

Spring 2016

Selected health behaviors among undergraduate college students in different academic disciplines

Patrick C. Gathman
James Madison University

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Selected Health Behaviors among Undergraduate College

Students in Different Academic Disciplines

An Honors Program Project Presented to

the Faculty of the Undergraduate

College of Health and Behavioral Studies

James Madison University

by Patrick Clark Gathman

May 2016

Accepted by the faculty of the Department of Kinesiology, James Madison University, in partial fulfillment of the requirements for the Honors Program.

FACULTY COMMITTEE:

HONORS PROGRAM APPROVAL:

Project Advisor: M. Kent Todd, Ph.D. Date
Exercise Science Professor, Kinesiology

Bradley R. Newcomer, Ph.D. Date
Director, Honors Program

Reader: Julia Wallace Carr, Ed.D. Date
Associate Director Professor, Sport &
Recreation

Reader: Trent A. Hargens, Ph.D. Date
Exercise Science Professor, Kinesiology

PUBLIC PRESENTATION

The manuscript portion of this work will be submitted for publication to the peer-reviewed Recreational Sports Journal on 4/20/16.

Table of Contents

List of Tables3

Acknowledgements.....4

Abstract.....5

Chapter I: Introduction.....6

Chapter II: Methodology.....11

Chapter III: Manuscript.....13

Appendix.....34

Bibliography43

List of Tables

Table 1. Number of Subjects by Academic Discipline and Sex29

Table 2. Physical Activity and Campus Recreation Use by Academic Discipline30

Table 3. Health Indices by Academic Discipline31

Table 4. Physical Activity and Campus Recreation Use by Sex32

Table 5. Health Indices by Sex33

Acknowledgements

My senior honors project would not have been remotely possible without my project advisor, Dr. Mikel Kent Todd. It is a great pleasure to express my gratitude to Dr. Todd for guiding me through this journey, as well as deeply inspiring me to complete each piece of this project to the best of my ability. This project has proven to be the most academically challenging task of my undergraduate career at James Madison University, but it has also proven to be one of the most rewarding processes thanks to the time, feedback, and support given to me by Dr. Todd. I am extremely fortunate to have been given this opportunity and feel blessed to have further grown intellectually as his student.

I would also like to extend my gratitude to thank Dr. Trent A. Hargens and Dr. Julie Wallace Carr for giving me their valuable time to assist me in the writing process by accepting the responsibility of serving as the readers of my project. Their advice and encouragement during the writing process greatly aided in the success of my project. I also wish to thank Julie W. Carr for the tremendous amount of time and effort she put forth into the data collection, the data analysis, and the writing process of the previously published study, which is the reason why this opportunity was originally presented to me.

A huge thank you to Nicole Grabowski for working on data assortment with me, helping me select my topic of interest, and answering all of my questions throughout the past three semesters.

Lastly, I would like to thank the kinesiology department at JMU for giving me the opportunity to be involved in the kinesiology honors program and conduct this research study. This experience has taught me the importance of serving as an important role model and to “walk the walk” as a future health professional.

Abstract

Physical activity, campus recreation (CR) use, body mass index (BMI), and varied health indices were compared between academic discipline (AD) groups and sex. Participants ($n = 219$) were classified as AD I (kinesiology and physical education majors), AD II (health science majors and nursing majors), and AD III (representative sample of other non-health-related majors) in order to make between group comparisons based on the amount of emphasis placed on physical activity and health-related content within different disciplines. Significant differences ($p < 0.05$) were found between the academic discipline groups for International Physical Activity Questionnaire (IPAQ) scores, CR minutes, CR days, CR time per day, vigorous physical activity (VPA), and perceived-health score; and between sex for BMI, VPA, sitting (SIT), fiber intake, and fruit and vegetable intake. When measuring CR use in total minutes per semester, days per semester, and minutes per day AD I was higher than AD II by 100%, 66%, and 21%, respectively; and AD I was higher than AD III by 247%, 160%, and 27%, respectively. The results indicate a positive relationship between the emphasis placed physical activity and health within an academic discipline and the degree to which students participate in physical activity, positive health behaviors and perceived health.

Keywords: campus recreation users, college major, body mass index, physical activity

Chapter I

Introduction

Upon entering college, undergraduate students are introduced to a level of autonomy that allows them to pick and choose from the variety of academic and extracurricular pursuits. According to Astin (1984), student involvement refers to the quantity and quality of physical and psychological energy that students invest into these experiences. Such involvement may include engaging predominantly in academics, or it may incorporate a mixture of participating in extracurricular activities, interaction with institutional personnel, and establishing relationships with other students. Astin's theory states that the greater a student's involvement, the greater the degree of learning and personal development (Astin, 1984). Therefore, if involvement has a strong correlation with student success, it is of great interest to university administrators to provide varied campus activities, as well as find ways to encourage and support student involvement. One response to these recommendations involves creating campus environments and student services intended to better incorporate physical activity and exercise into daily life (Keating, Guan, Piñero, & Bridges, 2005).

Many colleges and universities use campus recreation (CR) facilities as a selling point to potential incoming freshman. In fact, 30% of enrollment decisions were influenced by the quality of CR facilities and 95% of students regularly participate in recreational activities (Bryant, Banta, & Bradley, 1995). CR facilities provide students the opportunity to participate in sport- and fitness-related activities (Ellis, Compton, Tyson, & Bohlig, 2002), while playing an important role in student development by providing opportunities for students to cope with the stressors of college life (Kanters & Forester, 1996). Watson, Ayers, Zizzi, & Naoi (2006) showed that CR investments aided in both student recruitment and retention, along with

contributing to overall student well-being. For example, students who exercised more than 4 hrs/wk indicated that use of CR facilities improved quality of life, helped them feel more at home on campus, and helped them make more friends (Watson et al., 2006). Similarly, Haines (2001) concluded that 75% of students surveyed within the study benefited from CR use in the following categories: feeling of physical well-being, sense of accomplishment, fitness, physical strength, and stress reduction. Therefore, it is reasonable to conclude that CR use represents a good example of student involvement and that by providing CR facilities university administrators are supporting student development.

Astin (1984) also claims that the extent to which students can achieve particular developmental goals is directly related to the time and effort they invest in activities. For example, Astin (1984) states that a history major will spend more time reading books about history, listening to professors talk about history, and discussing history with other students (Astin, 1984). The same belief may apply to a student in an academic discipline that emphasizes health-related courses, such as physical education. This student may be expected to invest more time in physical activity compared to a student in a major that does not emphasize importance of healthy behaviors. Therefore it may be reasonable to expect that students in health-related majors, as compared to those in other majors (e.g., history), will exhibit greater amounts of regular physical activity, eat healthier, smoke less frequently, and believe that they are healthier because of such behaviors.

The data related to CR facility use and measures of health, and how they interact with a student's academic discipline is mixed. Some studies indicate that there is no relationship between facility use and student major (Dekker, Looman, Adriaanse, & Van der Maas, 1993; Khachkalyan, 2014; Richmond, 1999; Varela-Mato Cancela, Ayan, Martín, & Molina, 2012;

Webb, Ashton, Kelly, & Kamali, 1997) and others show that a relationship exists (Coe, Miller, Wolff, Prendergast, & Pepper, 1982; Ferrara, Nobrega, & Dulfan, 2013; Tirodimos, Georgouvia, Savvala, Karanika, & Noukari, 2009).

An important limitation in the previous studies is that the researchers only investigated the differences in CR use among majors that have some aspect of health-related content and those that do not (e.g., medical vs. non-medical students) with no attempt to further separate the amount of emphasis placed on physical activity and health-related content within different health-related disciplines (e.g., physical education and health science). Based on Astin's (1984) theory of student involvement it is reasonable to believe that students in physical education and kinesiology might be more engaged in physical activity and exercise than students majoring in other health-related disciplines (e.g., nursing) and that some health-related outcomes (e.g., body mass index (BMI)) might be different between these groups as well. Furthermore, addressing this question might resolve the discrepancy in the existing literature.

This study is intended to determine if academic discipline is related to student CR use, International Physical Activity Questionnaire (IPAQ) score, and markers of health, such as BMI, diet, smoking status, and perceived status of overall health. Participants will be classified into academic discipline groups including: kinesiology and physical education majors (AD I), health science majors and nursing majors (AD II), and a representative sample of other non-health-related majors excluding sports management majors (AD III). This study is based on the belief that both the emphasis placed on physical activity and exercise in a curriculum will influence the amount of physical activity/exercise performed as well as participation in other health behaviors and outcomes. Kinesiology and physical education majors contain a greater emphasis on physical activity/exercise-related course material, compared to health science and nursing, and

other majors such as history, business, physics, and art. Whereas, health science and nursing majors are considered to study broader-based health-related course content that is more heavily weighted towards general health systems and less focused on physical activity/exercise-related course content. Outside of general studies content that is included in all curriculums, the academic disciplines of history, business, physics, and art incorporate little, if any, health-related content. Therefore, it is expected that AD I and AD II will use CR facilities more and have lower BMI and fat intakes, smoke less, and have higher perceived ratings of overall health compared to AD III. It is further believed that CR use and health-related behaviors and outcomes will be different between AD I and AD II.

Significance of the Study

Findings of this study may be of importance to a greater spectrum of individuals in the occupational world. According Ming (2006), recreational professionals should “walk the talk” in promoting activity to the public. Based on the results, the study suggests that the institution in which a person works affects their level of physical activity. Just as an undergraduate student majoring in physical education is expected to partake in increased levels of physical involvement, Ming (2010) states that recreation professionals demonstrate a higher rate of participation in physical activity than non-recreation professionals and concludes that the willingness of participation in leisure time physical education is an influential contribution, as an increased frequency of working on health issues in the recreation profession is expected. The findings of Huddleston, Mertesdorf, & Araki (2002) further explain this relationship and state that different curriculum approaches significantly impact leisure time physical activity behaviors and attitudes.

The data related to CR facility use and markers of health and the relationship with academic discipline is not consistent. Some studies indicate no relationship between facility use (Dekker et al., 1993; Khachkalyan, 2014; Richmond, 1999; Varela-Mato et al., 2012; Webb et al., 1997) and student major and others show that there is a clear relationship between CR use and health-related disciplines (Coe et al., 1982; Ferrara et al., 2013; Tirodimos et al., 2009). It is therefore important to clarify the extent of the relationship. Furthermore, examining this relationship will prove to be valuable to college or university administration boards that oversee CR facility program operations. The data provided by this study will equip administrators with the information they need to make positive decisions directly related to the student body. By extension, administrators in mental-health services and student-health services can use the results of this study for successful decision-making and policy implementation. Determining the factors that influence or are associated with CR facility use and physical activity may allow colleges and universities to develop better ways to increase student involvement in behaviors that enhance health status, increase their freshman-retention rate, students' academic success, and overall student well-being.

Purpose

This study was conducted to determine whether or not academic discipline is related to the amount of CR use, IPAQ scores, and markers of health, such as BMI, diet, smoking status, and perceived status of overall health.

Chapter II

Methodology

This study compared CR use and other measures of physical activity and health among students who are majoring in different academic disciplines. Initial soliciting of participants was conducted through the use of e-mail, flyers, and residence hall advisors. All procedures used in the study were approved by the university's International Review Board.

Participants

Participants included undergraduate students enrolled at a public, four-year, mid-sized university in the mid-Atlantic region.

Data Collection

The electronic survey instrument, WebSurveyor®, was used to gather data. As part of the survey, participants provided informed consent, demographic data (i.e., sex, age, height, weight, etc.) and identified their academic major. They also completed the International Physical Activity Questionnaire (IPAQ), the National Cancer Institute Multifactor Diet Screener, and a smoking frequency questionnaire. Subjects were also asked to rank their “health” on a scale of 1 (poor health) to 5 (excellent health) (i.e., perceived-health score).

IPAQ scores were computed from participant's estimated number of minutes of sitting, walking, moderate activity, and vigorous activity (Craig et al., 2003). The Multifactor Diet Screener is designed to estimate intake of fat (% of total kcals), fiber (g/d), and fruit and vegetables (whole and partial servings/d) (Thompson et al., 2004). WebSurveyor® has previously been shown to be a valid and reliable method for collecting this data (Todd et al. 2009). Finally, in order to limit the subjectivity that may be associated with self-reported data,

CR use was obtained from the CR “card-swipe” system. Card swipe data representing times when student employees were working at the CR facility was removed from the data set.

Statistical Analysis

Subjects were categorized by academic discipline (i.e., AD I, AD II & AD III) and sex. Multivariate ANCOVA was used to test for main effects between academic discipline groups across the dependent variables (i.e., CR use, IPAQ scores, diet and smoking data). Additional analysis was done to compare male and female subject values across the dependent variables. Campus residency (i.e., on campus vs. off campus) was found to be correlated with several of the outcome variables (e.g., CR days), thus campus residency was used as a covariate. Pairwise comparisons were further investigated with a t-test for independent samples and adjusted using the Bonferonni correction statistic to protect against a type I error. Partial eta-squared analysis was used to further investigate the effect size across the academic discipline groups (small effect, $\eta^2 \geq .01 < .06$; moderate effect, $\eta^2 \geq .06 < .14$; large effect, $\eta^2 \geq .14$) (Cohen, 1988). The Independent-Sample Kruskal-Wallis test was used to compare the median values for smoking for each group. The alpha was set at $p < 0.05$ and the data was presented as means \pm standard deviation.

Chapter III

Manuscript

Selected Health Behaviors among Undergraduate College

Students in Different Academic Disciplines

Abstract

Physical activity, campus recreation (CR) use, body mass index (BMI), and varied health indices were compared between academic discipline groups and sex. Participants ($n = 219$) were classified as AD I (kinesiology and physical education majors), AD II (health science majors and nursing majors), and AD III (representative sample of other non-health-related majors) in order to make between group comparisons based on the amount of emphasis placed on physical activity and health-related content within different disciplines. Significant differences ($p < 0.05$) were found between the academic discipline groups for IPAQ scores, CR minutes, CR days, CR time per day, VPA, and perceived-health score; and between sex for BMI, VPA, SIT, fiber intake, and fruit and vegetable intake. The results indicate a positive relationship between the emphasis placed physical activity and health within an academic discipline and the degree to which students participate in physical activity, positive health behaviors and perceived health.

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Introduction

According to Astin (1984), student involvement refers to the quantity and quality of physical and psychological energy that students invest into these experiences; and that the greater a student's involvement, the greater the degree of learning and personal development (Astin, 1984). If involvement has a strong correlation with student success, it is of great interest to university administrators to provide varied campus activities and support student involvement. One response to these recommendations involves creating campus environments and student

services intended to better incorporate physical activity and exercise into daily life (Keating, Guan, Piñero, & Bridges, 2005).

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This study is intended to determine if academic discipline is related to student CR use, IPAQ score, and markers of health, such as BMI, diet, smoking status, and perceived status of overall health. Participants were classified into academic discipline groups including: kinesiology and physical education majors (AD I), health science majors and nursing majors (AD II), and a representative sample of other non-health-related majors excluding sports

management majors (AD III). This study is based on the belief that both the emphasis placed on physical activity and exercise in a curriculum will influence the amount of physical activity/exercise performed as well as participation in other health behaviors and outcomes. Kinesiology and physical education majors contain a greater emphasis on physical activity/exercise-related course material, compared to health science and nursing, and other majors such as history, business, physics, and art. Whereas, health science and nursing majors are considered to study broader-based health-related course content that is more heavily weighted towards general health systems and less focused on physical activity/exercise-related course content. Outside of general studies content that is included in all curriculums, the academic disciplines of history, business, physics, and art incorporate little, if any, health-related content. Therefore, it is expected that AD I and AD II will use CR facilities more and have lower BMI and fat intakes, smoke less, and have higher perceived ratings of overall health compared to AD III. It is further believed that CR use and health-related behaviors and outcomes will be different between AD I and AD II.

Findings of this study may be of importance to a greater spectrum of individuals in the occupational world. Ming (2006) suggests that the institution in which a person works affects their level of physical activity. Just as an undergraduate student majoring in physical education is expected to partake in physical activity, Ming (2010) states that recreation professionals demonstrate a higher rate of participation in physical activity than non-recreation professionals since an increased frequency of working on health issues in the recreation profession is expected. The findings of Huddleston, Mertesdorf, & Araki (2002) further explain this relationship and state that different curriculum approaches significantly impact leisure time physical activity behaviors and attitudes.

The data related to CR facility use and markers of health and the relationship with academic discipline is not consistent. Further examining this relationship will prove to be valuable to college or university administration boards that oversee CR facility program operations. The data provided by this study will equip administrators with the information they need to make positive decisions directly related to the student body, such as increasing student involvement in behaviors that enhance health status, increasing freshman-retention rate, enhancing students' academic success, and bettering overall student well-being.

This study was conducted to determine whether or not academic discipline is related to the amount of CR use, IPAQ scores, and markers of health, such as BMI, diet, smoking status, and perceived status of overall health.

Methodology

This study compared CR use and other measures of physical activity and health among students who are majoring in different academic disciplines. Initial soliciting of participants was conducted through the use of e-mail, flyers, and residence hall advisors. All procedures used in the study were approved by the university's International Review Board.

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frequency questionnaire. Subjects were also asked to rank their “health” on a scale of 1 (poor health) to 5 (excellent health) (i.e., perceived-health score).

IPAQ scores were computed from participant’s estimated number of minutes of sitting, walking, moderate activity, and vigorous activity (Craig et al., 2003). The Multifactor Diet Screener is designed to estimate intake of fat (% of total kcals), fiber (g/d), and fruit and vegetables (whole and partial servings/d) (Thompson et al., 2004). WebSurveyor® has previously been shown to be a valid and reliable method for collecting this data (Todd et al. 2009). Finally, in order to limit the subjectivity that may be associated with self-reported data, CR use was obtained from the CR “card-swipe” system. Card swipe data representing times when student employees were working at the CR facility was removed from the data set.

Statistical Analysis

Subjects were categorized by academic discipline (i.e., AD I, AD II & AD III) and sex. Multivariate ANCOVA was used to test for main effects between academic discipline groups across the dependent variables (i.e., CR use, IPAQ scores, diet and smoking data). Additional analysis was done to compare male and female subject values across the dependent variables. Campus residency (i.e., on campus vs. off campus) was found to be correlated with several of the outcome variables (e.g., CR days), thus campus residency was used as a covariate. Pairwise comparisons were further investigated with a t-test for independent samples and adjusted using the Bonferonni correction statistic to protect against a type I error. Partial eta-squared analysis was used to further investigate the effect size across the academic discipline groups (small effect, $\eta^2 \geq .01 < .06$; moderate effect, $\eta^2 \geq .06 < .14$; large effect, $\eta^2 \geq .14$) (Cohen, 1988). The Independent-Sample Kruskal-Wallis test was used to compare the median values for smoking for

each group. The alpha was set at $p < 0.05$ and the data was presented as means \pm standard deviation.

Results

Facility Users

Demographic data between academic disciplines and sex for the study participants are presented in **Table 1**. Significant main effects ($p < .05$) were found between the academic discipline groups for IPAQ scores, CR minutes, CR days, CR time per day, VPA, and perceived-health score, as depicted in **Table 2** and **Table 3**. In addition, a trend between academic disciplines was found in fiber intake ($p = .065$). Pairwise comparisons indicated that AD I had significantly higher ($p < .05$) IPAQ scores, VPA, and perceived-health scores than AD III, although the effect sizes were small ($\eta^2 > .01 < .06$) (**Table 1** and **Table 2**). Pairwise comparisons also showed that AD I had significantly higher ($p < .05$) scores than AD II and AD III for CR minutes, CR days, and CR time per day. These differences had moderate effect sizes ($\eta^2 > .06 < .14$) (**Table 1**). There were no significant differences found between AD II and AD III for any of the outcome variables. Independent-Samples Kruskal-Wallis test indicated significantly lower median cigarette use among AD II when compared to AD I and AD III ($p < .05$).

When compared to men, women had lower ($p < .05$) BMI, VPA, SIT, fiber intake, and fruit and vegetable intake (**Table 4**). The effect size for BMI, VPA, and SIT was small ($\eta^2 > .01 < .06$), whereas the effect size for fruits and vegetables was moderate ($\eta^2 > .06 < .14$) and the effect size for fiber intake was large ($\eta^2 > .14$) (**Table 5**). There was a significant interaction between academic discipline and sex for fiber intake ($F = 3.55$, $p = .030$, $\eta^2 = .03$) found in AD

II. A significant difference was also found across sex groups for cigarette smoking ($p < .05$). No other significant interactions were found.

Discussion

Data from the present study shows a positive relationship between the amount of physical activity and health-related content imbedded in the academic discipline and the use of CR facilities, IPAC scores and various markers of health. More specifically, CR use among subjects in AD I was significantly different from AD II and AD III ($p < .05$) when measured in total minutes per semester, days per semester, and minutes per day during the semester. Notably, the greater magnitude of differences were between AD I and AD III; that is, CR use in total minutes, days per semester and minutes per day was 247%, 160%, and 27% higher in AD I compared to AD III, respectively. In contrast, AD I was higher than AD II across the same measures by 100%, 66%, and 21%. AD I also displayed significantly higher values than AD III for IPAQ scores (48%), VPA (26%), and perceived-health scores (12%).

These data suggest that the degree of “fitness” and other health-related content contained within an academic discipline has a strong relationship with CR use, physical activity and perceived-health among undergraduate college students. Furthermore, these results might be expected given that Astin (1984) claims that the extent to which a student can achieve particular developmental goals is directly associated to the time and effort he or she invests in related activities. Similarly, Beggs et al. (2008) reported that the selection of an academic discipline by a student is, in order of importance, based on 1) how well the major matches student interests, 2) attributes of curricula and courses that fit student interests, 3) future occupational implications, 4) future financial earnings, as well as 5) perceived psychological and social benefits. Awareness of these findings has important implications for CR professionals who market recreational

activities to students, especially when reaching out to those who are less likely to take part in CR programs.

The validity of the data from this study is supported by the results from other researchers. Coe et al. (1982), for example, found that medical students engaged in physical activity and other healthy behaviors more than law students; and, Huddleston et al. (2002) reported that physical education majors exercised at significantly higher levels than students majoring in health and leisure. Ferrara et al. (2013) also emphasized the importance of health promotion education, concluding that health-related majors consumed more servings of fruits and vegetables compared to non-health-related majors (3.8 ± 0.3 vs. 3.0 ± 0.3 servings/day).

Additional data points to a relationship between occupation and health-behavior. Ming (2006) found that the organization in which a person works is associated with physical activity levels and that recreation professionals demonstrate a higher rate of activity than non-recreation professionals. Similarly, Coe et al. (1982) showed that practicing physicians were more physically active and otherwise engaged in favorable health practices when compared to lawyers (Coe et al., 1982).

Data from the present study may have broader implications. Specifically, when considered in the context of post-graduate job productivity and income, maintaining favorable physical activity patterns established in college will likely correlate well with professional success (Beggs et al. 2008; Cornelissen, 2008; Lechner 2009; Cabane, 2014). According to Lechner (2009), individuals with 'better' occupational positions (e.g., partake in greater responsibilities, demand a higher level of training, etc.) are more likely to be active in recreational activities than inactive colleagues. In addition, men who participate in recreational sports a minimum of one day per week earn 5% more income than men who do not. Also,

women who participated in sports at age 15 earn approximately 6% more than women who did not, thus indicating that youth sports may impact earnings later in life (Cabane, 2014). Although the transition from an inactive lifestyle to moderate physical activity levels of activity (i.e. 30 mins/d, 5 d/wk) was not found to significantly increase earnings, Cornelissen (2008) found that, engaging in higher levels of vigorous activity was associated with earning an additional 10-20% over 8-12 years. In summarizing this data, Lechner (2015) concluded that employees who participate in recreational sports and physical activity are more likely to occupy high level positions within their organization and have earnings that range from 4-17% higher than their less active counterparts. Thus, CR professionals charged with marketing to students from academic disciplines associated with lower involvement in CR activities may point to these data as part of the rationale for why students should utilize CR facilities and programs.

In addition to finding differences between the use of CR facilities by students from different disciplines, some important differences were found between males and females. Previously published literature shows that males are more physically active than females (Armstrong, 2012), and that they also demonstrate greater levels of vigorous physical activity (Caspersen et al., 2000; Cullen et al., 1999; Nelson et al., 2007). The results of this study are consistent with these findings in that male participants demonstrated 17.5% higher ($p < .05$) amounts of VPA compared to females. Although these differences may arise from sociocultural factors (i.e., sport participation of youth boys and girls is based on their sociocultural environment norms) (Van Mechelen, 2000) it is also possible that women may have a more difficult time achieving the absolute workload (≥ 8 METs) that serves as the IPAQ criteria for vigorous physical activity. It is apparent that preferred mode and intensity of physical activities between sexes requires further exploration. In correspondence with Matthews et al. (2008),

females also exhibited 23% greater ($p < .05$) amount of time spent sitting compared to males. This data supports efforts made by CR programming specialists to provide some physical activity and exercise classes that are sex specific.

Fiber intake among the participants in the present study was similar to the national averages. Among the men, intake was 26.4 ± 13.0 grams/day, which was notably higher than the 17-18 grams/day reported by King et al. (2012). Similarly, women in the present study had a fiber intake of 17.8 ± 7.76 grams/day, which was found to be greater than the 14-15 grams/day reported for women in King et al. (2012). Unlike fiber intake, the majority of the subjects in the present study did not meet the recommended daily amount of ≥ 2 servings of fruits and ≥ 3 servings vegetables (USDA, 2004). These results and the fact that there was no difference in fruit and vegetable intake between men and women were consistent with data reported by Casagrande et al. (2007).

A difference for fiber intake was found between males and females in AD II. Within this group, males (33.4 ± 19.7 grams/day) demonstrated a significantly larger ($P < 0.05$) fiber intake than females (17.7 ± 7.69 grams/day). This difference is most likely due to the fact that males, on average, have a greater daily caloric consumption. In contrast, fat intake was not different between males and females. The lack of difference in fat consumption may be related to the fact that the measure of fat intake in this study was based on the percentage of total calories consumed.

Finally, significant differences in cigarette smoking were found among the academic disciplines and between the sexes. While 11.4% and 11.2% of subjects in groups AD I and AD III, respectively, smoke cigarettes only 2.3% of subjects in group AD II smoked. This difference may be partially explained by the fact that AD II is composed of 91.0% females, whereas AD I

and AD II are comprised of 62.0% and 65.7% females, respectively. Moreover, across academic discipline groups, 15.4% of males and 5.6% of females smoke cigarettes. Therefore, these results may be expected, as females displayed a lower use of cigarettes and AD II is comprised of a greater percentage of females compared to the other groups. In addition, the overall number of smokers enrolled in this study (8.6%) is lower than the national average (16.7%) among persons' age 18-24 (Jamal et al., 2014).

Based on the findings of this study, academic disciplines that expose students to a greater degree of health-related content are positively associated with CR use, physical activity and other health behaviors. Furthermore, based on the findings of Todd et al. (2009), it is understood that students classified as higher users (average ≥ 3 visits/wk) of campus recreation facilities earn a significantly higher grade point average compared to moderate users (average $\geq 1 \leq 3$ visits/wk), low users (average ≤ 1 visit/wk), and nonusers (no visits). Watson et al. (2006) indicated that CR investments aided in both student recruitment and retention, along with contributing to overall student well-being. In addition, CR use plays a vital role in student development by providing opportunities for students to cope with the stressors of college life (Kanters & Forester, 1996). Also, the fact that student involvement (i.e. CR use) has a strong correlation with student success rates (Astin, 1984), it is suggested that university administrators make targeted efforts to increase CR use among students enrolled in academic disciplines that place little or no emphasis on physical activity, diet and other good health behaviors. Some ways in which this may be accomplished might include course and/or program requirements, university-related incentives, and educating the student population of the benefits of regular physical activity.

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Table 1. Number of Subjects by Academic Discipline and Sex

Academic Discipline	Male	Female	Total
AD I	19	33	52
AD II	10	80	90
AD III	30	47	77

Abbreviations: AD, academic discipline.

Table 2. Physical Activity and Campus Recreation Use by Academic Discipline

	Academic discipline groups <i>M</i> ± <i>SD</i>			<i>F</i>	<i>p</i>	η^2
	AD I	AD II	AD III			
IPAQ (MET-min/wk)	8663 ± 5677 ^a	6589 ± 3910	5866 ± 4548 ^a	4.83	.009	.044
CR (min/semester)	3392 ± 3796 ^{ab}	1697 ± 2314 ^b	977.0 ± 1332 ^a	13.5	.000	.113
CR (days/semester)	36.2 ± 29.1 ^{ab}	21.8 ± 21.9 ^b	13.9 ± 16.8 ^a	13.4	.000	.112
CR (min/day)	79.3 ± 28.9 ^{ab}	65.6 ± 27.8 ^b	62.4 ± 33.2 ^a	13.3	.000	.111
VPA (min/day)	107.5 ± 53.6 ^a	90.9 ± 49.2	85.4 ± 45.6 ^a	3.42	.035	.031
MPA (min/day)	98.7 ± 86.0	83.8 ± 54.5	85.1 ± 82.5	0.38	.683	.004
WLK (min/day)	110.8 ± 118.7	113.5 ± 86.0	111.3 ± 115.2	0.54	.585	.005
SIT (min/day)	351.2 ± 165.0	388.6 ± 176.6	372.3 ± 167.2	0.37	.695	.003

Abbreviations: AD, academic discipline; IPAQ, International Physical Activity Questionnaire; CR, campus recreation; VPA, vigorous physical activity; MPA, moderate physical activity; WLK, walking; SIT, sitting.

Bonferroni adjustment was used for multiple comparisons between academic disciplines.

Note: Like superscripts indicate significant differences ($p < .05$).

Table 3. Health Indices by Academic Discipline

	Academic discipline groups <i>M</i> ± <i>SD</i>			<i>F</i>	<i>p</i>	η^2
	AD I	AD II	AD III			
Perceived-health score*	4.12 ± .704 ^a	3.81 ± .762	3.69 ± .782 ^a	5.26	.006	.047
BMI (kg/m ²)	22.9 ± 2.83	23.3 ± 4.89	23.9 ± 4.70	1.32	.270	.012
Fat (% of total energy)	30.4 ± 5.09	30.6 ± 5.09	30.9 ± 4.47	0.08	.921	.001
Fiber (grams/day)	22.4 ± 10.9	19.1 ± 10.3	19.4 ± 9.03	2.77	.065	.025
Fruit & Vegetable (servings/day)	4.18 ± 1.90	3.67 ± 1.91	3.85 ± 2.07	0.17	.847	.002

Abbreviations: AD, academic discipline; BMI, body mass index

*1 = poor; 2 = fair; 3 = good; 4 = very good; 5 = excellent.

Bonferroni adjustment was used for multiple comparisons between academic disciplines.

Note: Like superscripts indicate significant differences ($p < .05$).

Table 4. Physical Activity and Campus Recreation Use by Sex

	Sex <i>M</i> ± <i>SD</i>		<i>F</i>	<i>p</i>	η^2
	Male	Female			
IPAQ (MET-min/wk)	7634 ± 6129	6530 ± 4521	2.65	.105	.012
CR (min/semester)	1943 ± 3025	1811 ± 2507	0.18	.671	.001
CR (days/semester)	22.6 ± 26.7	22.4 ± 22.6	0.13	.715	.001
CR (min/day)	61.8 ± 37.6	62.6 ± 31.5	0.03	.861	.000
VPA (min/day)	106.5 ± 54.5	87.9 ± 46.9	6.49	.012	.030
MPA (min/day)	95.3 ± 76.0	85.0 ± 72.1	1.21	.271	.066
WLK (min/day)	113.8 ± 97.4	111.5 ± 107.4	0.16	.691	.001
SIT (min/day)	320.1 ± 149.5	393.8 ± 173.8	4.82	.029	.022

Abbreviations: AD, academic discipline; IPAQ, International Physical Activity Questionnaire; CR, campus recreation; VPA, vigorous physical activity; MPA, moderate physical activity; WLK, walking; SIT, sitting.

Bonferroni adjustment was used for sex comparisons.

Table 5. Health Indices Use by Sex

	Sex <i>M</i> ± <i>SD</i>		<i>F</i>	<i>p</i>	η^2
	Male	Female			
Perceived-health score*	3.92 ± .795	3.82 ± .762	0.36	.552	.002
BMI (kg/m ²)	24.8 ± 4.71	22.9 ± 4.19	9.45	.002	.043
Fat (% of total energy)	31.6 ± 5.39	30.3 ± 4.62	2.74	.099	.013
Fiber (grams/day)	26.4 ± 13.0	17.8 ± 7.76	39.2	.000	.156
Fruit & Vegetable (servings/day)	4.71 ± 2.47	3.54 ± 1.65	16.2	.000	.071

Abbreviations: BMI, body mass index

*1 = poor; 2 = fair; 3 = good; 4 = very good; 5 = excellent.

Bonferroni adjustment was used for sex comparisons.

Appendix A:

INFORMED CONSENT

Purpose: The purpose of this project is to study electronic media use and wellness behaviors among college students.

Participant Responsibility: We are asking undergraduate students between the ages of 18 and 25 years to participate in this survey. It is estimated that it will take you 30 minutes to answer the survey. The survey contains 5 questionnaires including: DEMOGRAPHIC INFORMATION, ELECTRONIC MEDIA ACCESS, ELECTRONIC MEDIA USE, PHYSICAL ACTIVITY and FOOD FREQUENCY. Your responsibility is to truthfully answer all questions, although you may skip a question (JAC card number and email address are required) if you do not know the answer or find the question to be too personal in nature.

JAC Card Data: The researchers have been given permission to ask the Office of Residence Life will access student JAC card data to determine where students are dining and how often they have checked into the University Recreation Center.

Semester Grades and Overall GPA: The researchers have been given permission to ask the University Registrar to provide each subject's semester grades (for the semester in which you participate in the study) and overall GPA.

Benefits: Information obtained from this study is important for assessing the impact of electronic media on health and wellness behaviors.

Confidentiality & Risks: Every reasonable attempt will be made to keep the data and results confidential. Any hard copies of data will be kept secured in a locked cabinet in a locked office. At the conclusion of the study, all information that can be used to match respondents to their answers will be destroyed. There is a slight risk that confidential information may be obtained by someone gaining unauthorized access to the electronic data.

Reporting Procedures: Group results may be presented at professional conferences (e.g., American College of Sports Medicine Annual Meeting) or published in academic journals.

Giving of Consent: I have read this consent form and I understand what is being requested of me as a participant in this study. I understand that my participation is entirely voluntary. I also understand that I may withdraw from this study at any time without penalty. I freely consent to participate. And, I have been given satisfactory answers to my questions.

Inquiries: If you have any questions about the survey, please contact Dr. M. Kent Todd at 568-3947 (toddmk@jmu.edu). For questions about your rights as a research subject, you may contact the chair of JMU's Institutional Review Board (IRB). Dr. David Cockley, (540) 568-2834, cocklede@jmu.edu.

- I AGREE to participate in this study
- I DO NOT AGREE to participate in this study (If you select this option the program will terminate.)

DEMOGRAPHIC INFORMATION

Student ID/JAC #

required field

Format: 999999999

Last name

First name

Gender

Male Female

Date of birth (**Please use the format specified.**)

Format: YYYY-MM-DD

Total number of years at JMU as a student

Did you transfer to JMU?

Yes No

Do you live on-campus?

Yes No

If you live on campus, please enter the name of the residence hall.

Do you have a roommate?

Yes No

What are your credit hours for the current semester?

What is your major (or anticipated major)?

How many campus Activities, Groups or Clubs do you participate in (e.g., fraternities, sororities, intramurals, sport clubs, SGA, religious organizations, residence hall programs, etc.)?

If you have a job while enrolled in classes, how many hours do you work each week?

Height (inches)

Weight (lbs)

Weight one year ago (lbs)

How many cigarettes, cigars or pipes you smoke each day?

- 0 1 to 2 3 to 5 6 to 9 10 to 19 20 to 39 40 or more

How would you rate your overall health?

- Excellent Very good Good Fair Poor

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. 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

Place an "x" in the box if you did no vigorous physical activities

Format: x

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

Format: x

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. 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

Place and "x" in the box if you did no moderate physical activities

Format: x

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

Format: x

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

days per week

Place and "x" in the box if you did not walk

Format: x

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

hours per day

minutes per day

Don't know/Not sure

Format: x

The last question in this part 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. 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

Format: x

FOOD FREQUENCY QUESTIONNAIRE

Please think about what you usually ate or drank during the past month, that is, the past 30 days.

Please read each question carefully and:

- Report how many times per day, week, or month you ate each food.
- Choose the best answer for each question.
- Mark only one response for each question.

	Never	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 or more times per day
How many times per day, week, or month did you usually eat cold cereals?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many times per day, week, or month did you use milk, either to drink or on cereal?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What kind of milk did you usually use? (Pick the one you used most often).

- Whole milk
- 2% fat
- 1% fat
- 1/2% fat
- Non-fat or skim
- DID NOT DRINK MILK IN THE PAST MONTH

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