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Physical Activity and Social Support for Exercise in a Sample of College Sorority and Fraternity Members

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To the Graduate Council:

I am submitting herewith a thesis written by Jennifer Autumn Minton entitled "Physical Activity and Social Support for Exercise in a Sample of College Sorority and Fraternity Members." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Exercise Science.

Dixie L. Thompson, Major Professor

We have read this thesis and recommend its acceptance:

Eugene C. Fitzhugh, Leslee A. Fisher

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Dr. Leslee A. Fisher

Acceptance for the Council:

Carolyn R. Hodges
Vice Provost & Dean of the Graduate School

(Original signatures are on file with official student records.)

PHYSICAL ACTIVITY AND SOCIAL SUPPORT FOR EXERCISE IN A SAMPLE
OF COLLEGE SORORITY AND FRATERNITY MEMBERS

A Thesis Presented

for the Master of Science Degree

The University of Tennessee, Knoxville

Jennifer Autumn Minton

May 2008

Dedication

This manuscript is dedicated to my family. They have been supportive and understanding throughout my educational career. My family has inspired me to be a better person and to learn from all experiences. My husband, you have given me hope, laughter, and love. I also dedicate this to my mentors. They have given me the strength and encouragement to follow my dreams. They have also assisted by guiding me through challenging my strengths and weaknesses. Lastly, I dedicate this to those of you that have allowed me to think outside the box and have stood by me when I felt alone. Thank you.

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Family and friends: their support, encouragement, and kind words were reassuring when I needed them most.

The subjects: Sorority and Fraternity Presidents for their cooperation and assistance. Without subjects no study could have ever be conducted. With their assistance, the body of research on physical activity and social support has been expanded.

Abstract

PURPOSE: To provide 1) a description of the levels of physical activity and social support for exercise for fraternity and sorority members; 2) a comparison of gender differences in physical activity levels among fraternity and sorority members; and 3) to determine a relationship between levels social support for exercise and physical activity in fraternity and sorority members. **METHODS:** Three hundred thirty-seven members of fraternities and sororities completed an online survey (74.8% female). The online survey included the International Physical Activity Questionnaire (IPAQ), the Social Support for Exercise Survey, and demographic questions. **RESULTS:** According to the IPAQ, the majority of fraternity and sorority members (90%) were engaged in moderate or high volumes of activity. However, the majority of members (62.3%) were not vigorously active 3 days per week for at least 20 minutes per session. Males were significantly more likely to report being active than females ($p < 0.001$). There were moderate correlations between social support for exercise from friends and the combination of moderate and vigorous activity (0.42); moderate activity (0.41); and vigorous activity (0.44). Social support for exercise from friends and gender predicted approximately 20% of the variance in moderate and vigorous physical activity. **DISCUSSION:** Approximately 40% of fraternity and sorority members reported engaging in vigorous activity. Fraternity members were more likely to report participation in vigorous activity than sorority members. Social support for exercise from friends was higher in students with structured exercise including moderate and vigorous activity. All significant correlations between

social support for exercise and physical activity variables were positive. The strongest predictors of vigorous exercise were social support from friends and gender.

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Chapter 1: Introduction

The transition from high school to college provides a unique opportunity for individuals to express their independence. For most students this is the first time that they will live for an extended period outside of their family's home. All students will try to adapt to their new coursework, find a support system, and adjust to their new environment. With all of these changes, physical activity may become less of a priority in student lives. In addition, some students may no longer have a coach or parent encouraging them to be physically active. In contrast, some students may find new opportunities to increase their physical activity with recreational facilities in close proximity or a new social network that enjoys recreational activity (i.e., intramural sport, physical activity classes).

Although physical activity levels decline with age, ¹ adult levels of physical activity are correlated with activity during earlier life. ² Developing an active lifestyle during college may aid in the continuation of activity when students enter the working world. Calf's et al. ³ reported that the majority (54%) of alumni either continued with college levels of physical activity or even increased the amount of participation in physical activity. Unfortunately, several studies suggest that a large number of college students are inadequately active or are participating in no physical activity. ⁴⁻¹³ In a review by Keating et al., ⁶ inactivity ranged from 36% to 50% for undergraduate students. Similar findings were reported by Irwin, ⁵ suggesting approximately 40% of college students do not meet the Centers for Disease Control and Prevention and American College of Sports Medicine (CDC/ACSM) guidelines for physical activity. ¹⁴

Researchers suggest that future studies are needed in this population to determine what is influencing their behaviors as well as interventions that might be most effective in increasing physical activity.^{5,6} One determinant of physical activity levels in college students is social support for exercise.

Social support for exercise has been reported as a determinant of physical activity levels in several studies. These studies^{6, 15-18} included subjects of varying ages, races, and gender. Social support appears to influence physical activity levels¹⁹ and as well as aid in the continuation of physical activity programs.²⁰ As levels of social support for exercise increase, physical activity levels increase and/or sedentary behaviors decrease.²⁰⁻²⁶ Specifically for college students, social support for exercise from family²⁵ and friends^{25,26} has been reported to be an important predictor of physical activity levels. It appears that peer support is more influential on exercise patterns than family support.²⁶

Fraternities and sororities are common social organizations for students on college campuses. There is evidence that negative behaviors are reinforced by “Greek” membership.²⁷ It is unclear whether a positive behavior such as exercise is reinforced in these groups.

The purpose of this study was to provide a description of the levels of physical activity and social support for exercise – from family and friends – for fraternity and sorority members. In addition, physical activity levels of men in fraternities were compared to women in sororities. Lastly, this study examined the relationship between levels social support for exercise and physical activity in fraternity and sorority members.

Based on the information known about college students' physical activity patterns, a hypothesis was form proposing that fraternity men would report more physical activity than their sorority females. An additional hypothesis anticipated that there would be no difference for social support for exercise, received from family or friends, between fraternity men and sorority women. Lastly, individuals with higher levels of social support for exercise were expected to report more physical activity.

Chapter 2: Review of Literature

PHYSICAL ACTIVITY LEVELS OF COLLEGE STUDENTS

Research has shown a large variability in the physical activity levels of college students. Some of this variation may reflect the many methodologies and instruments used to determine physical activity levels.^{5,6} As stated by Keating et al.,⁶ inconsistencies make it difficult to compare studies of physical activity levels of college students. Published in 2005, Keating et al.⁶ conducted a meta-analysis of college students' physical activity behaviors. Several inconsistencies make it difficult to compare studies, including the way that physical activity levels were collected (frequency, intensity, duration), reported (i.e., METs, total steps), and classified (recommended standards set by different organizations). According to Keating et al.⁶ the prevalence of physical inactivity has been reported to be between 36% and 50% for undergraduate students. These findings are to be considered with caution due to the lack of standardization of physical activity measurement for college students and various criteria for meeting the recommendation.

In 2004, Irwin⁵ appraised the prevalence of college students engaging in physical activity levels necessary to acquire health benefits. This study was a systematic review of research conducted on samples of college students. The analysis was conducted on studies from the past 20 years and included 27 countries and 35,747 college students. To determine if physical activity levels were at adequate levels for health benefits, the CDC/ACSM recommendation from 1995 had to be met.¹⁴ The recommendation is to

participate in moderate physical activity for an accumulation of no less than 30 minutes on most, preferably all, days of the week. The accumulated 30 minutes could include several bouts of exercise throughout the day of at least 10 minutes of continuous exercise.

The review reported several significant findings.⁵ In many countries, the majority of students are physically inactive, including the United States, Canada, and China. Even in Australia, where the lowest amount of physical inactivity was reported (40%), a large percentage of college students failed to meet the minimum recommendations for physical activity. Due to a lack of specificity in several methodologies, some subjects may have been misclassified. Irwin⁵ stresses the importance of developing a standardized instrument to be used to determine physical activity levels based on CDC/ACSM guidelines. Standardization would allow for better comparisons in future reviews of physical activity in college students.

Some additional studies have focused on defining acceptable physical activity levels based upon guidelines provided by CDC/ACSM.¹⁴ Burke et al.⁷ used questions about types of activity to determine physical activity levels of 594 Canadian college students. Subjects were asked to choose what best described their exercise participation from four options presented: 1) structured aerobics class, 2) with others outside of a structured class setting, 3) alone in an exercise setting, or 4) completely alone. Subjects were subsequently asked about frequency (times per week), duration (minutes per session), and intensity (how hard) of activity. Significantly more women (48.2%) than men (31.1%) met physical activity recommendations. Overall, the majority of students (57.4%) did not meet the recommendations.

Dinger and Waigandt⁸ estimated physical activity levels at a large Midwestern university in the United States. Physical activity was determined using the Youth Risk Behavior Survey for College Students (YRBS-C).²⁸ This survey was developed by the CDC and is comprised of 79 multiple-choice questions. Physical activity was reported by recalling activities that were participated in during the last 7 days. Subjects recalled the frequency of vigorous activity, moderate activity, flexibility training, and muscular strength/endurance exercises. For frequency of exercises, certain durations had to be reported. The duration of vigorous exercise was a minimum of 20 minutes of aerobic activity and sport. Moderate activity included walking and riding a bike for at least 30 minutes.

Dinger and Waigandt⁸ found that 45% of the sample reported an adequate amount of vigorous activity (at least 3 days during the previous week). Forty-six percent of the sample reported participating in moderate activities at least 3 days during the previous week. However, 22% did not engage in any vigorous activity and 30% did not engage in any moderate activities in the previous week. Similar to Burke et al.,⁷ gender differences were noted in this study. Females were more likely to report participating in moderate activity, while males were more likely to report participating in vigorous activity.⁸ Males were also more likely to report participating in muscular strength/endurance exercise while females were more likely to report participating in flexibility training.

As previously discussed in the meta-analysis by Keating et al.,⁶ physical activity levels are not always reported by the same standard. The following studies reported

physical activity levels by frequency (days per week) of vigorous activity in a multicultural sample of college students.¹⁰ Three hundred forty-seven minority (African American, Hispanic, and Asian-Pacific) students' physical activity behaviors were gauged using the Lipid Research Clinics Physical Activity (LRC) Questionnaire.²⁹ This survey contains four questions to quantify the duration and frequency of "heavy" physical activity. This study found no significance difference for exercise intensity levels based on race ($p < 0.001$).¹⁰ However, significant differences in physical activity volume were reported ($p < 0.05$). Hispanics (48.4%) and Asians (48.4%) were less likely to report current regular physical activity than African-Americans (61.4%). Gender differences also emerged for activity levels ($p < 0.001$). Males were more likely to report moderate to high activity levels (76.4%) and regular physical activity (70.1%) than females (39.5% and 44.4%, respectively).

Several longitudinal studies have been conducted to evaluate how physical activity changes throughout the course of a month,⁴ from freshman to sophomore year,^{12,13} and over the course of a college career.¹¹ Irwin⁴ conducted a study measuring the prevalence of physical activity maintenance in a sample of 392 college students. The students' physical activity levels were reported at baseline and again after one-month. Physical activity was determined using an adapted form of The Godin Leisure Time Exercise Questionnaire.³⁰ Adaptations were made to allow levels of physical activity to be evaluated based on guidelines for health. Students were categorized into active and insufficiently active groups. Students included in the active group met CDC/ACSM guidelines.¹⁴ Those who did not meet these standards were classified as insufficiently

active. During a one-month follow-up active students were defined as maintainers using The Physical Activity Maintenance Questionnaire (PAM-Q).³¹

At baseline, 51% of the students met CDC/ACSM recommendations. However, after one-month only 35% of the students met guidelines to be considered maintainers. Although this study had some limitations including a relatively short follow-up and a large dropout rate (42%), the significance of the baseline results show that only about half of students were meeting CDC/ACSM recommendation for health.

Additional studies have taken longitudinal analysis a step further by describing how physical activity changes for entering college freshman (fall semester) to their sophomore year (spring semester). A study conducted by Racette et al.¹² measured baseline physical activity levels of 764 college students. An analysis was also conducted on a subample to evaluate physical activity changes from the beginning to the end of the students' freshman year in college (N=118). Two hundred ninety students completed questionnaires at the beginning of their freshman year and at the end of their sophomore year. A 3-item exercise questionnaire asking about the duration, intensity, and frequency of aerobic training, strengthening, and stretching was used.

At baseline 59% of the students reported participation in aerobic exercise at least 3 to 5 days per week.¹² Forty-five percent of students reported strength training and 36% reported stretching 2 to 3 days per week. In contrast, 30% of students reported no exercise. Results from the beginning to the end of the freshman year concluded no significant difference in aerobic or strengthening exercises over time (approximately 50% for both). However, stretching exercises were reported by more students at the end of the

semester compared to the beginning (41% vs. 22%). When analyzing the data from the beginning of freshman year to the end of the sophomore year, the research showed a significant decrease in the amount of aerobic exercise reported by the students, from 62% to 55% ($p = 0.039$). However, students reported an increase in stretching from 30% to 38% ($p = 0.007$). This study concluded that the number of people reporting no exercise did not significantly change (approximately 30%).

A follow-up study by Racette et al.¹¹ tracked change in physical activity from freshman to senior year in college students. Similar to the previous study conducted by Racette et al.,¹² physical activity was self-reported using a questionnaire based on ACSM guidelines.³² Results were determined using a sample size of 204 college students (who completed surveys at both time points). Baseline results report that 59% of entering freshman participated in regular aerobic exercise, 45% engaged in strength training, and 31% stretched. Twenty-nine percent of the students reported having no regular physical activity. An increase in stretching was the only exercise behavior that changed from freshman to senior year ($p = 0.013$). It was noted that there was no significant change for students that reported no regular physical activity in their senior year (25%). A limitation to this study is that the variables were categorical rather than absolute amounts of physical activity as a continuum. This restricts the way that the data can be analyzed and evaluated.

Pinto et al.¹³ conducted a similar study analyzing changes in physical activity participation from freshman to sophomore year in college. Baseline characteristics were described using a sample size of 332 students. Two hundred forty-two students (73%)

completed the follow-up questionnaire. The International Physical Activity Questionnaire (IPAQ) was used to measure physical activity levels from the previous 7 days.³³ Students were classified into dichotomous groups based on self-reported physical activity, active and sedentary. Active was defined as meeting the CDC/ACSM recommendations for either vigorous or moderate activity.¹⁴ If the students did not meet these guidelines, they were classified as sedentary. Baseline characteristics indicate that 58% of the students were classified as being active and 64% were active at the follow-up.

In conclusion, inconsistencies in assessment and report of physical activity levels in college students make it difficult to determine an accurate description of activity levels. However, despite these discrepancies, it appears that a large number of college students are inadequately active or are participating in no physical activity.^{5,6} Serious health consequences can be expected if the low levels of physical activity carry over into the post-college period.

SOCIAL SUPPORT AND EXERCISE

When changing or maintaining a health behavior, one of the important mediators is social support. Social support for exercise is the positive encouragement and reinforcement from the social environment that one receives which increases the likelihood of living an active lifestyle. Social support can come in different forms (i.e., emotional, instrumental), from various sources (i.e., spouse, family, friends, co-workers), and exist on a continuum (i.e., how much support, positive vs. negative, how often you need support vs. how often you receive support). Social support has been found to be an integral part of positive health outcomes.³⁴

Wallace and Buckworth²⁵ conducted a cross-sectional study evaluating social support in college students as a variable in longitudinal shifts in exercise stages of change. Stages of change include five phases in which a person goes through as they change a behavior. The stages include precontemplation, contemplation, preparation, action, and maintenance. These stages are on a continuum, a person can move from one stage to the next in sequential order or jump, skipping one or two stages. Social support was measured using the Social Support for Exercise Survey.³⁵ This survey estimates support from family and friends towards exercise separately (this survey is described in detail in a subsequent section). Additional variables were examined including demographic characteristics, stage of exercise behavior change, exercise self-efficacy, current physical activity behaviors, and sedentary behaviors. Physical activity was determined based on frequency (days per week), duration (minutes per session), and intensity (sweating and labored breathing). This is a self-report questionnaire that was administered to 173 students; 163 fully completed the packet of questionnaires at baseline and follow-up (6-months).

Overall, there were no significant changes in physical activity or social support from baseline to follow-up. A fall in social support from peers was a predictor for decreased physical activity. In addition, family social support was suggested to be important in changing irregular exercisers to more regularly active people. These results also suggest that for college students social support from family and friends is important in maintaining a physically active lifestyle.

International studies have also been conducted to examine social support as a determinant for physical activity. Ståhl et al.²² evaluated the importance of social environment for a physically active lifestyle. Six countries were used in this analysis with highly varied physical activity levels with 3,343 adults. Data were collected via telephone interviews and as a part of a larger international study (MAREPS project). Motivation to participate in sport and physical activity was gauged using ten items. These items determined social support with a multifaceted approach including personal, media, and external environments. Personal environment support was provided by friends, family, workplace, school. Media environment included support from TV, radio, journals, and newspapers. Social support encompassed support provided by health insurance, doctors, politicians, and the community. Even though some of the items were less direct influences of social support, they are components of everyday social environments. Physical activity was determined based on the response to one question, “Do you do any gymnastics, physical activity or sport?” Physically active was described by the interviewer in very general terms, and included transportation and leisure-time physical activity. The participants that answered “yes,” they were considered physically active.

The results showed several determinants for activity including high perception of opportunity, perceived high support from health policy for physical activity and sports, and high social support from personal environment. They found that 68% of women and 70% of men were active. People who reported high levels of social support from their personal environment were twice as likely to be physically active as people with low levels of support.

Social support for exercise is important in various age groups. Resnick et al.²¹ conducted a study evaluating the effect of social support on exercise behavior in older adults. A sample of 74 older adults was interviewed about their social support and physical activity behaviors. During the interview, subjects completed the Self-Efficacy for Exercise Scale (SEE), the Outcome Expectations for Exercise Scale (OEE), the Social Support for Exercise Scale (SSE), and were asked if they participated in regular aerobic or resistive exercise three times per week for at least 20 minutes (yes or no). Social support for exercise scores were divided into three categories (No/low, Medium, High). High support was a score between 4 and 5, moderate support included scores of 2 to 3, and no/low support was 0-1.

Based on the criteria for determining physical activity, 57% of the participants were physically active.²¹ A study determining physical activity levels of older adults reported a significant difference in the amount of social support from friends in those who regularly exercise compared to those who did not ($F = 5.6, df = 1, 73, p < 0.05$).²¹ Family and expert support were also analyzed but no significant difference was found between the subjects that were physically active as compared to not physically active. Additional findings suggest peer social support had an indirect influence on exercise behavior through self-efficacy expectations ($R^2 = 0.22, p < 0.05$), which had a direct influence on exercise behavior ($R^2 = 0.40, p < 0.05$).

Eyler et al.¹⁶ assessed the effects of social support on physical activity levels in middle- and older-aged minority women. Data were analyzed from the U.S. Women's Determinants Study that was conducted via telephone interviewed. Hispanic, Black, and

American Indian/Alaskan Native women over the age of 40 were interviewed. White women were used as a comparison. The Social Support for Exercise Survey was used to measure social support from family and friends. Social support for exercised was categorized as low, medium, and high based on the score received. Physical activity categories were assigned (sedentary, regular exercise, cumulative exercise, lifestyle exercise) based on physical activities participated in the last two weeks. Sedentary referred to someone reporting no exercise, sports, or physically active hobbies. “Regular exerciser” was a person engaged in leisure-time physical activity at least 5 days per week with a minimum duration of 30 minutes. Cumulative exercise was calculated based upon total minutes of activity (leisure-time physical activity at least 150 minutes). Lifestyle activity referred to physical activity conducted as part of everyday living/routine (at least 300 minutes of combined activity).

Results suggest that 37.5 % of these subjects were sedentary. However, 76.9% reported enough physical activity to be classified in lifestyle activity. Results from this study suggested that subjects having higher social support for exercise are significantly less likely to be sedentary, even after adjusting for race/ethnicity. Having high levels of social support for exercise increased the likelihood of participating in 300 minutes of cumulative exercise per week by 1.5 times. Hispanic women had a significantly higher score for social support for exercise from family than White women (58% vs. 42%, respectively) in the high category. White women had significantly lower scores for social support for exercise from friends (39%) than Hispanic, Black, and American Indian/Alaskan Native women (49%, 48%, and 46%, respectively) in the high social

support category. Overall, social support for exercise from family was equally important in this population as support from friends.

Social support has been reported as a determinant of exercise in several studies with a variety of subject, taking into account gender, age, race, and culture.^{6, 15-18} Specifically, social support for exercise from family²⁵ and friends^{25, 26} in college students has been reported to be important for physical activity levels. There is some indication that peer support is more influential than family support for exercise.²⁶

FRATERNITY AND SORORITY MEMBERSHIP

Limited studies have been published focusing on fraternity and sorority membership. The majority of studies have looked at negative health behaviors (i.e., drinking).^{27, 36-38} Furthermore, only one study to date evaluated social support in this population.³⁹ An additional study examined Greek membership as a predictor for physical activity levels in a group of college students.⁴⁰

Gender Differences in Social Support

An investigation was conducted to interpret social support differences among females in sororities and males in fraternities given by their “Greek” roommates. Woodward et al.³⁹ inquired about eight different forms of perceived social support (i.e., Emotion, Technical Appreciation, Personal Assistance, and Tangible). For each form of support, subjects listed the number of providers, difficulty of obtaining more, and satisfaction of the support. This questionnaire was an adaptation of the Social Support Survey (SSS) to more adequately evaluate this specific population.

The results indicated a gender difference among sorority and fraternity members for satisfaction of support and the difficulty of obtaining some forms of support. Fraternity support was classified as task/goal-oriented or “assert their individuality” compared to sorority members support classified as interpersonal interaction to build relationships. Fraternity members reported significantly lower satisfaction of their emotional support and found it more difficult to obtain more listening support than the sorority members. Sorority members reported lower levels of satisfaction for several forms of support than fraternity members reported. These forms of support included technical challenge (“the perception that an other is acknowledging the support recipient’s efforts and is expressing appreciation for the work she does”), emotional challenge (“the perception that an other is challenging the support recipient to evaluate her attitudes, values, and feelings”), and tangible support (“the perception that an other is providing the support recipient with either financial assistance, products, and/or gifts”). This study concluded that there were more similarities between perceived social support among fraternity and sorority members than differences.

The previous study³⁹ provided a general description of the perceived social support given by other fraternity and sorority affiliates. It also allowed gender differences to be recognized; however, general social support was not associated with physical activity levels.³⁵ Hence, additional research is needed to describe levels of social support for exercise of sorority and fraternity members.

Predictors of Health Behaviors

Cameron and Camp⁴⁰ conducted a study comparing predictors of three health behaviors (i.e., attitude toward behavior, perceived social norms, and demographics) in college students, including fraternity and sorority members. The health behaviors that were investigated were alcohol, smoking, and exercise. For each health behavior, perception of the social norm and attitude towards that behavior was evaluated. The health behaviors themselves were also estimated by self-report. Questions were asked about the average of the number of drinks that were consumed while socializing and the frequency of binge drinking (“five or more drinks in one sitting”). Smoking was measured by asking the number of cigarettes or cigars smoked and on how many days they smoked in the last month. Exercise was measured by asking frequency of exercise habits (days/week) and duration of the exercise per session (minutes).

Means were reported for frequency (3.28 days/week) and duration (57.55 minutes/session) of participation in physical activity.⁴⁰ Predictors of exercise frequency and duration included social norms and attitudes. Exercise frequency and duration increased based on the perception of the social norms for physical activity, enjoyment of the exercising, and the more important they found it to be for positive health outcomes. In addition, males reported exercising for longer durations, but less frequently than females.

Overall social norms were not strong predictors of these health behaviors. Positive beliefs about a behavior (positive influence on his or her health) were only a predictor for exercise (positive health behavior). The only behavior that was not predicted by gender was frequency of exercise, with males reporting higher scores than females for all

behaviors. Living arrangement failed to predict any health behaviors, whereas Greek affiliation only predicted drinking behaviors.

Previous studies have concentrated on perceived social norms. This has laid the groundwork for future research with regard to social influences as well as gender differences in “Greek” members. Generally, there appear to be gender differences in social support and physical activity. However, due to the limited amount of research, additional studies are required to provide an accurate description of levels of physical activity and social support for exercise in fraternity and sorority members.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

The International Physical Activity Questionnaire (IPAQ) was developed to assess physical activity levels using self-reported physical activity that could be modified to describe activities specific to the population being surveyed.⁴¹ The questionnaire has both a long and short form and can be administered in two ways – by telephone interview or in person. The IPAQ short form encompasses three activity categories including walking, moderate-intensity, and vigorous-intensity. Frequency (days per week), duration (at least 10 minutes of continuous activity) and intensity (walking, moderate, and vigorous) was determined for each type of activity.

Scoring of the IPAQ requires the use of assigned Metabolic Equivalent (METs) for walking (3.3 METs), moderate activities (4.0 METs), and vigorous activities (8.0 METs). The product of frequency (days/week), intensity (MET score), and duration (minutes per day) for each category was used to calculate MET-min/week. Total MET-minutes per week can be calculated by summing of MET-min/week for each of the

categories (walking, moderate, and vigorous). In addition, physical activity groups can be assigned based on total MET-minutes and cut-points for frequency and duration. The criteria used to establish activity groups are as follows:

“High Activity, any one of the following 2 criteria: 1) Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-min/week or 2) 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week. Moderate Activity, either of the following 3 criteria: 1) 3 or more days of vigorous activity of at least 20 minutes per day or 2) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day or 3) 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 600 MET-minutes/week. Low Activity, 1) No activity is reported or 2) Some activity is reported but not enough to meet category [Moderate] or [High].”⁴¹

These categories are in accordance with the CDC/ACSM 1995 recommendations for physical activity levels to achieve health benefits¹⁴.

Reliability and Validity of the IPAQ

In 2000, Craig et al.³³ conducted a 12-country reliability and validity study for the IPAQ. This study included 1880 people who answered questions on the long form and 1974 people who completed the short form. The majority of the sample was middle-aged and included men and women. Reliability was evaluated by having the participants complete the IPAQ the following week. Validity was determined by comparing the IPAQ to an accelerometer (CSA model 7164) which was considered the criterion method. The accelerometer was worn for the week between the initial administration of the IPAQ form (short or long) and the follow-up administration of the same form. Data from the CSA was summed in one-minute increments and stored for the 7 days of data collection.

Standard scoring and data reduction was applied to all subjects for both short and long versions of the IPAQ. Duration from each of the activity categories was totaled, then calculated into total energy expenditure (MET*min/week). Physical activity groups were assigned based on frequency, duration, and intensity of activities as well as total energy expenditure. CSA data were categorized by counts into moderate and vigorous activity levels to be compared to the moderate and vigorous activity levels estimated by the IPAQ.

Several analyses were run on the data. Reliability assessment when included test-retest of the same IPAQ forms administered approximately a week apart. In addition, concurrent validity compared the data from the short form to the long form of the IPAQ, which were administered on the same day. Lastly, criterion validity was also evaluated by comparing data recorded from the accelerometer to long and short IPAQ forms over the previous 7 days.

Overall, the results from the short and long form IPAQ indicated that the reliability was approximately 0.80 with a range of 0.46 to 0.96 (depending on country) indicating “very good” repeatability.³³ In addition, reasonable agreement was shown between the two forms based on concurrent validity coefficients. Furthermore, overall criterion validity showed a fair to moderate agreement between the IPAQ forms and accelerometer. Results from this study determined that the IPAQ is acceptable to be used by diverse populations and across a large age range (18-65 years old) with the majority of the population being middle aged.

In 2004, Brown et al.⁴² conducted a study to determine test-retest reliability of four physical activity measures used in population surveys. In this study, reliability was compared between the Active Australia Survey (AAS), short IPAQ, Behavioral Risk Factor Surveillance System (BRFSS), and Australian National Health Survey (NHS). Three hundred ninety respondents complete telephone interviews to estimate self-reported physical activity levels. The sample was comprised of 356 subjects between the ages of 18 and 75 years. Participants completed the Active Australia Survey and one of three other surveys during a phone interview. A retest was completed by participants the following day with the same physical activity questionnaires.

Scores were reported in minutes of activity per week for walking, moderate, and vigorous intensities. Vigorous activity was weighted to adjust for the elevated intensity. Statistical analyses calculated percent agreement, Kappa scores, and intra-class correlations between the four surveys. The results suggested the reliability in percent agreement scores for activity status had a range of 60% (NHS) to 79% (IPAQ). Kappa scores for activity level classification suggested that, overall; there was moderate agreement between the surveys. Kappa scores ranged from 0.40 (NHS & BRFSS) to 0.52 (AA1). The IPAQ had a kappa score of 0.47 with a 95% confidence interval of 0.29-0.66. Intra-class correlation was analyzed for activity levels and total minutes of activity for each of the surveys. The IPAQ had a moderate agreement for walking (0.53), moderate activity (0.41), and vigorous activity (0.52). A high agreement (0.68) for total (weight) minutes of activity was shown for the IPAQ. Overall, they found that all four surveys were reliable instruments to estimate various levels of intensity of physical activity.⁴²

In 2006, Dinger et al.⁴³ conducted a reliability and validity study using the IPAQ to inspect physical activity levels in a college-aged population. The sample was comprised of 123 college undergraduates between 18 and 30 years old (76% Caucasian, 74% female). Validation was judged by comparing the IPAQ to accelerometer and pedometer data. Each subject wore these devices for one week prior to the completion of the survey. The second IPAQ was administered 4-6 days after the completion of the first survey.

The test-retest interclass correlation had a range of 0.71 to 0.89. The criterion validity correlation coefficients ranged from 0.15 to 0.26 for total weekly time spent in physical activity from the IPAQ and values from the accelerometer and pedometer. Time spent in moderate activity was found to have a lower correlation ($r = 0.19$) compared to vigorous activity ($r = 0.23$). Although low, correlation coefficients in this are often seen between objectively monitored physical activity and questionnaires.

Research suggests that the IPAQ is an acceptable instrument to assess physical activity levels compared to other self-reported surveys.⁴² In addition, modifications to the survey are acceptable to capture cultural, racial, and age-related differences.³³ More specifically, the IPAQ has been suggested as an acceptable survey to assess physical activity level in college-aged populations.⁴³ In addition, Irwin specifically suggests the use of the IPAQ in this population even though validity studies have reported low correlations to measured values. The IPAQ records levels of physical activity that can be classified as adequate to achieve health benefits. In terms of future research, this would allow for more accurate categorization of subjects as adequately active or inactive for

health benefits. In addition, using the same questionnaire and scoring protocols would allow future cross-sectional studies, which will be better able to compare reported findings.

SOCIAL SUPPORT FOR EXERCISE (SSE) SURVEY

The survey is a 13-item, self-administered questionnaire evaluating behaviors, and attitudes of family and friends toward participation in exercise.⁴⁴ For example, participants are asked, “How often did family or friends exercise with me, offer to exercise with me, gave me helpful reminders to exercise, or changed their schedule so we could exercise together.” Two out of the 13-items were considered negative influences towards exercise behavior (i.e., “got angry at me for exercising” and “criticized me or made fun of me for exercising”). Items are rated on a 5-point Likert scale from 1 (none) to 5 (very often). SSE instructions give the user guidance on summing specific items to create a score for friends SSE and a separate score for family SSE.⁴⁵ The total score can also be used.

Reliability and Validity of the Social Support for Exercise Survey

In 1987, Sallis et al.³⁵ developed a survey to assess social support for health-related diet and exercise behavior from family and friends. This publication included two studies. In Study I, subjects were questioned about the details of their support or lack thereof from family and friends towards their behavior change. In addition, subjects were questioned about support that they would want in the future. Based on responses from these interviews, interpersonal behaviors were grouped into support items included in Study II social support scales.

Study II included social support scales and additional self-reported measures. These were administered to a sample of 171 subjects; females represented a large the majority of the subjects (75%). The social support scales listed items and subjects had to determine the frequency of what family or friends had said or done in the previous 3 months. Validity of the social support was determined using the Social Support Questionnaire. This questionnaire measured general social support. Physical activity was determined using a questionnaire that estimated physical activity at sufficient levels to result in a cardiorespiratory training effect. Reliability was measured using the 1-2 week test-retest of the subsample (N = 52).

Moderate correlations were found between vigorous exercise and social support for exercise for family (0.35) and friends (0.46). No significant correlations were discovered between the general Social Support Survey and the Social Support for Exercise Survey or exercise behavior. Reliability was measured with a two week test-retest (range, $r = 0.55- 0.86$) and was found to be moderately high. Wallace et al.²⁴ reported similar findings with internal consistencies of 0.89 for family and 0.90 for friends in a college-aged population.

In the same study by Wallace et al.²⁴, reliability was examined in a sample of 56 undergraduate students. Reliability was analyzed with a 1-week test-retest. Reliability was high for family SSE (0.86) and friends SSE (0.90). In an additional study on 74 older adults (at least 65 years old), reliability was estimated for the social support for exercise survey.²¹ Internal consistency was measured and alpha coefficients of 0.84 for family

and 0.90 for friends were reported for this population.²¹ However, social support levels did not significantly differ between regular exercisers and non-exercisers.

Although there was limited research on the validity of the Social Support for Exercise Survey, it has been found to be more acceptable at predicting physical activity levels than more general social support survey instruments.³⁵ In addition, reliability was high.^{21,24} A significant relationship between social support for exercise and activity levels has been seen in several populations.

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ABSTRACT

PURPOSE: To provide 1) a description of the levels of physical activity and social support for exercise for fraternity and sorority members; 2) a comparison of gender differences in physical activity levels among fraternity and sorority members; and 3) to determine a relationship between levels social support for exercise and physical activity in fraternity and sorority members. **METHODS:** Three hundred thirty-seven members of fraternities and sororities completed an online survey (74.8% female). The online survey included the International Physical Activity Questionnaire (IPAQ), the Social Support for Exercise Survey, and demographic questions. **RESULTS:** According to the IPAQ, the majority of fraternity and sorority members (90%) were engaged in moderate or high volumes of activity. However, the majority of members (62.3%) were not vigorously active 3 days per week for at least 20 minutes per session. Males were significantly more likely to report being active than females ($p < 0.001$). There were moderate correlations between social support for exercise from friends and the combination of moderate and vigorous activity (0.42); moderate activity (0.41); and vigorous activity (0.44). Social support for exercise from friends and gender predicted approximately 20% of the variance in moderate and vigorous physical activity. **DISCUSSION:** Approximately 40% of fraternity and sorority members reported engaging in vigorous activity. Fraternity members were more likely to report participation in vigorous activity than sorority members. Social support for exercise from friends was higher in students with structured exercise including moderate and vigorous activity. All significant correlations between

social support for exercise and physical activity variables were positive. The strongest predictors of vigorous exercise were social support from friends and gender.

INTRODUCTION

Although physical activity levels decline with age, ¹ adult levels of physical activity are correlated with activity during earlier life. ² Developing an active lifestyle during college may aid in the continuation of physical activity when students enter the working world. Calfas et al. ³ reported that the majority (54%) of alumni either continued with college levels of physical activity or even increased the amount of participation in physical activity. Unfortunately, several studies suggest that a large number of college students are inadequately active or are participating in no physical activity. ⁴⁻¹³ In a review by Keating et al., ⁶ physical inactivity ranged from 36% to 50% for undergraduate students. Similar findings were reported by Irwin, ⁵ suggesting approximately 40% of college students do not meet the Centers for Disease Control and Prevention and American College of Sports Medicine (CDC/ACSM) guidelines for physical activity. ¹⁴ Researchers suggest that future studies are needed in this population to determine what is influencing their physical activity behaviors as well as interventions that might be most effective in increasing physical activity. ^{5,6} One possible determinant of physical activity behavior in college students might be social support for exercise.

Social support for exercise has been reported as a determinant of physical activity levels in several studies. These studies ^{6, 15-18} included subjects of varying ages, races, and gender. Social support appears to influence physical activity levels ¹⁹ as well as aid in the continuation of physical activity programs. ²⁰ Generally, as levels of social support for

exercise increase, physical activity levels increase and/or sedentary behaviors decrease.

²⁰⁻²⁶ Specifically for college students, social support for exercise has been found to originate from family ²⁵ and friends ^{25, 26} and has been reported to be an important predictor of physical activity levels. It also appears that peer support may be more influential on exercise patterns than support from the family. ²⁶

Fraternities and sororities are common social organizations for students on college campuses. There is evidence that negative behaviors are reinforced by “Greek” membership. ²⁷ It is unclear whether a positive behavior such as exercise is encouraged in these groups.

The purpose of this study was to provide a description of the levels of physical activity and social support for exercise – from family and friends – for fraternity and sorority members. In addition, physical activity levels of men in fraternities were compared to women in sororities. Lastly, this study examined the relationship between social support for exercise and physical activity among fraternity and sorority members.

Based on the information known about college students’ physical activity patterns, a hypothesis was formed proposing that fraternity men would report more physical activity than their sorority females. An additional hypothesis anticipated that there would be no difference for social support from family or friends for exercise between fraternity men and sorority women. Lastly, individuals with higher levels of social support for exercise were expected to report more physical activity.

METHODS

Participants

Participants in this study were undergraduate students who were also fraternity and sorority members from a large university in the southeastern United States. Participants were at least 18 years of age. After gaining permission from the fraternity and sorority leadership, participants were recruited two ways, via email and presentation. An informational e-mail were sent directly to the fraternity and sorority faculty advisors. The faculty advisors then forwarded this e-mail to the sorority and fraternity presidents, who were asked to forward to their membership. There were approximately 1900 sorority members and 1450 fraternity members at the time the survey was distributed which make up about 12% of the student body. Four-hundred nineteen fraternity and sorority members started but did not complete the survey. Three-hundred and thirty-seven subjects (80%) had complete data for physical activity and social support variables (approximately a 10% response rate). The e-mail included a hypertext link to access a website where a survey was located. When approved by the chapter presidents, one weekly meeting was attended to give a brief information presentation about the online survey and handouts including the website were distributed to the membership (Appendix H) including the survey website. Approximately 30% of the sorority chapters received the presentation and 100% of the fraternity chapters. Every subject provided informed consent electronically. This study was approved by the Institutional Review Board for the university.

Data Collection and Instruments

Data were collected using an online survey. The online survey was developed using mrInterview™, a web design program in the SPSS 15.0 version for Windows (Statistical Package for the Social Sciences Inc., Chicago, IL). Physical activity data were gathered using the International Physical Activity Questionnaire (IPAQ) short form.⁴⁶ The Social Support for Exercise Survey was used to gather information on perceived social support from family and friends.⁴⁴ Demographic information was also collected.

The IPAQ short form assesses reported moderate and vigorous physical activity as well as walking in bouts lasting 10 minutes or longer from the previous week. This instrument has been shown to be an acceptable instrument assessing physical activity in college students.⁴³ Frequency (days per week), duration (at least 10 minutes of continuous activity) and intensity (walking, moderate, and vigorous) of physical activity are determined allowing the calculation of weekly energy expenditure (MET-min/week). The following MET values were used for calculations: walking = 3.3 METs; moderate intensity = 4.0 METs; and vigorous intensity = 8.0 METs. In addition, to expressing energy expenditure in MET-min/week, individuals were categorized into physical activity levels in accordance with the CDC/ACSM 1995 recommendations for healthy behavior.¹⁴

Fraternity and sorority members' physical activity was categorized into three activity levels based on the IPAQ scoring protocol. High activity was considered being active for 7 days that accumulated to at least 3000 MET-min/week (any combination of walking, moderate- or vigorous-intensity activity) or 3 or more days of vigorous-intensity

totally to at least 1500 MET-min/week. The moderately active category included subjects that participated in at least 3 days of vigorous-intensity activity for 20 minutes or more per session, or engaging in moderate-intensity activities and/or walking for 30 minutes or more on at least 5 days per week, or accumulating at least 600 MET-min/week from walking, moderate- and/or vigorous-intensity activities. Low activity participants were those that reported activity levels that did not meet criteria to qualify for moderate or high activity levels.

The Social Support for Exercise Survey is a 13-item, self-administered questionnaire assessing behaviors and attitudes of family and friends toward participation in exercise.⁴⁴ For example, participants were asked, “How often did family or friends exercise with me, offer to exercise with me, gave me helpful reminders to exercise, or changed their schedule so we could exercise together.” Two out of the 13 items were considered negative influences towards exercise behavior (i.e., “got angry at me for exercising” and “criticized me or made fun of me for exercising”). Items were rated on a 5-point Likert scale, from 1 (none) to 5 (very often). Scores were calculated by adding the responses from each positive question about perceived social support. Separate scores were tallied for family and friends.⁴⁵ Sallis et al.³⁵ did not find the negative social support from friends to significantly influence reported participation in vigorous activity. Negative responses for perceived social support from family was optional to include in scoring and was excluded from this study.

Demographic questions included age, height, weight, years of college attended, gender, race, length of membership of sorority/fraternity, living arrangements (on-campus vs. off-campus) and roommate (Greek vs. non-Greek).

Statistical Analysis

Statistical differences and associations were tested using SPSS 15.0 (SPSS Inc., Chicago, IL.). Group means were used to report variables. Chi square tests measured the differences between the distributions of observed results compared to the predicted outcomes. MANOVAs determined significant differences in levels of social support when taking into consideration physical activity and demographic variables. If there were significant findings from the MANOVA, ANOVAs followed to determine whether the significant interaction was due to family and/or friends. To examine how the social support differed between physical activity levels, Tukey HSD tests were conducted. This analysis allowed significant differences between physical activity categories to be determined. Pearson correlations were calculated to determine the relationship between activity (MET-min/week) and social support for exercise. Stepwise multiple regression was used to determine significant predictors (i.e., social support for exercise from family or friends, gender, living arrangement, and roommate) of physical activity (MET-min/week).

RESULTS

Participants consisted of undergraduate students between the ages of 18 and 27 years with 98 % of the respondents between 18 and 22 years old ($M = 19.7$). Approximately one quarter (25.2%) of the sample was male. The average membership

length in the sorority or fraternity was 1 year and 7 months, ranging from 1 month to 7 years. Additional descriptive statistics are shown in Tables 1 and 2.

Chi-squares tests were used to determine if individuals were equally distributed among physical activity categories and demographic categories. Overall, 7.4% reported low activity, 33.2% reported moderate, and 59.2% reported high activity. Year in school was the only demographic with a significant relationship with physical activity group [$\chi^2(6, N = 337) = 17.31, p = 0.008$] (Table 3.). Freshmen are less likely to be in the low activity group (1.2%) and most likely to be in the high activity group (68.2%). However, seniors are more likely to be in the low activity group (16.2%). Presence of a Greek roommate, gender, and living on- or off-campus did not alter likelihood of being in a given physical activity category.

Chi Square analysis was used to determine if individuals in various demographic categories were equally likely to participate in vigorous activity (Table 4). To be considered vigorously active, subjects had to participate in at least 3 days of vigorous activity for at least 20 minutes of continuous activity. Gender [$\chi^2(1, N = 337) = 13.07, p < 0.001$] and year in school [$\chi^2(3, N = 337) = 8.9, p < 0.05$] had significant relationships to vigorous activity. Females were less likely to report vigorous activity than males (32.1% vs. 54.1%, respectively). In addition, juniors (76.6%) were less likely to report vigorous activity than would be predicted compared with 56-59% of freshmen, sophomores, and seniors. Reports of vigorous activity did not significantly differ based on living arrangements [$\chi^2(1, N = 337) = 0.14, p = 0.71$] or roommate [$\chi^2(1, N = 337) = 0.61, p = 0.06$].

Table 1. Characteristics of Sample

	N	Percent
Gender		
Male	85	25.2
Female	252	74.8
Year in School		
Freshman	85	25.2
Sophomore	107	31.8
Junior	77	22.8
Senior	68	20.2
Living Arrangement		
On-campus	206	61.1
Off-campus	131	38.9
Roommate		
Greek	214	63.5
Non-Greek	123	36.5
Vigorous Activity[‡]		
Yes	127	37.7
No	210	62.3

[‡] Participation in 3+ days per week of vigorous activity lasting at least 20 minutes per bout.

Table 2. Descriptive Statistics of Subjects

	Mean	SD	Minimum	Maximum
Body Mass (kg)				
Male	84.89	11.89	61.36	115.91
Female	61.28	9.30	43.18	100.00
Body Mass Index (kg/m²)				
Male	25.49	3.01	19.30	32.35
Female	22.38	2.82	17.26	33.52
Social Support for Exercise				
Friends	29.3	06.6	10.0	48.0
Family	27.3	07.6	10.0	50.0
Weekly Physical Activity (MET-min/week)				
Total	4269.3	4825.3	49.5	56160.0
Walking	2204.9	4113.9	49.5	55440.0
Moderate Activity	759.6	1094.0	0.0	7200.0
Vigorous Activity	1305.5	1732.4	0.0	13440.0

Table 3. Physical Activity Classification Levels based on Standing in School

Dependent Variable		Low	Moderate	High
Overall		7.4	33.2	59.3
Year in School	Freshman	1.2 ⁻⁻	30.6	68.2 ⁺
	Sophomore	8.4	32.7	58.9
	Junior	5.2	42.9 ⁺	51.9
	Senior	16.2 ⁺	26.5	57.4

⁺ Percent greater than expected ($p < 0.01$)

⁻⁻ Percent less than expected ($p < 0.01$)

Table 4. Reported Vigorous Activity by Gender and Year in School

Dependent Variable		No	Yes
Overall		62.3	37.7
Gender	Female	67.9	32.1 ⁻
	Male	45.9 ⁻	54.1
Year in School	Freshman	58.8	41.2
	Sophomore	58.9	41.1
	Junior	76.6 ⁺	23.4
	Senior	55.9	44.1

⁺ Percent greater than expected ($p < 0.05$)

⁻ Percent less than expected ($p < 0.001$)

Social support for exercise was significantly different in the reported physical activity groups for both family [$F(2, N = 334) = 3.844, p = 0.022$] and friends [$F(2, N = 334) = 20.209, p < 0.001$] (Table 5). The high activity group had significantly higher levels of social support for exercise from friends than both the low activity group ($p = 0.002$) and moderate activity group ($p < 0.001$). No significant difference was observed between the low and moderate activity groups for friends ($p = 0.982$).

Family social support for exercise was significantly higher in the high activity groups compared to the moderate activity group ($p = 0.046$) (Table 5). However, no statistical difference was found between the high and low activity groups ($p = 0.151$). This finding may be attributed to the large variance in social support for exercise in the low activity group.

Table 5. Social Support for Exercise in the Physical Activity Groups

Social Support	Physical Activity Groups		
	Low	Moderate	High
Friends	23.4 ± 1.7	23.8 ± 0.8	29.6 ± 0.6***
Family	21.3 ± 2.0	22.4 ± 0.9	25.3 ± 0.7*

* p < 0.05 compared to only Moderate Activity Group

*** p < 0.001 compared to both Moderate and Low Activity Groups

Social support for exercise from family [$t(335) = 2.863, p = 0.001$] and friends [$t(335) = -1.836, p < 0.001$] was significantly higher for students reporting participation in vigorous exercise (Table 6). Vigorously active students had higher mean scores for social support from family (26.2 ± 0.9) and friends (31.7 ± 0.7) than students who did not participate in vigorous activity (22.6 ± 0.7 and 24.5 ± 0.6 , respectively). The relationship between social support for exercise and vigorous exercise remained true when gender, year in school, living arrangement, and roommate were taken into account. Students with higher levels of social support for exercise tend to report exercise at higher intensity levels.

A summary of the Pearson correlations between social support and physical activity variables is found in Table 7. Social support for exercise from friends was significantly correlated with all variables, except walking MET-min/ week. Additional significant weak correlations were found between social support from family and MET-min/week for all activity levels except total activity. There were moderate correlations between social support for exercise from friends and the combination of moderate and vigorous activity (0.42), moderate activity (0.41), and vigorous activity (0.44). All

Table 6. Social Support for Exercise based on Vigorous Activity Participation

Social Support	Vigorous Activity	
	Yes	No
Friends	31.7 ± 0.7 ^{***}	24.5 ± 0.6
Family	26.2 ± 0.9 ^{***}	22.6 ± 0.7

^{***} p ≤ 0.001 compared to no vigorous activity

Table 7. Correlation of Study Variables

Variable	SSE Friends	SSE Family	Walking	Moderate	Vigorous	Moderate & Vigorous
SSE Friends	1.0					
SSE Family	0.44 ^{**}	1.0				
Walking [§]	-0.03	0.01	1.0			
Moderate Activity [§]	0.27 ^{**}	0.15 ^{**}	0.09	1.0		
Vigorous Activity [§]	0.39 ^{**}	0.16 ^{**}	0.02	0.31 ^{**}	1.0	
Moderate & Vigorous [§]	0.42 ^{**}	0.19 ^{**}	0.05	0.70 ^{**}	0.89 ^{**}	1.0
Total Activity [§]	0.18 ^{**}	0.10	0.88 ^{**}	0.41 ^{**}	0.44 ^{**}	0.53 ^{**}

[§] Physical Activity reported in MET-min/week

^{**} p < 0.01

Table 8. Predictors of Vigorous Physical Activity

Predictors	R²	P
SSE from Friends	0.152	< 0.001
SSE from Friends + Gender	0.207	< 0.001

Table 9. Predictors of Moderate & Vigorous Physical Activity

Predictors	R²	P
SSE from Friends	0.174	< 0.001
SSE from Friends + Gender	0.220	< 0.001

significant correlations between social support for exercise and physical activity variables were positive indicating a direct association.

Stepwise regression was conducted with social support for exercise (family and friends) and demographic variables (gender, year in school, living arrangement, and roommate) to determine which variables would predict vigorous and moderate physical activity (MET-min/week). The strongest predictors for the combination of moderate and vigorous activity and vigorous activity was the combination of social support from friends and gender (Tables 8 and 9). Social support for exercise from friends and gender predicted approximately 21% of the variance of vigorous activity. Twenty-two percent of the variance for moderate and vigorous activity can be predicted by the interaction between social support for exercise and gender.

COMMENT

The purpose of this study was to provide a profile for physical activity and social support for exercise in a sample of fraternity and sorority members. In addition, reported

physical activity levels of men in fraternities were compared to women in sororities. Lastly, the relationship between reported levels of social support for exercise and physical activity in fraternity and sorority members was examined.

The major findings from this study include the impact of year in school on physical activity groups, gender differences in reporting vigorous activity, and predictors of exercise participation. Fraternity and sorority members who were questioned in this study accumulated a large amount of physical activity throughout their week (4269 ± 4825 MET-min/week). This included any physical activity (i.e., walking to class, basketball, swimming, etc.) that was at least ten minutes in duration. When fraternity and sorority members were categorized into physical activity groups, less than 10% of our sample was classified in the low activity group. The high volume of reported walking (52% of total MET-min/week) was a major factor leading to this outcome (Table 2).

In this sample of college students, freshman were less likely to be classified as low active, while seniors were more likely to be classified as low active (Table 3). Racette et al.¹¹ did not find a significant difference in the levels of aerobic activity in a longitudinal study evaluating exercise behaviors from freshman to senior year. Approximately 60% of their sample engaged in aerobic activity as freshmen and again as seniors. However, in the current sample of fraternity and sorority members, more freshmen were likely to be classified as highly active than would be predicted. This was in contrast to seniors who were more likely to fall into the category of low activity than other years in school. Racette et al.¹¹ did not have students report specific duration,

intensity, frequency, or type of exercise in which students participated. This limits the comparisons that could be made to our study.

Dinger and Waigandt⁸ found that 45% of their sample described themselves as vigorously activity which was very similar to our finding (37.7%). This suggests that students in fraternities and sororities may be similar to the non-Greek college body in terms of participation in vigorous activity. In addition, men were more likely than women to report vigorous activity. This finding has also been reported by Hall et al.¹⁰ and Dinger and Waigandt.⁸ Hall et al.¹⁰ reported that college males were more likely to report moderate to high activity levels (76.4%). Dinger and Waigandt⁸ reported a gender difference in the frequency of participation in exercise with males reporting engaging in it more so than women. We found no differences in reported physical activity levels when taking into account living arrangements or roommates. However, findings from Reed and Phillips⁴⁷ reported that the proximity of exercise facilities had a positive influence on intensity and duration of exercise. Discrepancies in comparison of the Reed and Phillips⁴⁷ study and our study are due to the limited choices for the description of living arrangements (on-campus vs. off-campus). From this question, proximity to an exercise facility could not be determined.

Physical activity refers to activity accumulated throughout one's day including transportation, occupational, and leisure time. Therefore, it was not limited to planned, structured "exercise." The IPAQ provides the opportunity to report various types of physical activity and is not limited to exercise or leisure-time physical activity. Social support has not been reported to have an association with physical activity, but has been

found have a relationship with exercise.³⁵ More specifically, social support for exercise was to found to be related to participation in regular exercise. Therefore, it was expected that the relationship between social support for exercise and reported participation in vigorous activity would be greater than reported overall physical activity levels. This was why vigorous and a combination of vigorous and moderate activity in MET-min/week was calculated to estimate participation in exercise. Although we cannot isolate exercise from other types of physical activity, it is likely that most moderate and vigorous activity is highly reflective of “exercise”. Social support for exercise from family and friends was correlated to moderate and vigorous activity ($r = 0.19$ and $r = 0.42$, respectfully). High correlations between total activity and walking ($r = 0.88$) were found. Furthermore, there were no significant correlations between social support from friends and walking ($r = -0.03$) or social support from family and total activity or walking ($r = 0.10$ and $r = 0.01$, respectfully).

When comparing the activity groups (low, moderate, and high) for levels of social support for exercise, the highly active fraternity and sorority members perceived higher amounts of social support for exercise from family and friends than the low to moderate physical activity groups. Additionally, social support for exercise from family and friends was significantly higher in the members that engaged in vigorous activity.

Walking was not related to social support for exercise from family or friends. This was not surprising since walking was an important mode of transportation on the large pedestrian campus from which the sample was measured. Since students have to walk to and from class, dining halls, and other activities on campus, it was not surprising that

social support for exercise was not significantly correlated (friends $r = -0.03$, family $r = 0.01$) to walking activity. As previously stated, the Social Support for Exercise Survey³⁵ measures perceived social support for “exercise” not all intensities of physical activity.

Predictors of moderate and vigorous activity included the interaction between gender and social support for exercise from friends. These findings are similar to previous studies.^{25, 35} In a sample comprised mostly of undergraduate students (90%), Sallis et al.³⁵ reported moderate correlations between social support for exercise from friends and vigorous activity ($r = 0.46$) as compared to this study ($r = 0.39$). Correlations between social support from family for exercise and vigorous activity were comparable between this study ($r = 0.31$) and those summarized by Sallis et al.³⁵ ($r = 0.35$). Wallace and Buckworth²⁵ evaluated college students’ changes in exercise behaviors during a six-month period. Students that did not maintain vigorous activity from baseline to follow-up had lower levels of peer support for exercise at follow-up compared to baseline. This would suggest that high levels of social support for exercise from friends are important for college students. This may be due to the nature of college life with students living away from home and much of their social support being provided by their friends.

Due to the limited amount of research on fraternity and sorority members, this study adds to the body of knowledge about physical activity levels in college students. In addition, social support for exercise from friends appears to be an important predictor of engaging in moderate to vigorous exercise in this population.

Limitations

Limitations of this study included the lack of ability to compare fraternity and sorority findings to students not involved in these organizations. However, other studies have shown similar results for overall activity⁸ and for the relationship between social support for exercise and physical activity.³⁵ In addition, three times as many women completed the survey compared to men. Furthermore, due to the survey instrument, there was no way to determine who was contributing the social support that the members perceived receiving. Sorority/fraternity member or non-members could have provided the social support from friends. Long-time friends or newly developed friendships could also have provided the support. An appraisal of living with Greek roommates was assessed, but was not found to be a significant predictor of physical activity or social support for exercise. Categorizing members as living on-campus or off-campus was an additional limitation of the living arrangement questions. Additionally, no findings can be presented about whether physically active people seek out fraternity and sorority memberships or if Greek membership increases physical activity levels.

It should also be noted that the physical location of the fraternity houses on campus are closer to the workout facilities than sorority housing or off-campus housing. Even though living arrangement was not found to be a significant predictor of physical activity, previous studies suggest that close proximity to a workout facility has a positive influence on intensity and duration of a workout.⁴⁷ Lastly, due to the cross-sectional nature of this investigation, associations were reported but cannot be used to draw conclusions about causation.

Implications

Fraternities and sororities are student social organizations on many college campuses. These social organizations may hold a key to encouraging healthy lifestyle choices, including physical activity. These organizations could encourage activity by providing education (i.e., speakers) or opportunities to be active through recreation activities (i.e., sporting tournaments, 5Ks, and fun runs). In addition, relationships could be formed between campus recreation facilities and Greek organizations to increase participation in exercise through personal training or group fitness classes. Further research is needed to determine other specific predictors of exercise in fraternity and sorority members so that interventions can be developed to target these groups as well as other students on campus.

Based on this study, fraternity and sorority members seem to be exceptionally physically active; however, the majority of members were not engaging in vigorous activities. Due to the social nature of these organizations, increasing the amount of social support for exercise from friends could have a positive impact on participation in exercise.

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Appendices

APPENDIX A
INFORMED CONSENT

INFORMED CONSENT

Physical Activity Levels and Social Support of College Students

Dear Participant,

I would like to personally invite you to participate in this study to help me learn more about physical activity levels of members of a Fraternity/Sorority. To be eligible for this study, **you must be at least 18 years old**. Participation in this survey is strictly voluntary and should take approximately 10 minutes to complete. Please fill out the following questions to the best of your ability. You will be asked questions about the people who encourage/discourage you to exercise and your current physical activity.

There are minimal risks to participating in this study. The information you provide will be held in the strictest confidence. The benefits from this study include building a knowledge base of physical activity levels and the social support fraternity/sorority members.

At the completion of the survey, you may enter your email address to be entered into our random drawing for one of several prizes (i.e., RecSports t-shirt, restaurant gift card, Personal Training Package, signed basketball). Your email address will not be linked to your survey. After the drawing has been completed, your email address will be destroyed.

Participation in this survey is anonymous and email address will be confidential and will only be seen by the primary investigator. No reference will be made in oral or written reports which could link participants to the study.

If you have questions at any time about the study or the procedures, you may contact the researcher, Jennifer Minton, at 2111 Volunteer Blvd, Knoxville, Tennessee, or (865) 974-5165. If you have questions about your rights as a participant, contact the Office of Research Compliance Officer at (865) 974-3466.

Thanks in advance for your cooperation.

Sincerely,

Jennifer Minton, B.S.
University of Tennessee

APPENDIX B
DEMOGRAPHIC QUESTIONS

DEMOGRAPHIC QUESTIONS

1. What is your age?
_____ Years
2. What is your height?
____ Feet
____ Inches
3. What is your current weight?
____ Pounds
4. What is your gender?
____ Male
____ Female
5. Which race do you consider yourself to be? Please select one or more.
____ American Indian or Alaskan Native
____ Asian
____ Black or African American
____ Native Hawaiian or Pacific Islander
____ White
____ Other: _____
6. What best describes your year in school?
____ Freshman
____ Sophomore
____ Junior
____ Senior
7. How long have you been a member of a sorority or fraternity (years and months)?
____ Years
____ Months
8. Where do you live?
____ Off-campus
____ Dorm
____ Fraternity House
9. Do you live on a sorority floor/dorm?
____ Yes
____ No
10. Do you live with other members of your sorority or fraternity?

- Yes
 No
11. Which best describes who you live with:
 Alone
 With friends
 With family
 With acquaintances/random roommates
 Other: _____
12. Did you participate in sports during high school?
 Yes
 No
13. Please check all the sports that you are currently participating in:
 Intramural Sports
 Sports Clubs
 Varsity Athletics
 Other Competitive Sports (city recreation league, church league, etc.):

14. Please describe which best describes your current exercise status?
 I do not exercise regularly
 I generally exercise alone
 I generally exercise with others

APPENDIX C

**INTERNATIONAL PHYSICAL ACTIVITY
QUESTIONNAIRE (IPAQ)**

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (August 2002)

SHORT LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation

Translation from English is supported to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Further Developments of IPAQ

International collaboration on IPAQ is on-going and an *International Physical Activity Prevalence Study* is in progress. For further information see the IPAQ website.

More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000).

Assessment of Physical Activity: An International Perspective. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

_____ No vigorous physical activities *Skip to question 3*

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

_____ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

_____ No moderate physical activities *Skip to question 5*

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

_____ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

_____ No walking *Skip to question 7*

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

_____ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

_____ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

APPENDIX D
IPAQ SCORING PROTOCOL

Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ)

– Short and Long Forms

November 2005

Contents

- 1. Introduction**
- 2. Uses of IPAQ Instruments**
- 3. Summary Characteristics of Short and Long Forms**
- 4. Overview of Continuous and Categorical Analyses of IPAQ**
- 5. Protocol for Short Form**
- 6. Protocol for Long Form**
- 7. Data Processing Rules**
- 8. Summary Algorithms**

Appendix 1. At A Glance IPAQ Scoring Protocol – Short Forms

Appendix 2. At A Glance IPAQ Scoring Protocol – Long Forms

1. Introduction

This document describes recommended methods of scoring the data derived from the telephone / interview administered and self-administered IPAQ short and long form instruments. The methods outlined provide a revision to earlier scoring protocols for the IPAQ short form and provide for the first time a comparable scoring method for IPAQ long form. Latest versions of IPAQ instruments are available from www.ipaq.ki.se.

Although there are many different ways to analyse physical activity data, to date there is no formal consensus on a 'correct' method for defining or describing levels of physical activity based on self-report population surveys. The use of different scoring protocols makes it very difficult to compare within and between countries, even when the same instrument has been used. Use of these scoring methods will enhance the comparability between surveys, provided identical sampling and survey methods have been used.

2. Uses of IPAQ Instruments

IPAQ short form is an instrument designed primarily for population surveillance of physical activity among adults. It has been developed and tested for use in adults (age range of 15-69 years) and until further development and testing is undertaken the use of IPAQ with older and younger age groups is not recommended. IPAQ short and long forms are sometimes being used as an evaluation tool in intervention studies, but this was not the intended purpose of IPAQ. Users should carefully note the range of domains and types of activities included in IPAQ before using it in this context. Use as an outcome measure in small scale intervention studies is not recommended.

3. Summary Characteristics of IPAQ Short and Long Forms

1. IPAQ assesses physical activity undertaken across a comprehensive set of domains including:
 - a. leisure time physical activity
 - b. domestic and gardening (yard) activities
 - c. work-related physical activity
 - d. transport-related physical activity;
2. The IPAQ **short** form asks about three specific types of activity undertaken in the four domains introduced above. The specific types of activity that are assessed are walking, moderate-intensity activities and vigorous-intensity activities.
3. The items in the **short** IPAQ form were structured to provide separate scores walking, moderate-intensity and vigorous-intensity activity. Computation of the total score for the short form requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities. Domain specific estimates cannot be estimated.

4. The IPAQ **long** form asks details about the specific types of activities undertaken within each of the four domains. Examples include walking for transportation and moderate-intensity leisure-time activity.
5. The items in the **long** IPAQ form were structured to provide separate domain specific scores for walking, moderate-intensity and vigorous-intensity activity within each of the work, transportation, domestic chores and gardening (yard) and leisure-time domains. Computation of the total scores for the long form requires summation of the duration (in minutes) and frequency (days) for all the types of activities in all domains. Domain specific scores or activity specific subscores may be calculated. Domain specific scores require summation of the scores for walking, moderate-intensity and vigorous-intensity activities within the specific domain, whereas activity-specific scores require summation of the scores for the specific type of activity across domains.

4. Overview of Continuous and Categorical Analyses of IPAQ

Both categorical and continuous indicators of physical activity are possible from both IPAQ forms. However, given the non-normal distribution of energy expenditure in many populations, it is suggested that the continuous indicator be presented as median minutes/week or median MET–minutes/week rather than means (such as mean minutes/week or mean MET-minutes/week).

4.1 Continuous Variables

Data collected with IPAQ can be reported as a continuous measure. One measure of the volume of activity can be computed by weighting each type of activity by its energy requirements defined in METs to yield a score in MET–minutes. METs are multiples of the resting metabolic rate and a MET-minute is computed by multiplying the MET score of an activity by the minutes performed. MET-minute scores are equivalent to kilocalories for a 60 kilogram person. Kilocalories may be computed from MET-minutes using the following equation: MET-min x (weight in kilograms/60 kilograms). MET-minutes/day or MET-minutes/week can be presented although the latter is more frequently used and is thus suggested.

Details for the computation for summary variables from IPAQ short and long forms are detailed below. As there are no established thresholds for presenting METminutes, the IPAQ Research Committee propose that these data are reported as comparisons of median values and interquartile ranges for different populations.

4.2 Categorical Variable: Rationale for Cut Point Values

There are three levels of physical activity proposed to classify populations:

1. Low
2. Moderate
3. High

The algorithms for the short and long forms are defined in more detail in Sections 5.3 and 6.3, respectively. Rules for data cleaning and processing prior to computing the algorithms appear in Section 7.

Regular participation is a key concept included in current public health guidelines for physical activity.¹ Therefore, both the total volume and the number of days/sessions are included in the IPAQ analysis algorithms.

The criteria for these levels have been set taking into account that IPAQ asks questions in all domains of daily life, resulting in higher median MET-minutes estimates than would have been estimated from leisure-time participation alone. The criteria for these three levels are shown below.

Given that measures such as IPAQ assess total physical activity in all domains, the “leisure time physical activity” based public health recommendation of 30 minutes on most days will be achieved by most adults in a population. Although widely accepted as a goal, in absolute terms 30 minutes of moderate-intensity activity is low and broadly equivalent to the background or basal levels of activity adult individuals would accumulate in a day. Therefore a new, higher cutpoint is needed to describe the levels of physical activity associated with health benefits for measures such as IPAQ, which report on a broad range of domains of physical activity.

‘High’

This category was developed to describe higher levels of participation. Although it is known that greater health benefits are associated with increased levels of activity there is no consensus on the exact amount of activity for maximal benefit. In the absence of any established criteria, the IPAQ Research Committee proposes a measure which equates to approximately at least one hour per day or more, of at least moderate-intensity activity above the basal level of physical activity. Considering that basal activity may be considered to be equivalent to approximately 5000 steps per day, it is proposed that “high active” category be considered as those who move at least 12,500 steps per day, or the equivalent in moderate and vigorous activities.

¹ Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of American Medical Association* 1995; 273(5):402-7. and U.S. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, The Presidents' Council on Physical Fitness and Sports: Atlanta, GA:USA. 1996.

This represents at least an hour more moderate-intensity activity over and above the basal level of activity, or half an hour of vigorous-intensity activity over and above basal levels daily. These calculations were based on emerging results of pedometers studies.²

This category provides a higher threshold of measures of total physical activity and is a useful mechanism to distinguish variation in population groups. Also it could be used to set population targets for health-enhancing physical activity when multidomain instruments, such as IPAQ are used.

‘Moderate’

This category is defined as doing some activity, more than the low active category. It is proposed that it is a level of activity equivalent to “half an hour of at least moderate-intensity PA on most days”, the former leisure time-based physical activity population health recommendation.

‘Low’

This category is simply defined as not meeting any of the criteria for either of the previous categories.

5. Protocol for IPAQ Short Form

5.1 Continuous Scores

Median values and interquartile ranges can be computed for walking (W), moderate intensity activities (M), vigorous-intensity activities (V) and a combined total physical activity score. All continuous scores are expressed in MET-minutes/week as defined below.

5.2 MET Values and Formula for Computation of MET-minutes/week

The selected MET values were derived from work undertaken during the IPAQ Reliability Study undertaken in 2000-2001³. Using the Ainsworth et al. Compendium (*Med Sci Sports Med* 2000) an average MET score was derived for each type of activity. For example; all types of walking were included and an average MET value for walking was created. The same procedure was undertaken for moderate-intensity activities and vigorous-intensity activities. The following values continue to be used for the analysis of

² Tudor-Locke C, Bassett DR Jr. How many steps/day are enough? Preliminary pedometer indices for public health. *Sports Med.* 2004;34(1):1-8.

³ Craig CL, Marshall A, Sjoström M et al. International Physical Activity Questionnaire: 12 country reliability and validity *Med Sci Sports Exerc* 2003;August

IPAQ data: Walking = 3.3 METs, Moderate PA = 4.0 METs and Vigorous PA = 8.0 METs. Using these values, four continuous scores are defined:

Walking MET-minutes/week = 3.3 * walking minutes * walking days

Moderate MET-minutes/week = 4.0 * moderate-intensity activity minutes * moderate days

Vigorous MET-minutes/week = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days

Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous METminutes/ week scores.

5.3 Categorical Score

Category 1 Low

This is the lowest level of physical activity. Those individuals who not meet criteria for Categories 2 or 3 are considered to have a 'low' physical activity level.

Category 2 Moderate

The pattern of activity to be classified as 'moderate' is either of the following criteria:

a) 3 or more days of vigorous-intensity activity of at least 20 minutes per day

OR

b) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day

OR

c) 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum Total physical activity of at least 600 MET-minutes/week.

Individuals meeting at least one of the above criteria would be defined as accumulating a minimum level of activity and therefore be classified as 'moderate'. See Section 7.5 for information about combining days across categories.

Category 3 High

A separate category labelled 'high' can be computed to describe higher levels of participation.

The two criteria for classification as 'high' are:

a) vigorous-intensity activity on at least 3 days achieving a minimum Total physical activity of at least 1500 MET-minutes/week

OR

b) 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum Total physical activity of at least 3000 MET-minutes/week.

See Section 7.5 for information about combining days across categories.

5.4 Sitting Question in IPAQ Short Form

The IPAQ sitting question is an additional indicator variable of time spent in sedentary activity and is not included as part of any summary score of physical activity. Data on sitting should be reported as median values and interquartile ranges. To-date there are few data on sedentary (sitting) behaviours and no well-accepted thresholds for data presented as categorical levels.

6. Protocol for IPAQ Long Form

The long form of IPAQ asks in detail about walking, moderate-intensity and vigorous intensity physical activity in each of the four domains. Note: asking more detailed questions regarding physical activity within domains is likely to produce higher prevalence estimates than the more generic IPAQ short form.

6.1 Continuous Score

Data collected with the IPAQ long form can be reported as a continuous measure and reported as median MET-minutes. Median values and interquartile ranges can be computed for walking (W), moderate-intensity activities (M), and vigorous-intensity activities (V) within each domain using the formulas below. Total scores may also be calculated for walking (W), moderate-intensity activities (M), and vigorous-intensity activities (V); for each domain (work, transport, domestic and garden, and leisure) and for an overall grand total.

6.2 MET Values and Formula for Computation of MET-minutes

Work Domain

Walking MET-minutes/week at work = 3.3 * walking minutes * walking days at work

Moderate MET-minutes/week at work = 4.0 * moderate-intensity activity minutes * moderate-intensity days at work

Vigorous MET-minutes/week at work = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days at work

Total Work MET-minutes/week = sum of Walking + Moderate + Vigorous MET-minutes/week scores at work.

Active Transportation Domain

Walking MET-minutes/week for transport = 3.3 * walking minutes * walking days for transportation

Cycle MET-minutes/week for transport = 6.0 * cycling minutes * cycle days for transportation

Total Transport MET-minutes/week = sum of Walking + Cycling MET-minutes/week scores for transportation.

Domestic and Garden [Yard Work] Domain

Vigorous MET-minutes/week yard chores= 5.5 * vigorous-intensity activity minutes * vigorous-intensity days doing yard work (**Note:** the MET value of 5.5 indicates that vigorous garden/yard work should be considered a moderate-intensity activity for scoring and computing total moderate intensity activities.)

Moderate MET-minutes/week yard chores= 4.0 * moderate-intensity activity minutes * moderate intensity days doing yard work

Moderate MET-minutes/week inside chores= 3.0* moderate-intensity activity minutes * moderate intensity days doing inside chores.

Total Domestic and Garden MET-minutes/week =sum of Vigorous yard + Moderate yard + Moderate inside chores MET-minutes/week scores.

Leisure-Time Domain

Walking MET-minutes/week leisure = 3.3 * walking minutes * walking days in leisure

Moderate MET-minutes/week leisure = 4.0 * moderate-intensity activity minutes * moderate-intensity days in leisure

Vigorous MET-minutes/week leisure = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days in leisure

Total Leisure-Time MET-minutes/week = sum of Walking + Moderate + Vigorous MET-minutes/week scores in leisure.

Total Scores for all Walking, Moderate and Vigorous Physical Activities

Total Walking MET-minutes/week = Walking MET-minutes/week (at Work + for Transport + in Leisure)

Total Moderate MET-minutes/week total = Moderate MET-minutes/week (at Work + Yard chores + inside chores + in Leisure time) + Cycling Met-minutes/week for Transport + Vigorous Yard chores MET-minutes/week

Total Vigorous MET-minutes/week = Vigorous MET-minutes/week (at Work + in Leisure)

Note: Cycling MET value and Vigorous garden/yard work MET value fall within the coding range of moderate-intensity activities.

Total Physical Activity Scores

An overall total physical activity MET-minutes/week score can be computed as:

Total physical activity MET-minutes/week = sum of Total (Walking + Moderate + Vigorous) METminutes/ week scores.

This is equivalent to computing:

Total physical activity MET-minutes/week = sum of Total Work + Total Transport + Total Domestic and Garden + Total Leisure-Time MET-minutes/week scores.

As there are no established thresholds for presenting MET-minutes, the IPAQ Research Committee proposes that these data are reported as comparisons of median values and interquartile ranges for different populations.

6.3 Categorical Score

As noted earlier, regular participation is a key concept included in current public health guidelines for physical activity.⁴ Therefore, both the total volume and the number of day/sessions are included in the IPAQ analysis algorithms. There are three levels of physical activity proposed to classify populations – ‘low’, ‘moderate’, and ‘high’. The criteria for these levels are the same as for the IPAQ short [described earlier in Section 4.2]

Category 1 Low

This is the lowest level of physical activity. Those individuals who not meet criteria for Categories 2 or 3 are considered ‘low’.

Category 2 Moderate

The pattern of activity to be classified as ‘moderate’ is either of the following criteria:

d) 3 or more days of vigorous-intensity activity of at least 20 minutes per day

OR

e) 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day

OR

f) 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum Total physical activity of at least 600 MET minutes/week.

Individuals meeting at least one of the above criteria would be defined as accumulating a moderate level of activity. See Section 7.5 for information about combining days across categories.

Category 3 High

A separate category labelled ‘high’ can be computed to describe higher levels of participation.

The two criteria for classification as ‘high’ are:

a) vigorous-intensity activity on at least 3 days achieving a minimum Total physical activity of at least 1500 MET-minutes/week

OR

⁴ Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of American Medical Association* 1995; 273(5):402-7. and U.S. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, The Presidents' Council on Physical Fitness and Sports: Atlanta, GA:USA. 1996.

b) 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum Total physical activity of at least 3000 MET-minutes/week.

See Section 7.5 for information about combining days across categories.

6.4 IPAQ Sitting Question IPAQ Long Form

The IPAQ sitting question is an additional indicator variable and is not included as part of any summary score of physical activity. To-date there are few data on sedentary (sitting) behaviours and no well-accepted thresholds for data presented as categorical levels. For the sitting question 'Minutes' is used as the indicator to reflect time spent in sitting rather than MET-minutes which would suggest an estimate of energy expenditure.

IPAQ long assesses an estimate of sitting on a typical weekday, weekend day and time spent sitting during travel (see transport domain questions).

Summary sitting variables include

Sitting Total Minutes/week = weekday sitting minutes* 5 weekdays + weekend day sitting minutes* 2 weekend days

Average Sitting Total Minutes/day = (weekday sitting minutes* 5 weekdays + weekend day sitting minutes* 2 weekend days) / 7

Note: The above calculation of 'Sitting Total' excludes time spent sitting during travel because the introduction in IPAQ long directs the responder to NOT include this component as it would have already been captured under the Transport section. If a summary sitting variable including time spent sitting for transport is required, it should be calculated by adding the time reported (travelling in a motor vehicle) under transport to the above formula. Care should be taken in reporting these alternate data to clearly distinguish the 'total sitting' variable from a 'total sitting – including transport' variable.

7. Data Processing Rules

In addition to a standardized approach to computing categorical and continuous measures of physical activity, it is necessary to undertake standard methods for the cleaning and treatment of IPAQ datasets. The use of different approaches and rules would introduce variability and reduce the comparability of data.

There are no established rules for data cleaning and processing on physical activity. Thus, to allow more accurate comparisons across studies IPAQ Research Committee has established and recommends the following guidelines:

7.1 Data Cleaning

- I. Any responses to duration (time) provided in the hours and minutes response option should be converted from hours and minutes into minutes.

- II. To ensure that responses in ‘minutes’ were not entered in the ‘hours’ column by mistake during self-completion or during data entry process, values of ‘15’, ‘30’, ‘45’, ‘60’ and ‘90’ in the ‘hours’ column should be converted to ‘15’, ‘30’, ‘45’, ‘60’ and ‘90’ minutes, respectively, in the minutes column.
- III. In some cases duration (time) will be reported as weekly (not daily) e.g., VWHRS, VWMINS. These data should be converted into an average daily time by dividing by 7.
- IV. If ‘don’t know’ or ‘refused’ or data are missing for time or days then that case is removed from analysis.

Note: Both the number of days *and* daily time are required for the creation of categorical and continuous summary variables

7.2 Maximum Values for Excluding Outliers

This rule is to exclude data which are unreasonably high; these data are to be considered outliers and thus are excluded from analysis. All cases in which the sum total of all Walking, Moderate and Vigorous time variables is greater than 960 minutes (16 hours) should be excluded from the analysis. This assumes that on average an individual of 8 hours per day is spent sleeping.

The ‘days’ variables can take the range 0-7 days, or 8, 9 (don’t know or refused); values greater than 9 should not be allowed and those cases excluded from analysis.

7.3 Minimum Values for Duration of Activity

Only values of 10 or more minutes of activity should be included in the calculation of summary scores. The rationale being that the scientific evidence indicates that episodes or bouts of at least 10 minutes are required to achieve health benefits. Responses of less than 10 minutes [and their associated days] should be re-coded to ‘zero’.

7.4 Truncation of Data Rules

This rule attempts to normalize the distribution of levels of activity which are usually skewed in national or large population data sets.

In IPAQ short - it is recommended that all Walking, Moderate and Vigorous time variables exceeding ‘3 hours’ or ‘180 minutes’ are truncated (that is re-coded) to be equal to ‘180 minutes’ in a new variable. This rule permits a maximum of 21 hours of activity in a week to be reported for each category (3 hours * 7 days).

In IPAQ long – the truncation process is more complicated, but to be consistent with the approach for IPAQ short requires that the variables total Walking, total Moderate

intensity and total Vigorous-intensity activity are calculated and then, for each of these summed behaviours, the total value should be truncated to 3 hours (180 minutes).

When analysing the data as categorical variable or presenting median and interquartile ranges of the MET-minute scores, the application of the truncation rule will not affect the results. This rule does have the important effect of preventing misclassification in the ‘high’ category. For example, an individual who reports walking for 10 minutes on 6 days and 12 hours of moderate activity on one day could be coded as ‘high’ because this pattern meets the ‘7 day’ and “3000 MET-min” criteria for ‘high’. However, this uncommon pattern of activity is unlikely to yield the health benefits that the ‘high’ category is intended to represent.

Although using median is recommended due to the skewed distribution of scores, if IPAQ data are analysed and presented as a continuous variable using mean values, the application of the truncation rule will produce slightly lower mean values than would otherwise be obtained.

7.5 Calculating MET-minute/week Scores

Data processing rules 7.2, 7.3, and 7.4 deals first with excluding outlier data, then secondly, with recoding minimum values and then finally dealing with high values. These rules will ensure that highly active people remain classified as ‘high’, while decreasing the chances that less active individuals are misclassified and coded as ‘high’.

Using the resulting variables, convert time and days to MET-minute/week scores [see above Sections 5.2 and 6.2; METS x days x daily time].

7.6 Calculating Total Days for Presenting Categorical Data on Moderate and

High Levels

Presenting IPAQ data using categorical variables requires the total number of ‘days’ on which all physical activity was undertaken to be assessed. This is difficult because frequency in ‘days’ is asked separately for walking, moderate-intensity and vigorous intensity activities, thus allowing the total number of ‘days’ to range from a minimum of 0 to a maximum of 21 ‘days’ per week in IPAQ short and higher in IPAQ long. The IPAQ instrument does not record if different types of activity are undertaken on the same day.

In calculating ‘moderately active’, the primary requirement is to identify those individuals who undertake activity on at least ‘5 days’/week [see Sections 4.2 and 5.3]. Individuals who meet this criterion should be coded in a new variable called “*at least five days*” and this variable should be used to identify those meeting criterion b) at least 30 minutes of moderate-intensity activity and/or walking; and those meeting criterion c) any

combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of 600 MET-minutes/week.

Below are two examples showing this coding in practice:

- i. an individual who reports '2 days of moderate-intensity' and '3 days of walking' should be coded as a value indicating "*at least five days*";
- ii. an individual reporting '2 days of vigorous-intensity', '2 days of moderate intensity' and '2 days of walking' should be coded as a value to indicate "*at least five days*" [even though the actual total is 6].

The original frequency of 'days' for each type of activity should remain in the data file for use in the other calculations.

The same approach as described above is used to calculate total days for computing the 'high' category. The primary requirement according to the stated criteria is to identify those individuals who undertake a combination of walking, moderate-intensity and or vigorous-intensity activity on at least 7 days/week [See section 4.2]. Individuals who meet this criterion should be coded as a value in a new variable to reflect "*at least 7 days*".

Below are two examples showing this coding in practice:

- i. an individual who reports '4 days of moderate-intensity' and '3 days of walking' should be coded as the new variable "*at least 7 days*".
- ii. an individual reporting '3 days of vigorous-intensity', '3 days moderate intensity' and '3 days walking' should be coded as "*at least 7 days*" [even though the total adds to 9] .

8. Summary algorithms

The algorithms in Appendix 1 and Appendix 2 to this document show how these rules work in an analysis plan, to develop the categories 1 [Low], 2 [Moderate], and 3 [High] levels of activity.

IPAQ Research Committee
November 2005

Appendix 1

At A Glance IPAQ Scoring Protocol (Short Forms)

Continuous Score

Expressed as MET-min per week: MET level x minutes of activity/day x days per week

Sample Calculation

MET levels

Walking = 3.3 METs
Moderate Intensity =
Vigorous Intensity =

MET-minutes/week for 30 min/day, 5 days

3.3*30*5 = 495 MET-minutes/week
4.0 METs 4.0*30*5 = 600 MET-minutes/week
8.0 METs 8.0*30*5 = 1,200 MET-minutes/week

TOTAL = 2,295 MET-minutes/week

Total MET-minutes/week = Walk (METs*min*days) + Mod (METs*min*days) + Vig (METs*min*days)

Categorical Score- three levels of physical activity are proposed

1. Low

- No activity is reported **OR**
- Some activity is reported but not enough to meet Categories 2 or 3.

2. Moderate

Either of the following 3 criteria

- 3 or more days of vigorous activity of at least 20 minutes per day **OR**
- 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day **OR**
- 5 or more days of any combination of walking, moderate-intensity or vigorousintensity activities achieving a minimum of at least 600 MET-minutes/week.

3. High

Any one of the following 2 criteria

- Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week **OR**
- 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week

Please review the full document “Guidelines for the data processing and analysis of the International Physical Activity Questionnaire” for more detailed description of IPAQ analysis and recommendations for data cleaning and processing [www.ipaq.ki.se].

Appendix 2

At A Glance IPAQ Scoring Protocol (Long Forms)

Continuous Score

Expressed as MET-minutes per week: MET level x minutes of activity/day x days per week

Sample Calculation

MET levels

Walking at work= 3.3 METs
Cycling for transportation= 6.0
Moderate yard work= 4.0
Vigorous intensity in leisure= 8.0 METs

MET-minutes/week for 30 min/day, 5 days

$3.3 \times 30 \times 5 = 495$ MET-minutes/week
 $6.0 \times 30 \times 5 = 900$ MET-minutes/week
 $4.0 \times 30 \times 5 = 600$ MET-minutes/week
 $8.0 \times 30 \times 5 = 1,200$ MET-minutes/week

TOTAL = 3,195 MET-minutes/week

Domain Sub Scores

Total MET-minutes/week at **work** = Walk (METs*min*days) + Mod (METs*min*days) + Vig (METs*min*days) at work

Total MET-minutes/week for **transportation** = Walk (METs*min*days) + Cycle (METs*min*days) for transportation

Total MET-minutes/week from **domestic and garden** = Vig (METs*min*days) yard work + Mod (METs*min*days) yard work + Mod (METs*min*days) inside chores

Total MET-minutes/week in **leisure-time** = Walk (METs*min*days) + Mod (METs*min*days) + Vig (METs*min*days) in leisure-time

Walking, Moderate-Intensity and Vigorous-Intensity Sub Scores

Total **Walking** MET-minutes/week = Walk MET-minutes/week (at Work + for Transport + in Leisure)

Total **Moderate** MET-minutes/week = Cycle MET-minutes/week for Transport + Mod METminutes/ week (Work + Yard chores + Inside chores + Leisure) + Vigorous Yard chores METminutes

Note: The above is a total moderate activities only score. If you require a total of all moderate-intensity physical activities you would sum Total Walking and Total Moderate

Total **Vigorous** MET-minutes/week = Vig MET-minutes/week (at Work + in Leisure)

Continued.....

Total Physical Activity Score

Total Physical Activity MET-minutes/week = Walking MET-minutes/week + Moderate MET-minutes/ week + Total Vigorous MET-minutes/week

Also

Total Physical Activity MET-minutes/week = Total MET-minutes/week (at Work + for Transport + in Chores + in Leisure)

Categorical Score- three levels of physical activity are proposed

1. Low

- a. No activity is reported **OR**
- b. Some activity is reported but not enough to meet Categories 2 or 3.

2. Moderate

Either of the following 3 criteria

- a. 3 or more days of vigorous-intensity activity of at least 20 minutes per day **OR**
- b. 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day **OR**
- c. 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week.

3. High

Any one of the following 2 criteria

- Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week **OR**
- 7 or more days of any combination of walking, moderate- or vigorous- intensity activities accumulating at least 3000 MET-minutes/week

Please review the full document “Guidelines for the data processing and analysis of the International Physical Activity Questionnaire” for more detailed description of IPAQ analysis and recommendations for data cleaning and processing [www.ipaq.ki.se].

APPENDIX E

SOCIAL SUPPORT FOR EXERCISE SURVEY

SOCIAL SUPPORT AND EXERCISE SURVEY

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question twice. Under family, rate how often anyone living in your household has said or done what is described during the last three months. Under friends, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

Please write one number from the following rating scale in each space:

none	rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	6

During the past three months, my family (or members of my household) or friends:

		Family	Friends
11. Exercised with me.	11	11	_____
12. Offered to exercise with me.	12	12	_____
13. Gave me helpful reminders to exercise (“Are you going to exercise tonight”)	13	13	_____
14. Gave me encouragement to stick with my exercise program.	14	14	_____
15. Change their schedule so we could exercise together.	15	15	_____
16. Discussed exercise with me.	16	16	_____
17. Complained about the time I spend exercising.	17	17	_____
18. Criticized me or made fun of me for exercising.	18	18	_____
19. Gave me reward for exercising (bought me something or gave me something I like.	19	19	_____
20. Planned for exercise on recreational outings.	20	20	_____
21. Helped plan activities around my exercise.	21	21	_____
22. Asked me for ideas on how they can get more exercise.	22	22	_____
23. Talked about how much they like to exercise.	23	23	_____

APPENDIX F

**SOCIAL SUPPORT FOR EXERCISE SURVEY SCORING
PROTOCOL**

SOCIAL SUPPORT FOR EXERCISE SURVEY SCORING PROTOCOL

October 1996

TO: Users of Social Support Surveys for Diet and Exercise Behaviors
FROM: James F. Sallis, Ph.D.
RE: Scoring of scales

Enclosed are copies of abbreviated versions of the Social Support and Eating Habits Survey and Social Support and Exercise Survey. These were designed to be easier to use than the original, complete scales reported in Preventive Medicine.

In scoring either the complete or abbreviated scales "8" should be recoded to "1."

The abbreviated Social Support for Eating Habits Survey should be scored separately for family and friends.

Encouragement: sum items 1 -5
Discouragement: sum items 6 -10

The Social Support and Exercise Survey should be scored differently for friends and family.

Family Participation: sum items 11 - 16 and 20 - 23
Family Rewards and Punishment (an optional scale): sum items 17 - 19
Friend Participation: sum items 11 - 16 and 20 - 23

The Rewards and Punishment subscale should not be scored for friends because it did not emerge in the factor analysis

Reference:

Sallis, J.F., Grossman, R.M., Pinski, R.B., Patterson, T.L., and Nader, P.R. (1987). The development of scales to measure social support for diet and exercise behaviors. **Preventive Medicine**, **16**, 825-836.

Address:

6363 Alvarado Court, Suite 250
San Diego, CA 92120

APPENDIX G
SURVEY WEBSITE

SURVEY WEBSITE

Physical Activity Levels and Social Support of College Students

Dear Participant,

I would like to personally invite you to participate in this study to help me learn more about physical activity levels of members of a Fraternity/Sorority.

To be eligible for this study, you must be at least 18 years old. Participation in this survey is strictly voluntary and should take **approximately 10 minutes to complete.** Return of the completed survey constitutes consent to participate.

At the completion of the survey, you may enter your e-mail address to be entered into our **random drawing** for one of several prizes (i.e., t-shirt, restaurant gift card, signed basketball, personal training packet). Participation in this survey is **anonymous** and e-mail address will be confidential and will only be seen by the primary investigator.

If you have questions at any time about the study or the procedures, you may contact the researcher, Jennifer Minton, at 2111 Volunteer Blvd, Knoxville, Tennessee, or (865) 974-5165. If you have question about your rights as a participant, contact the Office of Research [Compliance Officer](#) at (865) 974-3466.

Thanks in advance for your cooperation.

Sincerely,
Jennifer Minton, B.S.
University of Tennessee

Continue to the [Survey](#)

APPENDIX H
SURVEY HANDOUT

SURVEY HANDOUT

Side 1

FRATERNITY/SORORITY SURVEY

<http://web.utk.edu/~jminton3/>

Please enter this web address to go to the consent form and questionnaire.

If you have already completed this survey, then THANK YOU!

Questions? Please Contact:
Jennifer Minton
2111 Volunteer Blvd.
Knoxville, TN 37996
Phone: 865.974.5165

Side 2

<http://web.utk.edu/~jminton3/>

Participation in this survey is anonymous and takes approximately 10 minutes to complete.

As an incentive to participate, all participants will be given the chance to enter a random drawing for one of several items

Items include:
Personal Training Session
T-shirt
Gift card to Restaurant
Signed Basketball
(Pat Summitt or Bruce Pearl)

Vita

Jennifer Minton was born in Troy, Ohio on October 10th, 1983. She grew up in the small village of Fletcher, Ohio. She was a student of the Miami East School district from kindergarten to her senior year in high school. During high school, Jennifer had the honor of being a student ambassador in Uruguay for Children's International Summer Village (CISV) and an athletic ambassador playing soccer in New Zealand and Australia for People to People. She graduated with honors from Miami East High School in 2002. In the fall, she was enrolled as an undergraduate student at Ohio University. While at pursuing her bachelor degree, she worked the Ping Recreation Center as a Personal Fitness Trainer and Group Fitness Instructor. In the fall of 2005, she graduated from Ohio University with a Bachelor of Science degree in Sports Science. Jenn pursued her master's degree from the University of Tennessee in exercise physiology in 2006. While completing her degree, she was a Graduate Assistant for the RecSports Department in the fitness program. In addition to working at the recreation center on campus, Jenn was 2007-2008 Region II Student Representative for the National Intramural-Sports Recreation Association (NIRSA). On December 28, 2007 Jennifer married Ryan Bennett in Knoxville, Tennessee in the company of their families. In May 2008, she received her Master's of Science Degree with a concentration in exercise physiology.