ABSTRACT

The Relationship Between Body Composition and Exercise Patterns in College Students Enrolled in a Lifetime Fitness Course

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PURPOSE: To analyze the relationship between body composition and exercise participation, along with perception towards Lifetime Fitness (LF) courses. **METHODS:** Thirty-eight students (20 males and 18 females) at Baylor University completed a qualitative survey pertaining their LF course and exercise participation. Additionally, height, weight, waist-to-hip ratio, and body composition [fat free mass (FFM), fat mass (FM), and body fat percentage (BF%)] were assessed. **RESULTS:** Participants who exercised more than twice a week were associated ($p = 0.021$) with personal wellbeing as their motivation to exercise. Males who exercise less than twice a week were associated ($p = 0.041$) with having lower FFM, whereas females were associated ($p = 0.004$, 0.027, 0.001, respectively) with lower body mass index, FFM, and FM. **CONCLUSION:** Frequency of exercise was not determined by body composition due to sex differences. Additionally, students who took an LF course because of requirement exhibited a lack of exercise participation.

APPROVED BY DIRECTOR OF HONORS THESIS

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THE RELATIONSHIP BETWEEN BODY COMPOSITION AND EXERCISE PATTERNS IN COLLEGE STUDENTS ENROLLED IN A LIFETIME FITNESS COURSE

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By

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE

Introduction

Physical activity has been long studied as an effective treatment to reduce the prevalence of chronic diseases, such as cardiovascular disease, diabetes mellitus, and certain cancers. Despite its known benefits, around 60% of Americans do not actively participate in regular physical activity (1). Additionally, university students are at an increased risk to begin engaging in unhealthy behaviors, such as smoking and drinking, that places them at an elevated risk of developing chronic health problems (2), in addition to being sedentary (3). There is disparity between the known benefits of physical activity and the lack of actively engaging in it long after college students graduate. Instead, their amount of physical activity continues to decrease over time (1), which increases the risk of complications associated with a sedentary lifestyle. In attempt to counteract a sedentary lifestyle, 87.2% of United States four-year institutions, including Baylor University, offer fitness courses in their various degree programs that promote the development of healthy lifestyles and increase the level of health-related fitness education (4). However, the efficacy of these classes is unknown, which warrants further analysis.

At Baylor University, Lifetime Fitness (LF) courses are offered as a one-hour credit course towards the students' degrees. LF courses meet two to three times a week for a total of two to three hours per week and are designed to teach health, fitness, and recreational activities that prepare students for a lifelong experience of health and exercise habits. As previously explained (5), such class approach, a combination of brief lecture along with

practical applications, serves as a good model to incentivize students to engage in LF classes by promoting positive attitudes toward exercise and positive behavioral changes in physical activity. However, by lecturing and despite having LF courses scheduled for a set time, students who partake in these classes are unlikely to spend that given amount of time actively engaging in physical activities (6), which could hinder the effectiveness of an LF course by reducing its practical nature. Considering the completion of a university-level fitness course teaches lasting lessons about health to students (1) and increases the engagement in physical activity, which improves the quality of life of students (7), it is important to understand how the curriculum of an LF course can be better developed to bolster the motivation of students in relation to engaging in physical activity and their willingness to engage in LF courses in first place.

In terms of curricular development, mixed evidence supports the notion that males and females may require a different curricular approach to engage them during an LF course (8). Specifically, LF courses are known to elicit positive long-lasting effects on health (9), and to attain these benefits, two major points must be accounted for. One of these points is that LF courses seem to be effective when students can learn new activities, improve known skills, and genuinely have fun (2). Males seem to be more driven to seek skill-driven classes, whereas females seem to be more driven towards social cues related to physical activity (8). Therefore, a successful curriculum should be able to provide hands-on experience (10) while still ensuring that males' and females' drives to participate in physical activity are accounted for and provided (11).

Altogether, since it is known that males and females differ in their drives to participate in physical activity, the question then becomes what motivates them in first

place. By identifying possible motivators, curriculums could be modified to ensure that the provided activities during the LF course are student focused. Although this study did not utilize biological samples as previously suggested (12), the purpose of this study was to analyze the relationship between body composition of students and their participation in exercise, along with gauging their perceptions towards LF courses. The aim is to help broaden what factors could be determinant in the LF course experience that students get and further improve the development of these courses that have seen a reduction in their implementation and requirement since the early 1900s (11).

CHAPTER TWO

Materials and Methods

Participants

Thirty-eight college students at Baylor University, 20 males and 18 females, were recruited. Advertisement for recruitment included both posted flyers in common areas and in-class verbal recruitment. Eligibility to participate included the following criteria: 1) no self-reported medical complications, 2) currently enrolled in a "Lifetime Fitness" course, and 3) non-pregnant. Enrollment was voluntary, inclusive of any demographic status, and granted upon signing the university-approved informed consent form.

Study Design and Visits

Upon approval from the Baylor University Institutional Review Board (IRB), all participants attended a session at the beginning of the semester during which they were enrolled in an LF course. During the session, participants were given specific instructions regarding the protocol for the study and the data being collected, and upon their agreement to participate in the study, they were required to sign the consent form. Thereafter, participants completed a survey, followed by an assessment of anthropometric variables (height, weight, and waist-to-hip ratio), along with body composition. After the session, participants attended their LF course and remained enrolled in it for the remaining of the semester.

Survey and Coding

Participants were asked to complete a survey at the beginning of the semester in which they were enrolled in an LF class with a series of qualitative questions that asked about demographic data, the name of their LF course, their duration of exercise outside of their LF course, and their motivations for exercising in and outside of their LF course (see Appendix A). Because the answers were qualitative, the responses to the survey were coded into six dichotomous main themes (Appendices B & C), which were then used to compare the themes against each other and against anthropometric and body composition variables. In addition, as part of one of the themes, LF courses were coded into a type of course, aerobic or resistance-based (Appendix C), to categorize students for one of the analyses. The LF courses were placed into the aerobic or resistance category based on the course descriptions provided by Baylor University.

Anthropometric Variables

Height (cm) and weight (kg) were assessed on a standard dual-beam balance scale with a height measuring rod (Detecto 439, Webb City, MO). In addition, waist-to-hip ratio (WHR) was calculated by dividing the circumference of the waist around the navel (cm) by the measurement of the hips at the widest point (cm). Each measurement was made three times, and an average of the three measurements was used to calculate the WHR. For accuracy, the measurements were done with a standard pressure gauged Gulick tape measure by the same research personnel.

Body Composition

Body composition [fat free mass (FFM), fat mass (FM), and body fat percentage (BF%)] were determined by a certified research assistant using a dual energy x-ray absorptiometry (DXA, Hologic, Marlborough, MA) scan. During the scan, participants rested in supine position with both legs and arms against their body. Participants were instructed to remove all kinds of metallic clothing and/or jewelry and to wear a pair of shorts and t-shirt that had no major prints that could otherwise reflect the beam used by the scanner. The DXA scan lasted for approximately 7 minutes.

Statistical Analysis

All statistical analyses were performed using the IBM Statistical Package for the Social Sciences 27.0 (IBM, Armonk, NY, USA). A Chi-square test was performed to analyze each of the six dichotomous nominal themes against each other. A Point-biserial analysis was performed to analyze the continuous variables from the anthropometric measurements and the DXA scan with the dichotomous nominal themes. The level of statistical significance for both analyses was set at $P \leq 0.05$.

CHAPTER THREE

Results

Breakdown of Themes

There was a total of 6 main themes (Table 1 and Table 2) in which participant's responses to the qualitative survey (Appendix A) were coded into. Each theme was defined as a dichotomous variable with two possible responses (Appendix B). The frequency of responses (Table 1 and Table 2) for each theme is represented as the number of participants and the percentage from the whole sample size of 38 participants.

Group	**Exercise Frequency Outside of LF Course**		**Exercise Duration Per Bout Outside of LF Course**		**Motivation To Exercise Outside of LF Course**	
	More than 2x/week	Less than 2x/week	Longer than 1 hour	1 hour or shorter	Personal Achievement	Personal Wellbeing
Males	11 28.9%	9 23.7%	7 18.4%	13 34.2%	7 18.4%	13 34.2%
Females	9 23.7%	9 23.7%	2 5.3%	16 42.1%	4 10.5%	14 36.8%
Combined	20 52.6%	18 47.4%	9 23.7%	29 76.3%	11 28.9%	27 71.0%

LF Course = Lifetime Fitness Course, each cell contains *n* = x plus percentage of total *n*

Table 1. Frequency of classified responses for exercise related themes.

Group	Academic Standing		LF Course Type		Participating In an LF Course Because It Is Required	
	Freshman or Sophomore	Junior or Senior	Aerobic	Resistance	Yes	No
Males	2 5.3%	18 47.4%	6 15.8%	14 36.8%	8 21.1%	12 31.6%
Females	4 10.5%	14 36.8%	9 23.7%	9 23.7%	14 36.8%	4 10.5%
Combined	6 15.8%	32 84.2%	15 39.5%	23 60.5%	22 57.9%	16 42.1%

LF Course = Lifetime Fitness Course, each cell contains *n* = x plus percentage of total *n*

Table 2. Frequency of classified responses for course related themes.

Associations Between the Main Themes

From all possible two-pair comparison of the coded main themes (Appendix B), only 6 combinations met all of the assumptions required to conduct a Chi-Square test for association. No significant correlation was observed for the following 4 combinations: 1) between the LF course type that participants enrolled into and the enrollment in an LF course because of its requirement by Baylor University ($x^2 = 2.423$, $p = 0.120$), 2) the LF course type that participants enrolled into and the exercise frequency outside of LF course per week ($x^2 = 0.005$, $p = 0.944$), 3) the enrollment in an LF course because of its requirement by Baylor University and the exercise duration per bout outside of LF course ($x^2 = 0.145$, $p = 0.703$), and 4) between sex and the motivation to exercise outside of LF course ($x^2 = 0.752$, $p = 0.386$).

However, there was a significant correlation ($x^2 = 5.290$, $p = 0.021$) between the motivation to exercise outside of LF course and the exercise frequency outside of LF course. This association is represented in Figure 1. There was also a significant correlation

(x^2 = 5.546, p = 0.019) between the LF course type that participants enrolled into and whether the participant was male or female. This association is represented in Figure 2.

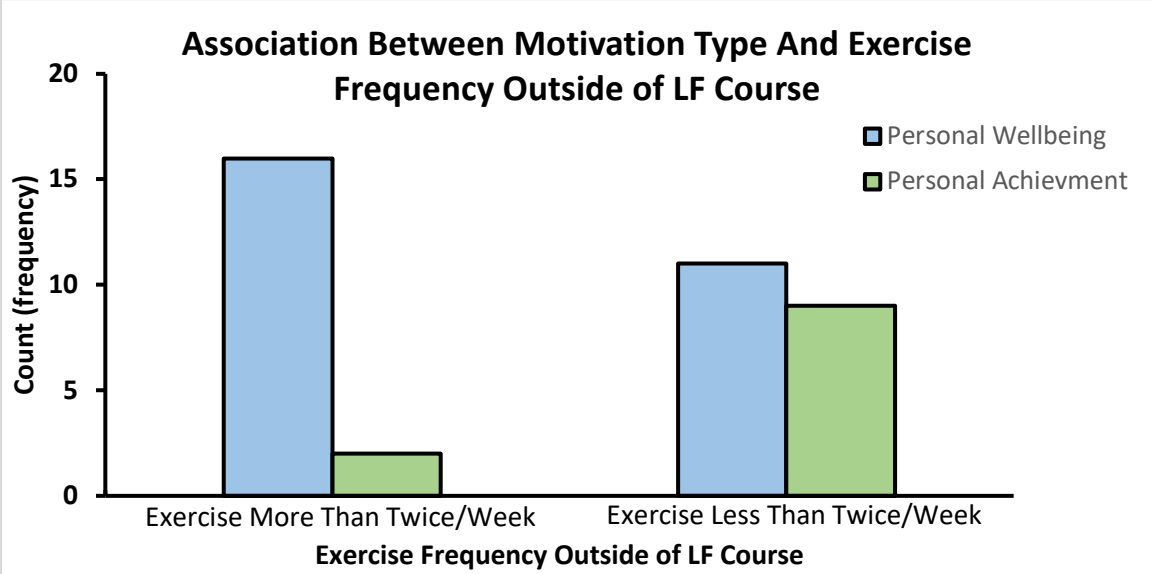

Figure 1. Significant association between the type of motivation a participant had and the duration of each workout outside of the LF course. Data is presented as the frequency of responses per motivation type. Total sample size = 38, p = 0.021.

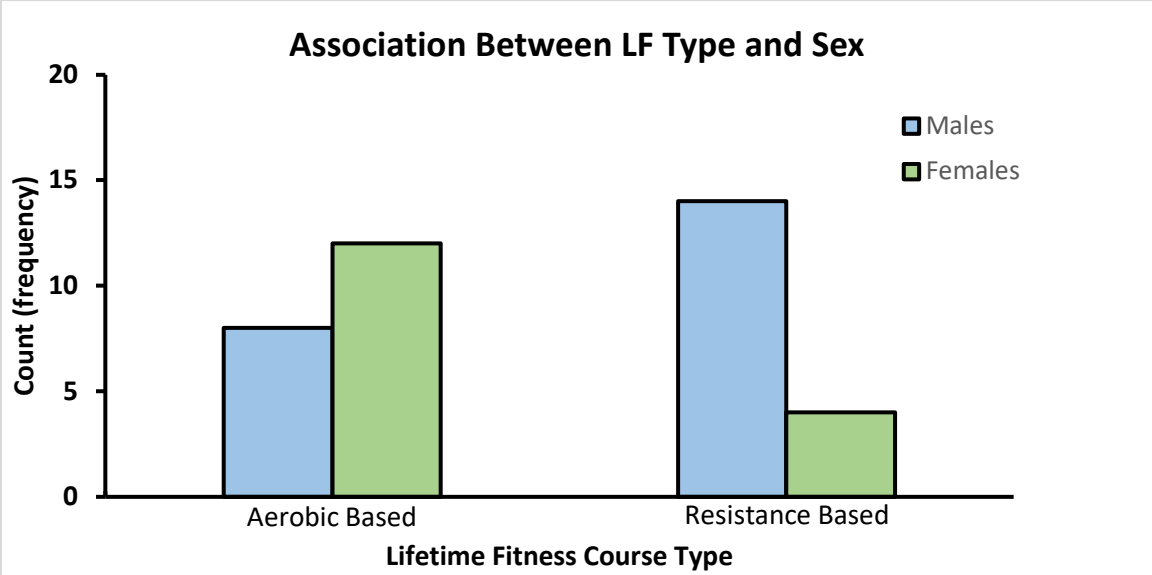

Figure 2. Significant association between LF course type and sex. Data is presented as the frequency of responses per motivation type. Total sample size = 38, p = 0.019.

Associations Between the Main Themes and Body Composition

A point biserial analysis was performed to compare all participants as a whole group with the 6 main themes, and subsequently repeated to compare males and females as separate groups. Descriptive statistics on the continuous variables are presented in Table 3 and Table 4.

Group	Age (yr)	BMI (kg/m^2)	Waist-Hip-Ratio	Fat Free Mass (kg)
Males	20.6 ± 1.0	24.9 ± 3.9	0.83 ± 0.04	60.9 ± 9.2
Females	20.8 ± 1.4	23.4 ± 3.5	0.74 ± 0.05	44.1 ± 6.7
Combined	20.7 ± 1.2	24.2 ± 3.7	0.78 ± 0.06	53.0 ± 11.7

Data are presented as mean ± SD.

Table 3. Body composition divided by gender and combined as a group.

Group	Fat Mass (kg)	Body Fat (%)	VATmass (g)	VATvolume (cm^3)	VATarea (cm^2)
Males	17.9 ± 6.7	22.3 ± 6.4	287.2 ± 19.9	310.5 ± 21.5	59.6 ± 4.1
Females	20.1 ± 6.4	30.8 ± 5.2	132.4 ± 16.7	142.9 ± 17.9	27.5 ± 3.5
Combined	18.9 ± 6.5	26.3 ± 7.2	213.9 ± 18.1	231.1 ± 19.6	44.4 ± 3.8

Data are presented as mean ± SD, VAT = Visceral Adipose Tissue.

Table 4. Body fat components divided by gender and combined as a group.

Associations With All Participants Combined

There was a significant correlation (r = -0.396, p = 0.014) between exercising an hour or less per bout outside of the LF course and having a lower waist-hip-ratio. In addition, there was a significant correlation (r = -0.324, p = 0.047) between participating in an LF course because it is not required and having a lower BF%. Lastly, there was a significant correlation (r = -0.526, p = 0.001) between exercising an hour or less per bout outside of the LF course and having a lower FFM. A complete correlation matrix is presented in Figure 2.

	Variable	Lifetime Fitness Course Type	Participating In A Lifetime Fitness Course Because It Is Required	Exercise Frequency Outside of LF Course	Exercise Duration Per Bout Outside of LF Course	Academic Standing	Motivation To Exercise Outside of LF Course
Age	Pearson Correlation	0.074	-0.016	-0.140	0.224	.671**	0.105
	Sig. (2-tailed)	0.660	0.923	0.403	0.175	0.000	0.532
BMI	Pearson Correlation	0.129	0.047	-0.303	-0.281	0.072	0.317
	Sig. (2-tailed)	0.439	0.780	0.064	0.087	0.668	0.053
WHR	Pearson Correlation	0.146	0.036	-0.092	-.396*	0.107	0.096
	Sig. (2-tailed)	0.380	0.832	0.583	0.014	0.521	0.567
BF%	Pearson Correlation	-0.143	-.324*	0.070	0.284	-0.107	0.171
	Sig. (2-tailed)	0.392	0.047	0.677	0.084	0.523	0.304
FatMass	Pearson Correlation	-0.030	-0.225	-0.089	0.053	0.069	0.270
	Sig. (2-tailed)	0.858	0.174	0.597	0.750	0.682	0.102
FFM	Pearson Correlation	0.222	0.234	-0.304	-.526**	0.202	0.033
	Sig. (2-tailed)	0.180	0.157	0.063	0.001	0.224	0.843
VATmass	Pearson Correlation	0.147	0.024	-0.059	-0.218	0.177	0.301
	Sig. (2-tailed)	0.378	0.886	0.725	0.188	0.287	0.066
VATvol	Pearson Correlation	0.147	0.025	-0.058	-0.218	0.177	0.302
	Sig. (2-tailed)	0.379	0.884	0.728	0.189	0.288	0.065
VATarea	Pearson Correlation	0.147	0.025	-0.059	-0.217	0.178	0.302
	Sig. (2-tailed)	0.379	0.883	0.727	0.191	0.286	0.066

* $p < 0.05$, ** $p < 0.01$.
WHR = Waist-Hip-Ratio, BF% = Body Fat Percentage, FFM = Fat Free Mass, VAT = Visceral Adipose Tissue.

Figure 3. Complete correlation matrix between the associations of the six main themes and the continuous variables related to body composition. Total sample size = 38.

Associations Only Within Male Participants

There was a significant correlation (r = -0.460, $p = 0.041$) between exercising less than twice a week outside of the LF course and having a lower FFM. In addition, there was a significant correlation (r = -0.674, $p = 0.001$) between exercising an hour or less per bout outside of the LF course and having a lower FFM. Lastly, there was a significant correlation between participating in a LF course for reasons other than it being required and having lower visceral adipose tissue (VAT) mass (r = -0.545, $p = 0.013$), lower VAT volume (r =

-0.544, p = 0.013), and lower VAT area (r = -0.544, p = 0.013). A complete correlation matrix is presented in Figure 3.

	Variable	Lifetime Fitness Course Type	Participating In A Lifetime Fitness Course Because It Is Required	Exercise Frequency Outside of LF Course	Exercise Duration Per Bout Outside of LF Course	Academic Standing	Motivation To Exercise Outside of LF Course
Age	Pearson Correlation	0.171	-0.020	0.039	0.123	.686**	0.288
	Sig. (2-tailed)	0.471	0.933	0.869	0.604	0.001	0.218
BMI	Pearson Correlation	-0.148	-0.108	-0.200	-0.346	0.037	0.271
	Sig. (2-tailed)	0.532	0.650	0.398	0.135	0.877	0.248
WHR	Pearson Correlation	0.176	-0.253	-0.134	-0.275	0.332	-0.003
	Sig. (2-tailed)	0.458	0.283	0.573	0.240	0.152	0.991
BF%	Pearson Correlation	-0.293	-0.146	0.281	0.207	0.134	0.348
	Sig. (2-tailed)	0.210	0.539	0.230	0.381	0.572	0.133
FatMass	Pearson Correlation	-0.288	-0.203	0.152	-0.003	0.131	0.354
	Sig. (2-tailed)	0.218	0.390	0.522	0.990	0.581	0.125
FFM	Pearson Correlation	0.052	-0.071	-.460*	-.674**	-0.005	-0.113
	Sig. (2-tailed)	0.827	0.765	0.041	0.001	0.982	0.636
VATmass	Pearson Correlation	-0.100	-.545*	0.038	-0.110	0.202	0.329
	Sig. (2-tailed)	0.676	0.013	0.875	0.644	0.392	0.157
VATvol	Pearson Correlation	-0.101	-.544*	0.039	-0.108	0.201	0.329
	Sig. (2-tailed)	0.671	0.013	0.870	0.651	0.396	0.156
VATarea	Pearson Correlation	-0.100	-.544*	0.039	-0.108	0.202	0.329
	Sig. (2-tailed)	0.675	0.013	0.870	0.651	0.393	0.157

* $p < 0.05$, ** $p < 0.01$.
WHR = Waist-Hip-Ratio, BF% = Body Fat Percentage, FFM = Fat Free Mass, VAT = Visceral Adipose Tissue.

Figure 4. Complete correlation matrix between the associations of the six main themes and the continuous variables related to body composition within male participants. Total sample size = 20.

Associations Only Within Female Participants

There was a significant correlation between exercising less than twice a week outside of the LF course and having a lower body mass index (BMI) (r = -0.674, p = 0.004), lower FM (r = -0.552, p = 0.027), and lower FFM (r = -0.919, p = 0.001). There was also a significant correlation between taking an LF course for reasons other than it being

required and having a lower WHR (r = -0.495, $p = 0.037$). A complete correlation matrix is presented in Figure 4.

	Variable	Lifetime Fitness Course Type	Participating In A Lifetime Fitness Course Because It Is Required	Exercise Frequency Outside of LF Course	Exercise Duration Per Bout Outside of LF Course	Academic Standing	Motivation To Exercise Outside of LF Course
Age	Pearson Correlation	0.000	0.041	-0.271	0.358	.745**	-0.069
	Sig. (2-tailed)	1.000	0.879	0.310	0.174	0.001	0.800
BMI	Pearson Correlation	0.328	-0.123	-.674**	-0.082	-0.021	0.207
	Sig. (2-tailed)	0.215	0.649	0.004	0.762	0.939	0.443
WHR	Pearson Correlation	-0.152	-.495*	-0.227	-0.343	-0.259	-0.009
	Sig. (2-tailed)	0.548	0.037	0.365	0.163	0.299	0.972
BF%	Pearson Correlation	0.315	-0.186	-0.159	0.015	-0.189	0.255
	Sig. (2-tailed)	0.235	0.489	0.556	0.957	0.484	0.340
FatMass	Pearson Correlation	0.353	-0.284	-.552*	-0.024	0.008	0.164
	Sig. (2-tailed)	0.180	0.286	0.027	0.930	0.977	0.544
FFM	Pearson Correlation	0.260	-0.211	-.919**	-0.149	0.204	-0.232
	Sig. (2-tailed)	0.331	0.433	0.000	0.582	0.449	0.386
VATmass	Pearson Correlation	0.152	-0.011	-0.288	0.188	0.038	0.349
	Sig. (2-tailed)	0.574	0.967	0.279	0.485	0.888	0.185
VATvol	Pearson Correlation	0.154	-0.012	-0.289	0.187	0.038	0.352
	Sig. (2-tailed)	0.570	0.964	0.277	0.488	0.889	0.181
VATarea	Pearson Correlation	0.151	-0.011	-0.289	0.190	0.040	0.349
	Sig. (2-tailed)	0.576	0.969	0.277	0.482	0.883	0.185

* $p < 0.05$, ** $p < 0.01$.
WHR = Waist-Hip-Ratio, BF% = Body Fat Percentage, FFM = Fat Free Mass, VAT = Visceral Adipose Tissue.

Figure 5. Complete correlation matrix between the associations of the six main themes and the continuous variables related to body composition within female participants. Total sample size = 18.

CHAPTER FOUR

Discussion

It is believed that motivation may play a role in whether college students choose to participate in exercise (13). Although there is likely a multifactorial answer regarding the factors that promote exercise participation, developing a better understanding of what motivates students to exercise and engage in their physical activity courses would help strengthen the curriculum of these courses. At our institution, physical activity courses are referred to as LF courses, where 57.9% of college students reported their participation in an LF course because it is required by the university. Hence, understanding why so many students do not value LF courses beyond them just being required is warranted. We examined the impact of such belief and how it relates to exercise, motivation, and other factors pertaining to the participation in an LF course. This study aimed to identify possible factors that can help improve the student's attitude towards LF courses.

Descriptively, both males (34.2%) and females (42.1%) reported a higher frequency of exercising for an hour or less per bout. Surprisingly, when comparing WHR to exercise duration, with males and females combined, there was a significant correlation between exercising one hour or less and having a smaller WHR, but the significance disappeared once males and females were analyzed as independent groups using a point-biserial test. Therefore, this warranted that sex differences be explored to better understand the relationship between WHR and exercise duration and how there might be

other sex differences relatable to exercise participation. For example, Lackman explained how males and females might have different motivators to engage in exercise, which may be attributed to personal, social, or other variables of wellbeing (11), which raises the question if a similar scenario could occur with an LF course.

In contrast, as indicated in our results, the motivation to exercise outside of an LF course could be a better indicator of the frequency that students decide to workout outside of an LF course, rather than WHR. While one study reported that only 14% of undergraduate students engaged in physical activity three or more times a week (14), our study identified a combined frequency of 52.6% males and females who exercised more than twice a week. From our study, most males (65%) and females (77%) reported personal wellbeing as their main motivation to exercise outside of their LF course, rather than it being driven by a personal achievement motivation (35% males and 23% females). This is comparable to a study that reported that most students choose a physical activity type related to "learn[ing] a new skill and to hav[ing] fun" (2), which resembles the personal wellbeing motivation code (Appendix B). All in all, this could suggest that motivation is an important determinant of the frequency that students exercise.

To better understand the relationship between exercise frequency and the motivation to exercise, actual physical status, portrayed by body composition, may serve as guidance to identify how motivation might shift based on the student's physical state and how they perceive LF courses. Specifically, a personal wellbeing motivation, comparable to an extrinsic motivation (12), may be the factor that determines whether a student exercises outside of a required LF course. Whether one's motivation is intrinsic or extrinsic, it is important to develop "autonomous self-regulation" in order to optimize

exercise participation and to sustain those exercise behaviors over a period of time (12), meaning that motivation alone may not be enough to elicit exercise participation if a student is not autonomous/independent. Further elaborating on the notion that body composition may impact motivation, the finding that FFM is associated with exercise duration suggests that motivation is imperative to ensure students spend enough time exercising, since that determined FFM. By exercising more, it will help students to attain a higher FFM, which is good for metabolic health (15), and to further enhance their personal wellbeing motivation to continue engaging in such exercise behavior.

Because physical status (body composition) for both males and females varies greatly, sex differences were explored to identify if a particular sex had unique traits within the six main themes. In males, motivation to exercise was highly distributed towards a personal wellbeing (65%), rather than a personal achievement (35%) motivation. When evaluating both sexes together, there was a relationship between FFM and exercise duration. Exploring males on their own, the same association was observed, which was absent in females, suggesting that male's FFM might be indicative of their time spent exercising. Furthermore, this finding emphasizes that motivation is imperative to ensure that students spend enough time exercising, and it suggests that personal wellbeing contributes to exercise frequency for males. Further exploring males independently, the association between exercise frequency and FFM indicated that males were more driven by personal wellbeing motivation than females. Knowing that males tend to have greater VAT values (16) likely explains the unique relationship between LF course requirement and VAT and how males who may not be motivated by personal wellbeing tend to have more VAT. In contrast, students who do not develop competency in playing sports in high

school are likely to not voluntarily sign up for fitness classes in college (8), which could suggest that motivation or self-determination may cause students to be inclined to exercise less and thus perceive LF courses as just being a requirement to graduate. On the other hand, having required physical activity classes that expose students to physical activity, who would otherwise never be exposed to it, may help them develop exercise habits (17).

When evaluating females independently, it is noted that they also have a higher frequency of personal wellbeing (77.7%) as the main motivation to exercise rather than personal achievement (22.3%). However, unlike in males, females demonstrated that BMI, FFM, and FM may be interrelated with the frequency of exercise participation, rather than their personal wellbeing motivation. The reason why the previously mentioned body composition variables (BMI, FFM, and FM) were lower in females may be because, within our sample population, female's personal wellbeing motivation is more associated with improving mental health and relaxation rather than being physically fit. This implies that females may be motivated to engage in physical activity for the fun of it, as previously suggested (11), but the engagement might not be enough to elicit positive body composition adaptations such as higher FFM. This concept could also be extrapolated to the reason why females who perceived participating in an LF course solely because it is required were also associated with having a higher WHR. As Lackman explained (11), females have a considerably different drive to participate in exercise in comparison to males. When participating in a physical activity class, like an LF course, that is required, evidence has shown that engagement is reduced for females (11). Therefore, it is inferred that majority of the personal wellbeing motivation in females was related to their interest in socializing and improving their mental health and relaxation, but it was not substantial

enough to induce body composition changes and/or engagement in their LF courses. However, when evaluating males, their personal wellbeing motivation domain might be more distributed toward actual physical performance and maintenance. The results also suggest that it may help them to be engaged in their LF course, but they may not particularly be motivated to benefit physically from it.

Altogether, it is important to better understand if required LF courses outweigh the benefits of an elective course that could have a more specific curriculum to ensure all students are motivated by personal achievement and goal-setting, relatable to intrinsic motivation (12). With this is mind, it could be beneficial to make the LF course curriculum focused on specific health improvements and personal goals for those enrolled, rather than emphasizing the social aspect of them. This assumption is based on the notion that males and females benefit differently from the current LF courses. In essence, having an LF course with students who are intrinsically motivated could help to set class-oriented goals that will challenge students and are likely to provide a dynamic class environment that will push all students to work towards a goal as a whole group that maybe is otherwise not possible with personal wellbeing motivated students.

Something to consider would be that this study coded survey answers into the six main themes. Although this was done as objectively as possible, there is always the possibility for bias in how the survey was coded. Another limitation is that the qualitative answers to the survey were self-reported leaving the opportunity for personal bias or the desire to inflate or deflate responses by the students. The sample size in the current study, which consisted of 20 males and 18 females, may not accurately represent the entire student population. However, there was a similar ratio of males and females which made the

analysis of the data feasible. An additional limitation was that the responses to the survey were a one-time point assessment. For the future, it is encouraged to gather pre, mid, and post-assessments to determine if student's motivation or perspective towards LF courses has changed, as previously seen how students improved their attitudes toward physical activity over time (18). However, all in all, the findings of this study can still be accounted for when developing a curriculum for LF courses.

Overall, when examining the role of motivation towards LF courses, it is important to account that students' perceptions of LF courses may not be reflective of their exercise motivation. In other words, students may be motivated to exercise and still not do it, or they do not value the importance of taking an LF course and still exercise outside of it. This assumption ties back to the discrepancy between motivation and exercise participation and how the implications of personal wellbeing motivation differed between sexes. Furthermore, there was also an association between sex and LF type, aerobic or resistance-based course, where males preferred resistance based and females preferred aerobic-based LF courses. The difference in preference of an LF course type could warrant sex-specific programs to meet the needs of both males and females (11), or instructors could design curriculums suited to both sexes to ensure that, despite the LF course type that students enroll into, they all will still attain a similar benefit by the end of the semester. Despite such difference, both males and females had a high frequency of responses that fell within the personal wellbeing motivation, but that did not relate with their LF course type, which suggests that there was a mismatch between the motivation of students and their chosen course.

Summarized, regardless of both sexes sharing a similar motivation, males and females differ in their preference of an LF course type. Therefore, to develop a curriculum that can engage students and entice them to carry on exercising after the semester is over, it is essential to better understand what motivates students to exercise and how an LF course can be modified to combine both aerobic- and resistance-based modalities to ensure all students are actively engaged by it. The modifications to an LF course curriculum could also include the promotion of self-competence and skill development, especially for those who are not as motivated or interested (8). In addition, to encourage participation, it is important to create a curriculum that increases cardiovascular fitness in aim to promote overall health, as seen in a study that reported an increase in long term physical fitness after requiring several credits of physical activity/aerobic classes (14). However, despite developing a good curriculum, at the end of the day, the success of an LF course may be dependent on the instructor's abilities to engage and provide the hands-on experience to students (10), and there is more work needed to elucidate how motivation to exercise can be better stimulated in an LF course. In these terms, it would be beneficial to explore the different outcome of two LF courses that are the same type, aerobic- or resistance-based. One of the courses would have a preset curriculum, whereas the other course would implement a curriculum based on the students' responses to their interests, motivations to exercise, among other factors that would be used to shape the course activities.

Conclusion

This study was conducted to identify what factors were associated with students' self-reported perception of LF courses and what drives students to exercise. Although there was a high frequency of personal wellbeing motivation, it did not explain why students

enrolled in an LF course, besides for it being required. However, it did demonstrate why students may engage in more or less exercise. Within that, males and females have unique trends in their desires to participate in an LF course. Therefore, future LF courses should consider adopting a curriculum that is able to uphold personal wellbeing motivation while promoting long term exercise participation. Additionally, the curriculum should account for unique needs and goals, personal achievement motivation, that males and females may have in order to promote LF course engagement.

REFERENCES

1. Adams, Thomas; Graves, Marla; Adams H. The Effectiveness of a University Level Conceptually-Based Health-Related Fitness Course on Health-Related Fitness Knowledge. Phys Educ. 2006;63(2):104–12.

2. Leenders NYJM, Sherman WM, Ward P. College physical activity courses: Why do students enroll, and what are their health behaviors? Res Q Exerc Sport. 2003;74(3):313–8.

3. Owen N, Healy GN, Matthews CE, Dunstan DW. Too much sitting: The population health science of sedentary behavior. Exerc Sport Sci Rev. 2010;38(3):105–13.

4. Strand B, Egeberg J, Mozumdar A. Health-Related Fitness and Physical Activity Courses in U.S. Colleges and Universities. ICHPER-SD J Res. 2010;5(2):17–20.

5. Dale D, Corbin CB. Physical Activity Participation of High School Graduates Following Exposure to Conceptual or Traditional Physical Education. Res Q Exerc Sport. 2000;71(1):61–8.

6. Sallis JF, McKenzie TL, Beets MW, Beighle A, Erwin H, Lee S. Physical education's role in public health: Steps forward and backward over 20 years and HOPE for the future. Res Q Exerc Sport. 2012;83(2):125–35.

7. Pucci G, Reis RS, Rech CR, Hallal PC. Quality of life and physical activity among adults: Population-based study in Brazilian adults. Qual Life Res. 2012 Nov;21(9):1537–43.

8. Hildebrand KM, Johnson DJ. Determinants of College Physical Education Class Enrollment: Implications for High School Physical Education. Phys Educ. 2001;58(1):51–6.

9. Tassitano RM, Barros MVG, Tenório MCM, Bezerra J, Florindo AA, Reis RS. Enrollment in physical education is associated with health-related behavior among high school students. J Sch Health. 2010 Mar;80(3):126–33.

10. Sparling PB. College Physical Education: An unrecognized agent of change in combating inactivity-related diseases. Perspect Biol Med. 2003;46(4):579–87.

11. Lackman J, Smith ML, McNeill EB. Freshman college students' reasons for enrolling in and anticipated benefits from a basic college physical education activity course. Front Public Heal. 2015 Jun 24;3(JUN).

12. Teixeira PJ, Carraça E V., Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: A systematic review. Int J Behav Nutr Phys Act. 2012 Jun 22;9.

13. Kilpatrick M, Hebert E, Bartholomew J. College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. J Am Coll Heal. 2005;54(2):87–94.

14. Mears D, Chan J, Huang C, Liu Y, Lin C, Huang J. The Effects of Physical Education Requirements on Physical Activity of Young Adults. Am Second Educ. 2008;36(3):70–83.

15. Hirsch KR, Smith-Ryan AE, Blue MNM, Mock MG, Trexler ET, Ondrak KS. Metabolic characterization of overweight and obese adults. Phys Sportsmed. 2016;44(4):362–72.

16. Nauli AM, Matin S. Why Do Men Accumulate Abdominal Visceral Fat? Front Physiol. 2019 Dec 5;10.

17. Kim MS, Cardinal BJ. Differences in university students' motivation between a required and an elective physical activity education policy. J Am Coll Heal. 2019 Apr 3;67(3):207–14.

18. Esslinger KA, Grimes AR, Pyle E. Effects of Requiring Physical Fitness in a Lecture-Based College Course: Students' Attitudes Toward Physical Activity. Phys Educ. 2016;73(1).

APPENDICES

APPENDIX A

Survey

1. Full Name: _____

2. Classification:
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior

3. Name of LF course you are taking: _____

4. What is the primary reason you are taking an LF course?
    a. It is a requirement for my major.
    b. To motivate me to exercise more.
    c. Because I think it is fun.
    d. To help me lose weight.

5. Frequency of current exercise outside of LF course:
    a. Less than once a week
    b. 1 to 2 times per week
    c. 3 to 4 times per week
    d. 5 to 6 times per week
    e. Everyday

6. Type of current exercise outside of your Lifetime Fitness course? Select all that apply.
    a. Walking
    b. Running
    c. Weightlifting
    d. Swimming
    e. Playing a sport
    f. Hiking
    g. F45
    h. Other: _____

7. Duration of exercise per workout:
    a. Less than 10 minutes
    b. 10-30 minutes
    c. 30 minutes-1 hour
    d. 1-2 hours
    e. Greater than 2 hours

8. What is your primary motivation to exercise outside of your Lifetime Fitness course?
    a. To be healthy and physically fit.
    b. To feel better.
    c. To lose weight.
    d. To have fun.
    e. To improve mental health and personal relaxation.
    f. To fulfill personal goals.
    g. To be outside.
    h. No motivation to exercise.
    i. Other: _____

9. What do you expect to gain from taking this Lifetime Fitness course? Select all that apply.
    a. Improvements in health and physical fitness
    b. Weight loss
    c. Fun exercise experience
    d. Improvements in mental health and personal relaxation techniques
    e. Improvements in personal fitness goals
    f. Do not expect to gain anything
    g. Other: _____

APPENDIX B

Survey Coding

Question	Answer	Coding
Is the participant's motivation to take an LF class because it is required?	Yes	It is a requirement for my major.
	No	Because I think it is fun.
		To help me lose weight
		To motivate me to exercise more
		To get stronger
Does the participant workout more than twice a week outside of class?	Yes	3 to 4 times per week
		5 to 6 times per week
		Everyday
	No	Less than once a week
		1 to 2 times per week
Does the participant workout for more than one hour at a time outside class?	Yes	60-120 min
	No	10-30 min
		30-60 min
Is the participant an underclassman?	Yes	Freshman
		Sophomore
	No	Junior
		Senior
Is the participant's motivation to workout outside of class due to personal wellbeing?	Yes (Personal Wellbeing)	To be healthy and physically fit
		To improve mental health and personal relaxation
	No (Personal Achievement)	To be outside
		To fulfill personal goals
		To help compensate eating disorders
		To lose weight

APPENDIX C

Lifetime Fitness Course Coding