in Physical Education classes (Leith & Shaw, 1997). The females associated past negative experiences with physical inactivity later in life, which does not support the goal of Physical Education's to promote lifelong fitness. Physical Educators are now making an effort to avoid games that include elimination and embarrassment, in order to reduce the negative experiences in Physical Education. If Physical Education classes can provide a positive learning experience to students at a young age, it may be possible for physical activity to be more enjoyable to them as they grow older.

In an attempt to understand physical activity among individuals, Brown (2005) conducted research on perceived benefits and perceived barriers for physical activity. This study targeted demographics, cognition, behaviors, social environment, and physical environment variables of subjects between 18 and 35 years of age. There were 398 undergraduate participants with 57% being female. The data was collected from one longitudinal study (n=108) and two cross-sectional studies (1<sup>st</sup>: n=168, 2<sup>nd</sup>: n=122). To measure the physical activity of the subjects a seven-day physical activity recall questionnaire that was developed by Sallis (1985) was administered. The results showed the majority of this sample (81.5%) to have met the recommended amount of physical activity,

which was higher than expected. The subjects from the study participated in an average of 8.18 ( $\pm 6.43$ ) hours of moderate physical activity or more within the previous seven days. The subjects expended an average of 260.25 ( $\pm 30.82$ ) kilocalories during the previous seven days before the questionnaire was administered. There was a significant difference between physical activity of men and women, with men ( $264.55 \pm 32.23$ ) expending more kilocalories than women ( $256.41 \pm 28.95$ ) during the previous seven days before the study (Brown, 2005). These types of results are what drive the current study to determine what differences are within female groups.

### **Physical Activity Assessment**

Assessing physical activity habits of a population presents many challenges for researchers. The unique daily patterns of people are what cause these challenges because people are active at different times, on different days, at different locations, for different reasons, and in different forms (Sallis, Haskell, Wood, Fortmann, Rogers, Blair, & Paffenbarger, 1985). These unique activity patterns are what led Sallis et al. (1985) to design an assessment method to address all of the habits. The purpose of this study was to describe their methods for assessing and reporting activity. There were a total of 2,126 subjects used in this study, with 1,120 (53%) being female and 1,006 (47%) being male between the ages of 20 and 74 years. A two-hour survey was designed to collect the activity data, health knowledge, attitudes, behavior, and medical status of the subjects. In an attempt to eliminate previous problems of



assessing physical activity the Five-City Project staff covered work and leisure activities in the seven-day total activity recall section of the survey, with weekdays and weekends being examined separately. The activities were classified as moderate, hard, or very hard and expressed in METs. Total kilocalories of energy expended were used to determine the physical activity levels of the subjects. The mean age of the females in the study was 41 ( $\pm 15.8$ ) years and 39.2 ( $\pm 15.5$ ) for males. Ninety-two percent of females and 75% of males reported no vigorous activities (Sallis et al., 1985). Males reported participation in a greater number of hard and very hard activities than women. Participation in moderate and vigorous activities was highest in both males (62%) and females (49%) classified in the high education category. Females from the age group 20-34; which are the closest to the age group of the current study, reported 50.3 ( $\pm 0.38$ ) hours of sleep, 108.0 ( $\pm 0.56$ ) hours of light activity, 7.0 ( $\pm 0.38$ ) hours of moderate activity, 1.4 ( $\pm 0.14$ ) hours of hard activity, and 0.83 ( $\pm 0.07$ ) hours of very hard activity (Sallis et al., 1985). A separate study was conducted using 64 of the subjects to examine the reliability of the test. The subjects were to report back to the staff three times over a two-week span to have their activity assessment re-administered. Reported hours of sleep, in light activity, and in very hard activities were stable during the two-week interval. Reliability was higher in males than females when reporting energy expenditure. The data from the reliability study determine that kilocalories per kilogram per day were not an acceptable measure of energy expenditure in overweight populations.

Moderate-intensity activities vary greatly, which may be the reason a large number of questions remain unanswered about the relationship between moderate activity and cardiovascular disease (Sallis et al., 1986). The hypothesis was that moderate-intensity activities would reduce cardiovascular risk factors such as high blood pressure, lipoproteins, smoking, and body mass. Sallis et al. (1986) used a reliable form of measurement to recorded moderate-intensity activities in their study. There were three samples taken from both men and women, with the first sample consisting of 2,119 subjects, the second sample consisting of 1,946 subjects, and the last consisting of 1,865 subjects. All samples were taken during a 2-year period of time with the following sample directly proceeding. All subjects reporting hypertension, regular vigorous activity, or women using estrogen or birth control pills were excluded from the study. Moderate-intensity activity expenditure was obtained through a seven-day recall survey. The study also required that the subjects have their blood pressure measured, non-fasting blood samples taken, height and weight measured, and BMI calculated (Sallis et al., 1986). The subjects were then divided into groups distinctive by age: 20-34 years, 35-49 years, and 50-74 years. Then the subjects were placed into categories based on the information obtained through the recall survey. If the subjects reported 0 moderate-intensity activities during the previous seven days they were classified as low activity level, if they reported 1 or 2 moderate-intensity activities during the previous seven days they were classified as medium activity level, and if they reported 3 to 5 moderate-intensity activities during the previous seven days they were classified as high activity

level (Sallis et al., 1986). There were 138 ( $\pm 15.8$ ) women ages 20-34 years classified as low activity level, 499 ( $\pm 57.1$ ) subjects classified as medium activity level, and 237 ( $\pm 27.1$ ) classified as high activity level. Moderately active women from all age groups had a significantly lower BMI scores than their sedentary counterparts (Sallis et al., 1986). The main conclusion reached from the study was that higher reports of moderate activity are connected with significantly lower BMI scores in five of the six age-sex categories (Sallis et al., 1986). This shows that there may be a relationship between moderate physical activity and body mass.

### **Summary**

This review of literature revealed that college students tend to adopt sedentary lifestyles. College age adults are more likely to participate in unhealthy behaviors. The unhealthy behaviors are seen to a greater extent in fraternity and sorority members, particularly binge drinking than in non-Greek students. These unhealthy behaviors might lead one to hypothesize that they would deter the fraternity and sorority members from physical activity. However, the literature showed that fraternity and sorority members participated in more vigorous physical activity than non-members. The fraternity and sorority members compete against other fraternities and sororities, which can give them more drive to participate in vigorous activities. Also, Greek members are encouraged to play intramural sports for their fraternities and sororities, which can motivate them to participate in more vigorous activities. The current study

analyzed the data in this review of related literature and with the use of a questionnaire developed by Sallis et al. (1985) will determine if females in a sorority are more physically active than non-sorority members.

## CHAPTER III

### METHOD

The purpose of this study was to determine whether females who were not members of a sorority were more physically active than females who were sorority members. An additional objective of the study was to determine whether there was a relationship for physical activity with demographic factors or unhealthy lifestyle behaviors. It was hypothesized that non-members would be more physically active than sorority members. It was also hypothesized that the unhealthy behaviors demonstrated by sorority members would lead to a decrease in physical activity levels.

#### **Participants**

A sample was taken from the 4,823 female undergraduate students enrolled at a midwestern university during the Spring 2008 semester. All subjects were between the ages of 18 and 25 years. After giving their informed consent (Appendix A), the subjects voluntarily completed a questionnaire about their physical activity patterns. The subjects were separated into two groups to analyze their physical activities. One group consisted of sorority members (n=162) and another group included female undergraduate students not in a sorority, which was called non-members (n=156) for this study. All graduate students and college athletes were excluded, leaving 300 subjects.

## **Instruments**

The instrument was a questionnaire that was broken into two sections. The first section included open ended, Likert Scale, and yes or no questions focusing on demographics, academics, unhealthy behaviors, and dietary habits (Appendix A). The subjects then completed the second section which consisted of the Seven-Day Physical Activity Recall Questionnaire (Sallis et al., 1985) (Appendix B), which has been validated against other methods, such as doubly-labeled water, heart rate monitoring, changes in maximal oxygen uptake, and accelerometers (Johansen, 2001). The Seven-Day Physical Activity Recall Questionnaire was developed by Sallis et al. (1985) as part of the Stanford Five-City Project. This questionnaire determined the physical activity of sorority members and non-members by assessing the total METs expended per day. The Seven-Day Physical Activity Recall Questionnaire (Sallis et al., 1985) contained 14 items measuring sleep (1 MET), moderate activities (3-5 METs), hard activities (5.1-6.9 METs), and very hard activities (>7.0 METs) (Mahabir et al., 2006). The questionnaire addressed weekends and weekdays separately by examining the hours of sleep, light, moderate, hard, and very hard activities performed on weekdays and weekends. Subjects were asked to recall the number of hours spent in moderate, hard, and very hard activities and sleep during the previous week and on the most recent weekend. Examples of each level of activity were provided for comparison in the questionnaire (Appendix C). The total number of METs expended in light activity was calculated by taking 168 (total hours per week) and subtracting the sum of total sleep, total moderate

activity hours, total hard activity hours, and total very hard activity hours multiplied by 1.5. The total number of moderate METs per week was calculated by taking the sum for number of hours for weekday and weekend moderate activity then multiplying by four. The total number of hard METs was calculated by taking the sum of the weekday and weekend hard activity hours and multiplying by six. Very hard activity hours were calculated by taking the sum of weekday and weekend very hard activity hours and multiplying by ten. Total METs per day were calculated by taking the sum of total sleep METs, total light activity METs, total moderate activity METs, total hard activity METs, and total very hard activity METs and dividing by seven.

The seven-day physical activity recall questionnaire was used because it specifically queried about sleep, moderate, hard, and very hard activities of the subjects, leaving time in light activity to be assessed through subtraction. Light activities tend to be more difficult to recall than the less frequent and numerous more vigorous activities (Sallis et al., 1985). In addition, this method of assessment was brief, requiring the subjects to take only a few minutes to complete the questionnaire (Sallis et al., 1985).

## **Procedure**

Three hundred questionnaires were distributed to a sample of female undergraduate students. All college athletes and graduate students were excluded from the study because their physical activity patterns may not be representative of the typical undergraduate college student due to athletic

practice or increased academic responsibilities. The majority of subjects from sororities were recruited to participate in the study by randomly selecting three of the nine sororities on campus and surveying the members. The sorority presidents were contacted to receive permission to distribute the questionnaire at a chapter meeting. Chapter meetings occur weekly and time is set-aside for people from outside the sorority to present the members with information. During this time sorority members were given instructions for the questionnaire and asked to complete the questionnaire after giving their voluntary informed consent. The questionnaires were returned immediately upon completion. In addition to collecting the questionnaires from sorority chapter meetings, the remaining questionnaires were obtained from sorority members at the University Union, bookstore, food court, and residence halls in a similar manner.

In order to reach a large number of non-member undergraduates in one location, the questionnaires were distributed at residence hall meetings. The residence hall directors of three dormitories were contacted and permission to attend these meetings was granted by two directors. At the beginning of the residence hall meetings, time was set aside for the completion of the questionnaires. The residents were given the directions and completed the questionnaire after giving their informed consent. Though the main goal of distributing the questionnaires at residence halls was to reach non-members, there was an opportunity to obtain questionnaires from sorority members as well. The remaining non-member questionnaires were collected from common access areas around campus, such as the University Union, food court, and bookstore.



Distributing the questionnaires at these facilities allowed for maximum return from one location and a diverse group of subjects to be reached.

### **Data Analysis**

The data was analyzed by group using SPSS (V. 15) software. Descriptive statistics were calculated for sorority members and non-members. Differences in mean scores for each group were compared using independent t-tests. For categorical data, a chi-square test was utilized to determine if significant differences existed between group means. A Pearson Product Moment correlation was used to determine if a significant relationship between two variables existed within the sorority member or non-member group. An alpha level of  $p \leq 0.05$  was used for statistical significance.

## CHAPTER IV

### RESULTS & DISCUSSION

The purpose of this study was to determine whether females who were not members of a sorority were more physically active than females who were sorority members. An additional objective of the study was to determine whether there was a relationship for physical activity with demographic factors or unhealthy lifestyle behaviors. It was hypothesized that non-members would participate in more physical activity than sorority member measured by total MET expenditure per day. It was also hypothesized that sorority member's alcohol consumption would decrease the amount of physical activity they participated in.

#### **Subject Demographics**

Three hundred and eighteen subjects were recruited to participate in the study. All of the recruited subjects completed the questionnaire for a participation rate of 100%. Eighteen questionnaires were excluded because the subjects were in graduate school (5) or were college athletes (13), leaving 300 valid questionnaires (94.3% usable). Of the remaining 300 subjects, 150 were sorority members and 150 were non-members. All subjects were full time students from a midwestern university.

The mean age of the sorority members was 20.01 ( $\pm 1.14$ ) years and 20.29 ( $\pm 1.50$ ) years for the non-members. An independent t-test determined there to be no significant difference ( $t(298) = -1.813, p = 0.71$ ) in age between the

sorority members and non-members. Those subjects belonging to a sorority had been members for an average of 2.1 ( $\pm 0.99$ ) years. Table 1 shows the place of residence for the subjects.

Table 1. Place of Residence for Sorority Members and Non-Members

	Sorority Members (n = 150)		Non-Members (n = 150)	
	n	%	n	%
Sorority House	70	46.7%	0	0.0%
Dorm	32	21.3%	70	46.7%
Off-Campus House	34	22.7%	45	30.0%
Off-Campus Apartment	12	8.0%	27	18.0%
On-Campus Apartment	2	1.3%	7	4.7%
Other: Commute	0	0.0%	1	0.7%

A chi-square test ( $\chi^2(df, N=5) = 93.37, p=0.00$ ) was used to determine that there was a significant difference in place of residence between sorority members and non-members. The academic standing of the subjects is displayed in Table 2. A chi-square test ( $\chi^2(df, N=3) = 2.719, p=0.437$ ) determined there to be no significant difference between the two groups for academic standing. Both groups were registered for a similar number of credit hours, 15.07 ( $\pm 1.53$ ) for sorority members and 15.13 ( $\pm 2.13$ ) for non-members.

Table 2. Academic Standing for Sorority Members and Non-Members

	Sorority Members (n=150)		Non-Members (n=150)	
	n	%	n	%
Freshman	27	18.0%	36	24.0%
Sophomore	51	34.0%	39	26.0%
Junior	46	31.0%	47	31.0%
Senior	26	17.0%	28	19.0%

An independent t-test determined there was no significant difference ( $t(298) = -0.280, p = 0.78$ ) in the number of credit hours completed between sorority members and non-members. The number of hours per week each subject spent on academics outside of class is shown in Table 3.

Table 3. The Number of Hours Spent on Academics per Week

	Sorority Members (n = 150)		Non-Members (n = 149)	
	n	%	n	%
0-2 Hours per Week	16	10.7%	17	11.4%
3-5 Hours per Week	70	46.7%	68	45.6%
6-8 Hours per Week	48	32.0%	49	32.9%
9 or More Hours per Week	16	10.7%	15	10.0%

A chi-square test ( $\chi^2(df, N=3) = 0.099, p=0.992$ ) indicated that there was no significant difference in time spent on academics outside of class between the two groups.

Thirty-two percent of sorority members (49/150) and 43% of non-members (64/150) held a job while they were at school. A chi-square test determined there was no significant difference ( $\chi^2(df, N=1) = 3.194, p=0.074$ ) in the number of sorority members who held jobs compared to non-members. Sorority members ( $n=148$ ) worked an average of 3.57 ( $\pm 6.45$ ) hours per week, while non-members worked 5.72 ( $\pm 8.99$ ) hours per week ( $n=146$ ). Two sorority members and four non-members were excluded from the calculation because they did not respond with an answer to the question and it was not assumed that they worked "0" hours per week. An independent t-test determined that the non-members worked significantly more hours per week ( $t(292) = -2.352, p = 0.019$ ) than the sorority members.

### **Lifestyle Behaviors**

The results indicated that 95.3% of sorority members (143/150) and 77% of non-members (116/150) in the study consumed alcohol. A chi-square test determined that sorority members reported consuming alcohol significantly ( $\chi^2(df, N=1) = 20.595, p=0.000$ ) more than non-members. Sorority members reported consuming alcohol on 1.89 ( $\pm 1.17$ ) occasions within the previous seven days, as compared to 1.53 ( $\pm 1.55$ ) occasions within the previous seven days for non-members. An independent t-test determined that sorority members ( $t(298) =$

2.309,  $p = 0.022$ ) consumed alcohol on significantly more occasions within the previous seven days than non-members.

The average number of alcohol drinks consumed on a typical night was 5.77 ( $\pm 2.71$ ) for sorority members ( $n=146$ ) and 4.99 ( $\pm 4.10$ ) for non-members ( $n=148$ ). Four sorority members and two non-members did not respond to this question on the questionnaire and were excluded from the calculation. An independent t-test determined there was no significant difference ( $t(292) = 1.906$ ,  $p = 0.06$ ) in the number of alcoholic drinks on an average night between sorority members and non-members. The types of drinks consumed by the subjects are shown in Table 4.

Table 4. The Types of Alcohol Drinks Consumed by the Subjects

	Sorority Members (n = 149)		Non-Members (n = 149)	
	n	%*	n	%*
Mixed Drinks	111	74.5%	86	58.0%
Wine	25	16.8%	38	26.0%
Shots	86	57.7%	57	38.0%
Beer	91	61.1%	77	52.0%
n/a	7	4.7%	34	23.0%

\*Subjects were allowed to select more than one response.

Another unhealthy behavior that was examined in the questionnaire was cigarette smoking. These results are shown in Table 5.

Table 5. The Number of Cigarettes Smoked per Day

	Sorority Members (n = 150)		Non-Members (n = 150)	
	n	%	n	%
0 Cigarettes	128	85.3%	115	76.7%
1-3 Cigarettes	12	8.0%	14	9.3%
4-6 Cigarettes	4	2.7%	7	4.7%
7-9 Cigarettes	4	2.7%	7	4.7%
10-12 Cigarettes	2	1.3%	4	2.7%
12 or More Cigarettes	0	0.0%	3	2.0%

A chi-square test ( $\chi^2(df, N= 5) =6.152, p=0.292$ ) determined there was no significant difference between groups in the number of cigarettes smoked per day.

The subjects were asked to rate their diet on a 5-point Likert Scale. Table 6 displays the results of these ratings. A chi-square test ( $\chi^2(df, N=4) =2.311, p=0.679$ ) determined there was no significant difference between how the two groups portrayed their diets.

Subjects were also asked to rate their concern for eating healthy on a 5-point Likert Scale. This data can be found in Table 7. A chi-square test ( $\chi^2(df, N=4) =0.601, p=0.963$ ) determined there to be no significant difference between groups in regard to their concern for eating healthy.

Table 6. The Subject's Rating of the Quality of Their Diet

	Sorority Members (n = 150)		Non-Members (n = 150)	
	n	±SD	n	±SD
Very Unhealthy	3	2.0%	1	0.7%
Unhealthy	14	9.3%	16	10.7%
Moderate	97	64.7%	91	60.7%
Healthy	34	22.7%	41	27.3%
Very Healthy	2	1.3%	1	0.7%

Table 7. The Subject's Response to the Statement: "I am Concerned About Eating Healthy"

	Sorority Members (n = 150)		Non-Members (n = 150)	
	n	±SD	n	±SD
Strongly Disagree	2	1.3%	2	1.3%
Disagree	8	5.3%	6	4.0%
Neutral	40	26.7%	41	27.3%
Agree	76	50.7%	80	53.3%
Strongly Agree	24	16.0%	21	14.0%



### **The Physical Activity of the Subjects**

A seven-day physical activity recall questionnaire that was used in the Physical Activity Assessment Methodology in the Five-City Project was also used to assess physical activity in this current study (Sallis et al., 1985). The current study determined that 86% of all subjects engaged in sufficient amounts of moderate activity. Eighty percent (120/150) of the sorority members and 91% (137/150) of the non-members participated in adequate amounts of moderate activity. For vigorous activity 69% of all subjects engaged in sufficient amounts, with 69% (103/150) of sorority members and 69% (103/150) of non-members engaging in sufficient amounts. Sufficient activity was examined using the recommendations of the Surgeon General (2007) who recommends 120-150 minutes of moderate or greater activity per week.

Seventy-two percent (107/148) of sorority members participate in one or more intramural sport per semester compared to only 21% (32/150) of non-members. Sorority members ( $n=148$ ) were found to participate in 1.44 ( $\pm 1.65$ ) intramural sports per semester compared to 0.26 ( $\pm 0.58$ ) for non-members. Two sorority members failed to indicate the number of intramurals they participated in, so their questionnaires were excluded. An independent t-test determined that sorority members participated in a significantly ( $t(296) = 8.213, p = 0.00$ ) greater number of intramural sports per semester than non-members. The total hours the subjects slept were needed to determine the total number of METs each group expended in the previous week (Table 8).

Table 8. Seven Day Recall for the Hours of Sleep on Weekdays and Weekends

	Sorority Members (n=150)		Non-Members (n=150)	
	M	±SD	M	±SD
Weekday Hours of Sleep	34.73	6.10	35.07	6.53
Weekend Hours of Sleep	14.30	4.52	14.43	4.83
Total Sleep Hours	49.03	8.17	49.50	8.32

The estimated number of hours spent in light, moderate, hard, and very hard activities for weekdays and weekends were used to determine the number of METs each group expended during the previous week. Table 9 shows the total number of hours for weekday activity and Table 10 displays the total for weekend activity. The sum of light, moderate, hard, and very hard activity hours were calculated and are shown in Table 11. Independent t-tests were used to determine if there was a significant difference in hours of sleep, total weekday activity hours, total weekend activity hours, and total activity hours between the two groups (Tables 12, 13, 14, and 15 respectively).

After the total hours were calculated, each group's total METs for the previous week were determined. The number of METs expended per day was calculated from the sum of METs from each activity category divided by seven (Table 16).

Table 9. Seven-Day Recall for Weekday Hours of Physical Activity by Light, Moderate, Hard, and Very Hard Activity

	Sorority Members (n=150)		Non-Members (n=150)	
	M	±SD	M	±SD
Weekday Light Activity Hours	72.95	11.20	72.23	12.65
Weekday Moderate Activity Hours	7.10	5.82	8.05	7.71
Weekday Hard Activity Hours	3.70	4.04	3.06	3.67
Weekday Very Hard Activity Hours	1.52	3.17	1.60	2.95
Total Weekday Activity Hours	85.27	6.10	84.93	6.53

Table 10. Seven-Day Recall for Weekend Hours of Physical Activity by Light, Moderate, Hard, and Very Hard Activity

	Sorority Members (n=150)		Non-Members (n=150)	
	M	±SD	M	±SD
Weekend Light Activity Hours	30.31	6.20	28.95	7.44
Weekend Moderate Activity Hours	2.18	2.57	3.25	4.15
Weekend Hard Activity Hours	0.91	1.44	1.01	2.01
Weekend Very Hard Activity Hours	0.31	0.90	0.35	1.12
Total Weekend Activity Hours	33.70	4.52	33.57	4.83

Table 11. Seven-Day Recall for Total Hours of Activity by Light, Moderate, Hard, and Very Hard Activity

	Sorority Members (n=150)		Non-Members (n=150)	
	M	±SD	M	±SD
Total Light Activity Hours	103.26	14.97	101.18	17.07
Total Moderate Activity Hours	9.28	7.80	11.29	10.89
Total Hard Activity Hours	4.61	5.01	4.08	5.09
Total Very Hard Activity Hours	1.82	3.83	1.95	3.63
Total Hours of All Activity	118.97	8.17	118.50	8.32

Table 12. Independent T-Test Results Hours of Sleep on Weekdays and Weekends

Variable	t	df	Probability
Weekday Sleep	-0.459	298	0.647
Weekend Sleep	-0.247	298	0.805
Total Sleep	-0.492	298	0.623

Table 13. Independent t-Test Results for Weekday Hours of Physical Activity by Light, Moderate, Hard, and Very Hard Activity

Variable	t	df	Probability
Weekday Light Activity	0.527	298	0.599
Weekday Moderate Activity	-1.200	298	0.231
Weekday Hard Activity	1.433	298	0.153
Weekday Very Hard Activity	-0.236	298	0.814
Total Weekday Activity	0.459	298	0.647

Table 14. Independent t-Test Results for Weekend Hours of Physical Activity by Light, Moderate, Hard, and Very Hard Activity

Variable	t	df	Probability
Weekend Light Activity	1.710	298	0.088
Weekend Moderate Activity	-2.683	298	0.008*
Weekend Hard Activity	-0.512	298	0.609
Weekend Very Hard Activity	-0.397	298	0.692
Total Weekend Activity	0.247	298	0.805

\*Probability indicates a significant difference between groups ( $p \leq 0.05$ ).

Table 15. Independent t-Test Results for Total Hours of Activity by Light, Moderate, Hard, and Very Hard Activities

Variable	t	df	Probability
Total Light Activity	1.122	298	0.263
Total Moderate Activity	-1.844	298	0.066
Total Hard Activity	0.918	298	0.360
Total Very Hard Activity	-0.302	298	0.763
Total Hours of All Activity	0.492	298	0.623

Table 16. Seven Day Recall for Total METs by Light, Moderate, Hard, and Very Hard Activity

	Sorority Members (n=150)		Non-Members (n=150)	
	M	±SD	M	±SD
Total Light METs	154.89	22.44	151.77	25.60
Total Moderate METs	37.10	31.22	45.17	43.54
Total Hard METs	27.66	30.07	24.45	30.52
Total Very Hard METs	18.23	38.26	19.53	36.33
Total METs	286.91	58.31	290.42	62.33
METs per Day	40.99	8.33	41.49	8.90

Table 17. Independent t-Test Results for Total METs by Light, Moderate, Hard, and Very Hard Activities

Variable	t	df	Probability
Total Light METs	1.122	298	0.263
Total Moderate METs	-1.844	298	0.066
Total Hard METs	0.918	298	0.360
Total Very Hard METs	-0.302	298	0.763
Total METs	-0.503	298	0.615
METs per Day	-0.503	298	0.615

An independent t-test determined there to be a significant difference between groups only in the amount of weekend moderate activity. Non-members were found to have participated in significantly ( $p = 0.008$ ) more moderate activity hours during the previous weekend than sorority members, while the total METs expended in moderate activity was not significantly different ( $p = 0.066$ ). The independent t-test also determined that there was no significant difference between sorority members and non-members for any of the remaining activity categories.

A Pearson Product Moment correlation was used to determine if there was a relationship between total METs expended per day and the lifestyle behaviors within the sorority member or non-member group exclusively. The results from the Pearson correlation are displayed in Table 18.

Table 18. Pearson Correlations for the Relationship between Total METs Expended and Specific Subject Behaviors and Characteristics

	Sorority Members			Non-members		
	r	n	p	r	n	p
Age	-0.045	150	0.586	0.131	150	0.109
Years in a Sorority	-0.082	150	0.317	n / a		
Intramurals	0.338	148	0.000*	-0.001	150	0.993
Credit Hours	0.182	150	0.026*	-0.039	150	0.636
Hours Worked	-0.024	148	0.772	0.238	146	0.004*
Occasions Alcohol Was Consumed Previous 7 Days	-1.181	150	0.026*	0.088	150	0.286
Number of Drinks on Average Night of Consumption	-0.005	146	0.948	0.016	148	0.850

\*Probability indicates a significant difference between groups ( $p \leq 0.05$ ).

There was a significant positive but weak correlation for sorority members between participating in intramural sports and total METs expended per day. As the number of intramural sports increased, so did the total METs expended by sorority members. Also, there was a significant positive but weak correlation for sorority members with the number of credit hours and total METs expended per day. While the number of credit hours increased, the total METs expended per day increased. A significant negative correlation existed with the number of occasion's alcohol was consumed within the last seven days and total METs expended per day. While total METs expended per day increased, the number



of occasion's alcohol was consumed within the last seven days decreased. The only significant correlation found within the non-member group was between the total number of hours worked per week while in college and total METs expended per day resulting in a positive but weak correlation. As the total number of hours worked per week while in college went up, so did the total METs expended per day.

### **Summary**

In summary, no significant differences were found between sorority members and non-members total METs expended per day. However, non-members expended significantly more weekend moderate METs than sorority members. Also, there was a significant difference found between groups for intramural sports participation. Sorority members were found to participate in significantly more intramural sports than non-members. Sorority member's participation in intramural sports had a positive correlation with their total METs expended per day.

There were also significant differences found in place of residence, hours worked, and the number of occasions' alcohol was consumed within the last seven days. There was a significant difference in place of residence between groups. The majority of sorority members resided in their sorority houses, while the majority of non-members resided in the dormitories. Non-members were found to work significantly more hours per week than sorority members, which resulted in a positive correlation in non-members between the total hours worked

per week while in college and total METs expended per day. Sorority members consumed alcohol on significantly more occasions than non-members within the last seven days, resulting in a negative correlation in sorority members between the number of occasion's alcohol was consumed within the last seven days and total METs expended per day. The total number of credit hours also had a positive correlation in sorority members with the total METs expended per day. It was determined in all other categories that no significant differences existed between groups.

## Discussion

A study conducted by Dinger and Behrens (2005) found that out of 454 (454 out of 19,584 enrolled undergraduates) college age subjects, only 53% engaged in sufficient amounts of moderate physical activity and only 4.6% of the participants engaged in vigorous physical activity. These numbers are extremely low compared to the current study where 86% of the subjects engaged in sufficient amounts of moderate activity. In order to determine sufficient amounts of physical activity the recommendations of the Surgeon General (2007) were used, who recommends 120-150 minutes of moderate activity or greater per week. Eighty percent (120/150) of the sorority members and 91% (137/150) of the non-members participated in adequate amounts of moderate activity. For vigorous activity, 69% of the subjects from the current study engaged in sufficient amounts, with 69% (103/150) of sorority members and 69% (103/150) of non-members engaging in sufficient amounts. The differences in findings between these studies may be because two different instruments were used to determine the physical activity levels. In the study conducted by Dinger and Behrens (2006) accelerometers were used to determine physical activity levels, while in the current study a seven-day physical activity recall questionnaire was used. However, a study conducted by Sallis et al. (1985) which used a similar seven-day physical activity recall instrument found women between 20-34 years of age ( $n = 480$ ) to have engaged in 50.7 ( $\pm 0.38$ ) hours of sleep per week, 108.0 ( $\pm 0.56$ ) hours of light activity per week, 7.0 ( $\pm 0.38$ ) hours of moderate activity per week, 1.4 ( $\pm 0.14$ ) hours of hard activity per week, and 0.83 ( $\pm 0.07$ ) hours of very hard

activity per week. The female subjects from the current study appear to be more active having reported higher levels of moderate (sorority members  $9.28 \pm 7.80$  and non-members  $11.29 \pm 10.89$ ), hard activity (sorority members  $4.61 \pm 5.01$  and non-members  $4.08 \pm 5.09$ ), and very hard activity (sorority members  $1.82 \pm 3.83$  and non-members  $1.95 \pm 3.63$ ). The sleep levels in both studies were almost identical, while the subjects in the current study appeared to participate in slightly lower amounts of light activity (sorority members  $103.26 \pm 14.97$  and non-members  $101.18 \pm 17.07$ ). The subjects from the current study may be participating in more vigorous exercise than the subjects from the study by Sallis et al. (1985), which could explain the current study's subjects reporting lower levels of light activity. Physical activity decreases with age (Surgeon General, 2007) and the subjects from the current study only ranged between 18 – 25 years of age opposed to the study by Sallis et al. (1985), which had subjects between 20-34 years of age. The current study's subjects may be reporting more vigorous physical activity because the sample was taken from a younger age group, which according to the Surgeon General (2007) may be participating in more physical activity.

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In the current study it was hypothesized that non-sorority members would be more physically active than sorority members. Though there was limited research conducted on physical activity levels of sorority members, this hypothesis was developed through previous research which found that members of Greek organizations participated in more unhealthy, high risk behaviors than non-members (Lo & Globetti, 1995; Vickers et al., 2004; McCabe, Schulenberg,

Johnston, O'Malley, Bachman, & Kloska, 2005; McCabe et al., 2005; Ward & Gryczynski, 2007). Examples of these unhealthy, high-risk behaviors are binge drinking and cigarette smoking. It was believed that these unhealthy behaviors would lead to a decrease in the amount of physical activity being performed. Also contributing to the hypothesis were the findings of Dinger (1999), which indicated that non-members participate in more moderate physical activity than members of Greek organizations.

### **Subject Demographics**

There was a wide range of underclassman and upperclassman who participated in the study. Subject's residences were distributed among dormitories, sorority houses, off-campus apartments, off-campus houses, and on-campus apartments, with the majority of sorority members residing in their sorority houses and the majority of non-members residing in dormitories. The large gaps between sorority housing and dormitory residency may have led to the significant difference in place of residence. In the study conducted by Dinger (1999) all fraternity and sorority members participating in the research lived in a fraternity or sorority house, while all non-members were residents in a dormitory. Dinger (1999) found that non-fraternity and non-sorority members participated in more moderate physical activity than fraternity and sorority members. In the current study the same portion of sorority members (46.7%) reported living in a sorority house as non-members (46.7%) reported living in a dormitory. Perhaps the determining factor in moderate activity is not if the subject is a member of a

sorority or not, but rather their place of residence. Both sorority houses and dormitories are usually located on-campus, which would result in many students walking to class. The subjects may be accumulating their moderate activity through walking to class.

### **Employment**

The current study determined that more non-members held a job while in college than sorority members. It was also determined that non-members worked significantly more hours per week than sorority members. The jobs held by non-members could be inhibiting the amount of available time to perform physical activity. This could limit the extra time needed to participate in intramural sports, resulting in non-members reporting significantly lower intramural sports involvement than sorority members. Also, having a job while in college may contribute to sedentary behaviors if little activity is entailed in their position. Conversely, it may also create opportunities for more activity if they have an active job. Thus, a Pearson correlation determined there was a positive relationship between the total hours worked per week while in college and total METs expended per day in non-members. Non-members may be holding active jobs that cause them to be physically active. Non-members may not be getting much physical activity with intramurals, however they may be making up for this with their jobs in college. Future research should explore the types of jobs subjects hold while in college to determine the category of physical activity subjects are receiving through their employment activities.

## **College Lifestyle**

It was determined that there was no significant difference between sorority members and non-members in age, number of credit hours currently being taken, and number of hours spent on academics outside of class. A possible reason there were no significant differences between sorority members and non-members for the categories listed could be the simple fact that they are a college student cohort first and sorority members or non-members second. There may not be any differences within the actual cohort because they all are experiencing many similar situations. Brehm (2004) believes that the majority of the college lifestyle is based around studying, reading, and writing, which could factor into many of the sorority members and non-members results being similar. College students are typically between 19 and 24 years of age, take between 12 and 17 credit hours, have similar class schedules with midterms and finals which could play a role in their study patterns, participate in risky behaviors, and can find it hard to watch their diet. These shared characteristics make it understandable why there are no significant differences in many of these variables. However, this does not explain the significant positive relationship in sorority members between total credit hours and total METs expended per day. Sorority members may relieve the stress of studying, reading, and writing through physical activity. Further investigation is needed to determine if these students use physical activity to relieve the stresses experienced in college.

### **Diet/Eating Habits**

Sorority members and non-members reported similar behaviors for their diet and concern for eating healthy. This could be explained by the social desirability and approval that is linked to misreporting diets to receive higher scores on social desirability scales, especially seen in female subjects (Adams et al., 2005). This could also explain the high reports of physical activity in the current study.

Also, there may not be any significant differences in diet between sorority members and non-sorority members because while on campus all students are offered the same food choices at dormitories and the food court. When living in a sorority house or dormitory, students are offered a meal plan, which allows them to eat at the dormitories or food court. Due to the large number of sorority members living in a sorority house (46.7%) or dormitory (21.3%) and a large number of non-sorority members living in dormitories (46.7%), the food options for the two groups are relatively similar.

### **Unhealthy Behaviors**

In the current study 95.3% of sorority members (143/150) reported that they consume alcohol compared to only 77% of non-members (116/150). This is a large proportion of the sorority members reporting consuming significantly more alcohol than non-members, showing that alcohol may be associated with sorority membership. Twenty percent fewer non-members reported consuming alcohol than sorority members. Another finding was that sorority members had



consumed alcohol on significantly more occasions than non-members during the previous seven days. Sorority members consumed alcohol an average of 1.89 ( $\pm 1.17$ ) times within the previous seven days and non-members an average of 1.53 ( $\pm 1.55$ ) times. These findings are consistent with previous research where sorority members participate in more unhealthy behaviors than non-members (Lo & Globetti, 1995; Vickers et al., 2004; McCabe, Schulenberg, Johnston, O'Malley, Bachman, & Kloska, 2005; McCabe et al., 2005; Ward & Gryczynski, 2007). A correlation determined a significant relationship between the number of occasions alcohol was consumed within the previous seven days and the total METs expended per day. This shows that some unhealthy behaviors do have a negative impact on physical activity levels. However, this negative relationship does not support the current study's hypothesis that the unhealthy behaviors might be a contributing factor to a decrease in physical activity in sorority members because both groups are still expending similar amounts of total METs per day.

There were also no significant differences in the number of alcohol drinks consumed on a typical night of alcohol consumption, the number of cigarettes smoked per day, how subjects rated their diet, and the subjects concern for eating healthy.

Alcohol abuse is a concern on any college campus and with the higher risks of acute health problems associated with binge drinking one can understand the severity of this growing problem (Wechsler, Dowdall, Davenport, & Castillo, 1995). Binge drinking for females is defined as 4 or more alcohol

drinks per occasion (Wechsler, Dowdall, Davenport, & Castillo, 1995). A previous study found that 61% of the 412 female subjects participated in binge drinking during the previous two weeks of the study (Vickers et al., 2004), while another found that 39% (3,979 / 10,203) of the females in the study binge drank in the last two weeks (Wechsler, Dowdall, Davenport, & Castillo, 1995). The non-members from the current study produced similar results as Vickers et al. (2004) by 58% (86/148) of the non-members reporting binge drinking within the last seven days. However, the data from the sorority members in the current study shows extremely high reports of participation in binge drinking compared to both previous studies. Eighty-seven percent (127/146) of sorority members would be classified as binge drinkers, for they consumed four or more drinks on at least one occasion within the previous seven days. Binge drinking could be a determining factor in what leads sorority members to put themselves at risk for missing class, earning poor grades, having unprotected sex, violence, and even death (Caron, Moskey, & Hovey, 2004).

In the current study there was no significant difference in the number of cigarettes smoked by sorority members or non-members. This finding goes against previous research, which indicated fraternity and sorority members to have elevated levels of cigarette use (McCabe et al., 2005).

### **The Physical Activity of the Subjects**

There were no significant differences between sorority members and non-members in any of the sleep categories. It is likely that college students tend to

have similar sleep patterns and stay up later than most other adults. This could be because they are studying, reading, writing (Brehm, 2004), or it is part of the college lifestyle. With most college students having classes during the day, it leaves the evening for their schoolwork to get done which can lead to late nights. Sorority members and non-members having similar class schedules and schoolwork could lead to the similarities in hours of sleep.

To determine the overall physical activity of each group the total number of METs expended per day was calculated. The present study found no significant difference in expended METs per day between sorority members and non-members. Sorority members expended 40.99 ( $\pm 8.33$ ) METs per day and non-members expended 41.49 ( $\pm 8.90$ ) METs per day in physical activity. This finding did not support the a priori hypothesis that non-members would be more physically active than sorority members. One possible reason for the results not supporting the current hypothesis could be the limitations of the instrument. The information pertaining to physical activity was collected through a recall questionnaire, which can lead to human error or misrepresentation of activities performed.

There was a significant difference between groups in their participation in intramural sports per semester. Sorority members participate in significantly more intramural sports per semester than non-members. Sorority members participated in an average of 1.44 ( $\pm 1.65$ ) intramural sports per semester compared to only 0.26 ( $\pm 0.58$ ) intramural sports for non-members. Sorority members are usually encouraged to participate in intramural events to earn

points for their sorority. At the end of each semester the fraternities and sororities add up the total number of points earned from intramural events and a championship is awarded (Dinger, 1999). The point system and encouragement from their sororities to participate in intramural sports could be the reason that 72% (107/148) of sorority members participate in one or more intramural sport per semester compared to only 21% (32/150) of non-members. This difference in the number of intramural sports played could be a contributing factor to the amount of physical activity sorority members are participating in. Most intramural sports have one or two games per week, giving sorority members an extra hour or two per week of added physical activity. A Pearson correlation determined that there was a significant relationship in sorority members where increased participation in intramural sports was associated with an increase in total METs expended per day. If it were not for these intramural sports, sorority members might not have participated in similar amounts of physical activity when compared to non-members. This finding can lead to further research into what causes sorority members to participate in more intramural sports than non-members. If this finding persists, then universities could promote the attributes of intramural sports that attract sorority members to the non-Greek members. Future research is needed that examines intramural sports and college students because no previous research was found.

Non-members were also found to have participated in significantly more weekend moderate activity than sorority members. Non-members participated in 3.25 ( $\pm 4.15$ ) hours of weekend moderate activity, where sorority members only

participated in 2.18 ( $\pm 2.57$ ) hours. This finding was again consistent with previous research, which indicated that non-members participated in more moderate activity than sorority members (Dinger, 1999). However, even with the assumption that non-members would participate in more moderate activity than sorority members holding true for the weekends, non-members did not expend more mean METs per day for the entire week than sorority members rendering the omnibus hypothesis incorrect. Intramural sports would be classified as hard or very hard activity, causing sorority members to report less moderate activity because of their increased participation in these events. Still the explanation of why non-members are only participating in more moderate activity on the weekends has yet to be determined.

No significant differences were found in weekday light activity, weekend light activity, total light activity hours, and total light METs. Light activity is achieved through everyday activities and since both groups are from the same cohort they are participating in the very similar activities. This may be why there are no significant differences in light activity between sorority members and non-members.

There were no significant differences in weekday moderate activity, total moderate activity, and total moderate METs expended. The only significant difference in moderate physical activity was found in weekend moderate activity. However, there was a near correlation ( $p=0.066$ ) in total moderate METs expended.

No significant differences were found in weekday hard activity, weekend hard activity, total hard activity hours, and total hard METs. However, the small numerical differences in these categories do seem greater because hard activities are being multiplied by a larger number than light and moderate activity to estimate MET levels.

There were also no significant differences found between the two groups in weekday very hard activity, weekend very hard activity, total very hard activity, and total very hard METs. The total very hard METs were separated by almost one MET. The results from the calculations of these very hard categories were again found to be very similar between sorority members and non-members.

The findings in all activity categories were so close that the total hours of activity between the two groups was separated by only 0.47 hours. Sorority members reported 118.97 ( $\pm 8.17$ ) hours of total activity and non-members reported 118.50 ( $\pm 5.09$ ) total hours. Minimal differences were also found in total weekday activity and total weekend activity. It appears that sorority members and non-members have similar physical activity patterns, for there are no differences in the amount of total activity being displayed on weekdays or weekends. However, the only difference found in weekend activity was that non-members significantly participated in more weekend moderate activity than sorority members.

Though sorority members and non-members may achieve their activity levels in different ways, they are still participating in similar amounts of physical activity because no significant difference was found in total METs expended per

day. Sorority members appear to receive the majority of their physical activity through hard activities, while non-members seem to receive their physical activity from moderate activity. One may think that sorority members and non-members are different and they may be in many aspects, but physical activity does not appear to be one. Instead of conducting research to determine the differences in the two groups, it would be interesting to study the similarities that are prevalent in the two groups.

## CHAPTER V

### SUMMARY & CONCLUSION

The purpose of this study was to determine if there was a significant difference in physical activity levels between non-members and sorority members. An additional objective of the study was to determine whether there was a relationship for physical activity with demographic factors or unhealthy lifestyle behaviors. It was hypothesized that non-members would participate in more physical activity than sorority member measured by total MET expenditure per day. It was also hypothesized that sorority member's alcohol consumption would decrease the amount of physical activity they participated in.

#### **Summary**

Information about the subject's physical activity and other behaviors was obtained from questionnaires completed by 300 undergraduate females. To determine which group participated in more physical activity the MET level of each group was estimated from a seven-day activity recall instrument (Sallis et al., 1985). It was hypothesized that non-members would be more physically active than sorority members. The hypothesis was reached based upon previous research that reported non-members participating in more moderate activity compared to fraternity and sorority members (Dinger, 1999). Previous research also determined that sorority members were more likely to participate in unhealthy, high risk behaviors than non-members (Lo & Globetti, 1995; Vickers



et al., 2004; McCabe, Schulenberg, Johnston, O'Malley, Bachman, & Kloska, 2005; McCabe et al., 2005; Ward & Gryczynski, 2007). These unhealthy behaviors were believed to lead to a decrease in physical activity because these behaviors have lead sorority members to miss class, poor grades, unprotected sex, violence, and even death (Caron, Moskey, & Hovey, 2004)..

The current study found that sorority members and non-members had no significant difference in physical activity levels assessed by total MET expenditure per day. This finding does not support the original hypothesis, which stated that non-members would be more physically active than sorority members. Rather than one group being more physically active than the other, both sorority members and non-members physical activity levels were similar in most of the categories examined. Instead of sorority members and non-members being perceived as different, their physical activity patterns are much alike.

The only significant difference found in physical activity between the two groups was in weekend moderate activity hours. Non-members significantly participated in more weekend moderate activity than sorority members. Though this significant difference did agree with previous research, it did not result in non-members being more physically active based upon MET levels as originally hypothesized.

This current study also found that sorority members participated in significantly more intramural sports per semester than non-members. The elevated levels of intramural sports provide an opportunity for sorority members to achieve physical activity. Without this opportunity for physical activity, similar

levels of activity with non-members might not have been reached. The study found that for sorority members as the number of intramural sports they participated in increased, so did the total METs expended per day. Though this relationship was weak, it showed that intramural sport participation had a positive impact on total MET expenditure.

Sorority members consumed alcohol and significantly consumed alcohol on more nights within the last seven days than non-members as previous research exposed similar results (Lo & Globetti, 1995; Vickers et al., 2004; McCabe, Schulenberg, Johnston, O'Malley, Bachman, & Kloska, 2005; McCabe et al., 2005; Ward & Gryczynski, 2007). The significant negative relationship for sorority members between the number of occasion's alcohol was consumed and the total METs expended per day supported the hypothesis that alcohol would have a negative effect on sorority members. The correlation determined that in sorority members as the number of occasion's alcohol was consumed within the previous seven days increased the total METs expended per day decreased. However, this relationship was not observed in non-members.

This current study found that non-members worked significantly more hours per week than sorority members. Having a job while in college did not hinder the non-members physical activity levels because a significant relationship determined that as non-members total number of hours worked per week while in college increased, so did the total METs expended per day. There was also a significant difference in the place of residence between sorority members and non-members.

Another significant correlation was found between total number of credit hours and total METs expended per day in sorority members. This is intriguing considering there was no significant difference between sorority members and non-members credit hours enrolled in, yet only sorority members are expending more METs per day as credit hours increase.

The current study determined there to be no significant differences between the two groups age, in the number of credit hours currently being taken, the number of hours spent on academics outside of class, the number of alcoholic drinks on a typical night of consuming alcohol, the number of cigarettes smoked per day, the rating of their diet, their concern for eating healthy, total light activity hours, total moderate activity hours, total hard activity hours, total very hard activity hours, total overall hours, weekday and weekend light METs, weekday moderate METs, weekday and weekend hard METs, weekday and weekend very hard METs, total light METs, total moderate METs, total hard METs, and total very hard METs.

### **Conclusion**

The current study determined that sorority members and non-members participate in similar amounts of physical activity as determined by total METs expended per day. Despite the fact that the sorority members and non-members have different experiences and attributes, their physical activity levels remained the same. Sorority members and non-members have different ways of achieving

physical activity and different reasons for participating in physical activity but whatever may be their motivator, the end results are similar.

### **Recommendations for Future Studies**

Future research regarding physical activity levels of college sorority members and non-members is warranted because this current study only examined one specific university. Future research should include more subjects and a sample from multiple universities in order to enhance the depiction of physical activity levels between the two groups. Also, universities should be selected from more than one region to provide a variety of subjects from different geographic, ethnic, economic, and cultural backgrounds.

An additional factor that should be examined is the timing of the activity assessment. The questionnaires should be distributed on a week when neither sorority members nor non-members have events scheduled, which are not offered to all students. This could provide the researchers with more realistic results of a typical week's physical activity, rather than having the data skewed because of special events that do not allow all subjects to participate. One way to combat this would be to survey the subjects on multiple occasions throughout the school year. This would provide a more realistic depiction of the subject's activity throughout the entire year, not just one particular week. When the assessment is only administered once during the school year, the previous seven days may not have depicted their true activity patterns for a number of barriers or motivators may have occurred.

Another recommendation would be to have subjects keep a physical activity log of their activities. Leaving the subjects to complete a questionnaire by recalling their physical activities performed throughout the previous week allows the subjects the opportunity to exaggerate their activity levels, along with forgetting the exact duration. Other forms of monitoring the subjects could be used, such as: accelerometers, pedometers, or heart rate monitors.

Though the current study determined sorority members to be more physically active than non-members additional studies should be conducted to further support the results and investigate the determining factors in more depth. This information would be useful for universities to determine if there is not only a true problem of sedentary behaviors for their students, but if joining a sorority makes females more active. This could change the public perception of sorority members only participating in unhealthy, high risk behaviors. It could also lead to further studies being conducted on other campus organizations to determine if joining an organization leads to an increase in physical activity levels.

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## Appendix A

### Physical Activity Survey

**By completing this survey, you are indicating your voluntary consent to use the information provided in this study. If you do not wish to participate, please return the survey to the researcher. All information will remain anonymous and confidential. You may choose to terminate your participation at any time without prejudice.**

-----

Please respond to the following questions with the answers that best pertain to you.

1. What is your age? \_\_\_\_\_ Are you a college athlete? (Circle)  
Yes / No
  
2. Are you in a sorority? (Circle) Yes / No  
If yes, for how many years? \_\_\_\_\_
  
3. How many intramural sports do you play on average per semester? \_\_\_\_\_
  
4. Where do you reside while at Eastern Illinois University? (Circle)  

<b>sorority house</b>	<b>off-campus house</b>	<b>off-campus apart.</b>
<b>on-campus apartment</b>	<b>dorm</b>	<b>other (explain):</b>
  
5. Academic standing: (Circle)  

<b>Freshman</b>	<b>Sophomore</b>	<b>Junior</b>	<b>Senior</b>	<b>Graduate</b>
-----------------	------------------	---------------	---------------	-----------------
  
6. How many credit hours are you currently taking? \_\_\_\_\_ semester hours
  
7. On a typical week, how much time do you spend on academics outside of class?  
(Circle)  

<b>0-2 hour(s)</b>	<b>3-5 hours</b>	<b>6-8 hours</b>	<b>9+ hours</b>
--------------------	------------------	------------------	-----------------
  
8. Do you have a job at school? (Circle) Yes / No  
How many hours per week do you work? \_\_\_\_\_ hrs
  
9. Do you drink alcohol? (Circle) Yes / No  
If yes, how many times in the last 7 days? \_\_\_\_\_  
If yes, how many alcoholic drinks on a typical night? \_\_\_\_\_

If yes, what kind of drinks on a typical night? (Check all answers that correspond)

- |                                       |   |
|---------------------------------------|---|
| <input type="checkbox"/> Mixed Drinks | <input type="checkbox"/> Beer             |
| <input type="checkbox"/> Wine         | <input type="checkbox"/> Hard alcohol     |
| <input type="checkbox"/> Shots        | <input type="checkbox"/> Other (explain): |

10. How many cigarettes (20 per pack) do you smoke per day? (Circle)

**0**      **1-3**      **4-6**      **7-9**      **10-12**      **12+**

11. Rate your diet? (Circle)

<b>Very unhealthy</b>	<b>Unhealthy</b>	<b>Moderate</b>	<b>Healthy</b>	<b>Very Healthy</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

12. I am concerned about eating healthy. (Circle)

<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## Appendix B

### Seven-Day Physical Activity Recall

*Instructions:* This questionnaire is called the Seven-Day Physical Activity Recall. The questions will ask you about your physical activity during the last 5 weekdays and last weekend, Saturday and Sunday. Please look at the attached list, which shows some examples of what is considered moderate, hard, and very hard activities. If your physical activity is not listed, use your best judgment to determine where it fits. The information from the questionnaire will be used to estimate the number of calories you burn up through physical activity. If you have any questions pertaining to the questionnaire, please feel free to ask me about it.

---

- A. On the average, how many hours did you sleep each night during the last 5 weekday nights (Sunday-Thursday)? (Record to nearest quarter-hour)
- \_\_\_\_\_ Hours X 5 = \_\_\_\_\_ **Total**
- B. On the average, how many hours did you sleep last Friday and Saturday night? (Record to the nearest quarter-hour)
- \_\_\_\_\_ Hours X 2 = \_\_\_\_\_ **Total**
- C. What **moderate** activities did you do and how many total hours did you spend during the last 5 weekdays doing these moderate activities or others like them? Please tell me to the nearest half-hour.
- |                |               |                    |
|----------------|---------------|--------------------|
| _____ Monday   | _____ Tuesday | _____ Wednesday    |
| _____ Thursday | _____ Friday  | _____ <b>Total</b> |
- D. Last Saturday and Sunday, how many hours did you spend on **moderate** activities? Please tell me to the nearest half-hour.
- |                |              |                    |
|----------------|--------------|--------------------|
| _____ Saturday | _____ Sunday | _____ <b>Total</b> |
|----------------|--------------|--------------------|
- E. What **hard** activities did you do and how many total hours did you spend during the last 5 weekdays doing these **hard** activities or others like them? Please tell me to the nearest half-hour.
- |                |               |                    |
|----------------|---------------|--------------------|
| _____ Monday   | _____ Tuesday | _____ Wednesday    |
| _____ Thursday | _____ Friday  | _____ <b>Total</b> |
- F. Last Saturday and Sunday, how many hours did you spend on **hard** activities? Please tell me to the nearest half-hour.
- |                |              |                    |
|----------------|--------------|--------------------|
| _____ Saturday | _____ Sunday | _____ <b>Total</b> |
|----------------|--------------|--------------------|
- G. What **very hard** activities did you do and how many total hours did you spend during the last 5 weekdays doing these **very hard** activities or others like them? Please tell me to the nearest half-hour.
- |                |               |                    |
|----------------|---------------|--------------------|
| _____ Monday   | _____ Tuesday | _____ Wednesday    |
| _____ Thursday | _____ Friday  | _____ <b>Total</b> |

H. Last Saturday and Sunday, how many hours did you spend on **very hard** activities? Please tell me to the nearest half-hour.

\_\_\_\_\_ Saturday      \_\_\_\_\_ Sunday      \_\_\_\_\_ **Total**

## Appendix C

<p style="text-align: center;"><b>Moderate Activities (3-5 METs)</b></p> <p>These activities involve modest increases in heart rate &amp; breathing—e.g., many household &amp; home repair tasks.</p> <ul style="list-style-type: none"> <li>• Calisthenics without weights</li> <li>• Carpentry</li> <li>• Cleaning, heavy (such as vacuuming, sweeping)</li> <li>• Croquet</li> <li>• Cycling—leisure, 5.5 mph mild</li> <li>• Electrical work</li> <li>• Feeding farm animals, manual milking</li> <li>• Fencing</li> <li>• Forestry—slow ax chopping, power sawing, stacking firewood, weeding</li> <li>• Frisbee playing</li> <li>• Gardening—hedging, raking, planting, mowing</li> <li>• Golf—no power cart</li> <li>• Gymnastics</li> <li>• Horseback riding</li> <li>• Locksmith</li> <li>• Machine tooling—lath, punch press, tapping &amp; drilling, welding</li> <li>• Mopping floor</li> <li>• Motor-cross</li> <li>• Mowing lawn—push &amp; power mower</li> <li>• Music—playing drums</li> <li>• Painting—outside</li> <li>• Planting seedlings</li> <li>• Plastering</li> <li>• Sailing &amp; board sailing</li> <li>• Scraping Paint</li> <li>• Stock clerking</li> <li>• Surfing</li> <li>• Sweeping</li> <li>• Swimming—mild</li> <li>• Grocery shopping</li> <li>• Table tennis</li> <li>• Laundry—heavy</li> <li>• Childcare</li> <li>• Window cleaning</li> <li>• Walking on firm level surface, 3-4 mph – Average to fairly brisk</li> <li>• Yoga</li> <li>• Tai-chi</li> <li>• Bowling</li> <li>• Horse shoes</li> <li>• Grocery shopping</li> <li>• Heavy cooking</li> </ul>	<p style="text-align: center;"><b>Hard Activities (5.1-6.9 METs)</b></p> <p>Most people will have noticeable increases in breathing and will likely perspire—e.g., vigorous household, home repair and gardening tasks, heavy industrial work, and some construction and vigorous sports.</p> <ul style="list-style-type: none"> <li>• Aerobic Dance</li> <li>• Badminton</li> <li>• Climbing hills with no load</li> <li>• Coal shoveling</li> <li>• Cycling—leisure, 9.4 mph (moderate)</li> <li>• Farming—shoveling grain</li> <li>• Fast Walking</li> <li>• Folk Dancing</li> <li>• Forestry—hoeing, planting by hand</li> <li>• Karate or Judo</li> <li>• Roller skating</li> <li>• Scrubbing floors</li> <li>• Skiing, water or downhill</li> <li>• Tennis, doubles</li> <li>• Walking on level Brisk or striding, firm surface @ 4.5 mph</li> <li>• Weight lifting or training (count only lifting time)</li> <li>• Swimming—moderate</li> </ul>
	<p style="text-align: center;"><b>Very Hard Activities (&gt;7.0 METs)</b></p> <p>These include strenuous sports involving a lot of movement and running. Very few household or occupational tasks are included, except carrying heavy loads, digging or chopping with heavy tools, or other similar hard physical labor.</p> <ul style="list-style-type: none"> <li>• Boxing—in ring, sparring</li> <li>• Circuit training</li> <li>• Climbing hills with 5-20 kg load</li> <li>• Cycling, racing (intensive)</li> <li>• Digging ditches</li> <li>• Farming—barn cleaning</li> <li>• Field hockey</li> <li>• Football</li> <li>• Forestry—fast ax chopping, barking trees, carrying logs, sawing by hand</li> <li>• Gardening, digging</li> <li>• Marching, rapid</li> <li>• Racquetball</li> <li>• Rope jumping</li> <li>• Running, jogging—cross country, 6-10 min/mile</li> <li>• Skiing, cross country</li> </ul>