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Associations Between Self-Selected Body Size Figures and Physical Activity in Young Adult College Students

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ASSOCIATIONS BETWEEN SELF-SELECTED BODY SIZE FIGURES AND PHYSICAL ACTIVITY IN YOUNG ADULT COLLEGE STUDENTS

by

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Abstract

How we view others and ourselves can have a very powerful influence on our lives and how we make decisions. The purpose of this study was to observe self-selected body size images for oneself, self-selected body size figures for a healthy, overweight and obese figure, and the relationship between self-selected body size figures and physical activity (PA) in young adult, male and female, college students (n=34, aged 18-22). During the spring of 2015, PA was measured for seven consecutive days using both accelerometers and the International Physical Activity Questionnaire (IPAQ). For accelerometer data, 3-day means were computed. Self-selected body size figures were assessed using the Body Image Assessment Scale-Body Dimensions (BIAS-BD) along with selected demographics. Participants chose what they thought represented their own body figure, and a healthy, overweight, and obese body figure. The self-selected body size figures were then compared to PA. No relationship between self-reported and measured PA was found ($p=0.13$), therefore only accelerometer data were used when reporting findings. When comparing self-selected body size figures and accelerometer-measured PA for the total sample, as self-selected body size figure increased, the amount of time doing moderate-vigorous activity decreased ($p=0.04$). The implication is that a higher perceived body size could be a barrier to physical activity. When comparing self-selected body figure size and what image represented a healthy, overweight, or obese body figure, there were similarities in both males and females. As self-selected body size figure went up, what they thought a healthy person looked like increased as well, significantly for females ($p=0.025$) and trending for males ($p=0.059$). For females, there was no significant association between self-selected body size figure and what they perceived as

overweight and obese, however, for males there was. As self-selected body size figure increased, what males thought an overweight and obese person looked like decreased ($p=0.034$ and $p=0.045$, respectively). There was an outlier, which when removed, no association was evident. With a larger sample size, the original association might be confirmed. It is interesting to study body size figures from the perspective of gender and influence on physical activity.

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Chapter 1

Literature Review

1.1 Introduction

As of 2010, 68.8% of Americans were considered to be overweight or obese, and 35.7% were considered obese.[1-3] With obesity comes other issues such as cardiovascular risk, hypertension, dyslipidemias, and type 2 diabetes.[4] Modern society emphasizes thinness and brands those who are obese. These messages are seen anywhere and can be internalized by those affected most.[5] Obesity is closely associated with poor body image, but not all persons are equally affected by this side effect. A negative body image can affect both the physical and mental health in a person. People with a negative self body image are more likely to develop depression, anxiety, low-self esteem, and poor concentration, which can inhibit them from doing things they enjoy, such as exercise and other activities. Poor body image is also linked to disordered eating which can lead to serious mental health issues, such as anorexia nervosa, bulimia nervosa, or binge eating disorder.[6] Some argue the struggles and dissatisfaction associated with obesity helps drive people to lose weight; however, more likely, this unhappiness forms both biological and physiological barriers, leading to continued increased eating.[5] In order for these people to lose weight, positive encouragement and praise is commonly needed.

Among those who gain weight the fastest over a small period of time are college students. While "The Freshman 15" is a commonly used phrase, freshman year weight gain typically is closer to five to seven pounds, followed by two to three pounds their sophomore year. Those who are already at-risk individuals are more likely to be affected by this newfound freedom of college. Not only do college students engage in poor eating

habits, they are also physically inactive. Along with this weight gain comes the previously stated feelings of inadequacy and poor self-image. Students who gain weight have a decrease in self-confidence and are more aware of the weight gained.[7]

The World Health Organization defines health as a complete state of physical, mental, and social well-being, and not merely the absence of disease or infirmity. Health is not defined by how skinny, beautiful, or athletic one is. In order for people to become healthy they need to improve both mental and social facets. Self-love and confidence are important steps in the weight loss process. The combination of nutritional education, physical exercise, and positive body image can help college students stay and be healthy.

The study was an observational study with the objective of looking at the self-selected body size figures for oneself, self-selected body size figures for healthy, overweight and obese figures, and the relationship between body size figure and physical activity in a sample of college students at the University of Maine. Students were part of the Get Fruved Project, a United States Department of Agriculture-National Institute of Food and Agriculture funded research study on health habits to prevent obesity. Gender differences were observed, as well.

1.2 Physical Activity

Nelson and colleagues[8] used the 2003-2004 National Health and Nutrition Examination Survey to evaluate if daily physical activity affected insulin resistance. Healthy U.S. adults (n=402) were assessed for cardiorespiratory fitness, fasting plasma glucose, insulin concentrations, and physical activity, using accelerometers. They used Actigraph AM-7164 accelerometers placed on the right hip, similar to those used in the

Get Fruved study. The analysis included only those who wore the accelerometer for more than 600 minutes on four or more days of the week. Minutes with ≥1952 activity counts were coded as moderate-to-vigorous physical activity (MVPA) and minutes ≥260 and <1952 activity counts were coded as light physical activity (LPA). Researchers found that those who participated in more MVPA had significantly lower amounts of insulin resistance, while both LPA and cardiovascular fitness had no effect.

1.3 Body Image

Gardner and colleagues[9] assessed eye movement and body size judgments in the obese. In this observational study there were 40 volunteers, which included 20 males and 20 females. In each group, 10 were classified as obese (20% or more over their recommended weight for height). Obese subjects estimated their body size on a television monitor and were asked to adjust the size of the virtual person to their own size, while their eye movements were recorded throughout. All groups looked at their chest, waist, and head the most while estimating their body size, with little attention to their thighs, feet, or calves. Obese subjects viewed their waist more than normal subjects. Overall, subjects underestimated their size by 4.62% and females underestimated their size more than males.

1.4 Body Image Related to Physical Activity

Kopcakova and colleagues[10] studied poor body image as a barrier for physical activity. This observational study was part of the Health Behavior in School-Aged Children Study in Slovakia. The children (n=8,042, 11-15 years old) were 49% males and 51% females. They answered questions about their body image and frequency of their

physical activity. Body image was assessed by a single survey question: "Do you think your body is," with five possible answers ranging from "Much too fat" to "Much too thin." They then separated the answers into two groups: those who answered "too fat" and those who did not. Their physical activity was also assessed by a single survey question: "Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?" with answers ranging from 0-7 days. This instrument was proven a reliable and valid screening measure of MVPA of children and adolescents. Statistically significant gender differences were found for all studied variables. Males reported more physical activity, higher satisfaction with their body, and higher body mass index (BMI) than females. Results show that adolescents with a negative body image are less likely to engage in regular sufficient physical activity, and males are more likely to report sufficient physical activity.

Zaccagni and colleagues[11] compared body image and weight perceptions to level of physical activity. In this observational study, 734 university students in Italy participated, 354 females (aged 21.5 ± 2.9 years), and 380 males (aged 22.1 ± 3.6 years). They were recruited from the second year of the Sport Sciences degree program. They completed a self-administered questionnaire to acquire socio-demographic and sport participation information. Anthropometrics of height and weight were taken and BMI was calculated. Body image perception was self-assessed based on a silhouette matching technique. Nine male and nine female figures with increasing body weight were shown to the students. They then chose which figure best represented how they currently looked, how they ideally wanted to look, and how the ideal opposite sex would look. On average, females thought they looked larger than they actually were, and 81% said they would

have liked to have a significantly thinner figure compared to the 38.4% of males who responded. Only 13% of females were satisfied with their body size and shape, compared to 33.3% in males. Men were more likely to say they wanted to be more robust (28.3%) compared to females (6%). Males were more physically active than females (6.7 ± 4.2 hours/week vs. 4.2 ± 3.8 hours/week; $p < 0.0001$). Both males and females who engaged in less physical activity had higher body dissatisfaction.

Korn and colleagues[12] looked at health perceptions, body image, physical exercise, and nutrition among undergraduate students (n=1500) in Israel. A self-administered 21-item questionnaire was used in this observational study. This questionnaire included four items about health perceptions, four items about self-image, four items about body image, one item about physical activity, and eight items on nutrition. 47.2% of females did not engage in any physical activity, compared to only 27.8% of males. Males were also more likely to perceive their physical condition in a more positive manner, and were more pleased with how they looked. Engagement in physical exercise contributed to positive body image and positive health perceptions.

1.5 Body Image in Eating Disordered Patients

Bratland-Sanda and colleagues[13] examined drive for muscularity and physical activity in adolescents (n=722, aged 12-18 years, 405 males, 367 females). Participants were required to fill out a questionnaire containing the Drive for Muscularity Scale, Eating Disorders Inventory subscale Drive for Thinness, Body Dissatisfaction and Bulimia, and questions about motives for physical activity. Height and weight were self-reported and the respondents were classified as underweight, normal weight, or

overweight using BMI. If the male's BMI was less than 15.1 (12-14 yrs old), 16.8 (15-16 yrs old), or 18 (17-18 yrs old), they were considered underweight. For females, the cut-off for underweight status was 15.1 (12-14 yrs old), 16.5 (15-16 yrs old), or 17.4 (17-18 yrs old). Eating Disorders Inventory Subscale Drive for Thinness and Body Dissatisfaction and Bulimia were both used to determine respondents with symptoms of eating disorders. Higher scores on these scales indicate higher levels of symptoms. There was a higher frequency of underweight females (6%) compared to males (3%). Females with eating disorders had a lower Drive for Muscularity than males with eating disorders, which resulted in less physical activity.

Thornborg and colleagues[14] rated body awareness in 87 people (84 women, 3 men; ages 17-53 yrs, mean 24.3 yrs) suffering from diagnosed eating disorders, 26 with anorexia nervosa, 20 with bulimia nervosa, and 41 with not specified eating disorders. They compared two scales: the Body Awareness Scale and the Interview Scale Body Ego. The two scales are used together to create six subscales. Five of these subscales are used to describe the person's relationship to his or her own body and are labeled: grounding, mid-line, centering, breathing, and flow. The last subscale is labeled relations and is used to describe the patient's relationship to other people and their environment. Each subscale is scored from 0 to 6, with 0 being healthy, and 6 being a pattern of malfunction. Body awareness and self-awareness were reduced in eating disorder patients compared to the control. Those with eating disorders had a mean score of 2.1, while the healthy control had a mean score of 1.5. In all subscales, the eating disorder patients ranked higher than the healthy control. Based on the findings from this study, body

awareness therapy may help people with eating disorders to establish a realistic body image.

1.6 Accelerometers and Physical Activity

Aubrianne and colleagues[15] sought associations between lifestyle physical activity and body image among 120 females who were between 18-23 years old. Subjects wore accelerometers for one week and filled out the 69-item Multidimensional Body-Self Relations Questionnaire. This survey includes ten subscales: five for physical appearance, two for physical abilities, and three for biological integrity. Each subscale ranged from one to five and mean scores were calculated for each one. Higher scores reflected positive feelings about body image and lower scores reflected negative feelings. Females who spent more time in MVPA scored higher on physical ability as measured by the Fitness Orientation subscale. They also found that females spending more time in vigorous physical activity (VPA) tended to score higher on biological integrity, as measured by the Health Orientation subscale. The authors suggested that females who were physically active were more invested in their fitness, health and well-being than females who were not as physically active.

Sorenson and colleagues[16] assessed physical activity in 9- to 10-year old children participating in the pilot of the family-centered intervention project iCook. There were 48 children from five different states who wore accelerometers for seven days at pre- and post- intervention (four months later). Intervention included a 6-week educational program designed to improve culinary skills, physical activity, and family mealtime and play time interaction. While 37% of the children met guidelines of at least 60 minutes of

MVPA at pre-intervention and 47% at post-intervention, the children were not significantly more physically active after the intervention.

Downs and colleagues[17] compared accelerometer-measured physical activity against self-reported physical activity in college students (n=77, mean age of 18.6 yrs, 48.6% female, 79.2% Caucasian). Participants wore accelerometers for two weeks to assess actual physical activity levels and completed a validated self-report on physical activity, measures of physical activity, and benefits/barriers to exercise. Students' self-reports of time-spent doing MVPA were significantly higher than that measured through accelerometers. The authors stated the implications were self-reported physical activity may not be an accurate representation and, what may be of more concern, was college students could be even less active than previously reported.

Summary

Overall, researchers seemed to report similar findings when looking at body image and physical activity. Females were much more likely to be dissatisfied with their current body when compared to males.[9-12] Males were also more likely to engage in higher amounts of physical activity than females. As a result, those who spend more time doing physical activity are more likely to have body satisfaction.[10-12] Establishing a realistic idea of one's body is important for people who have a poor body image in order to help them gain or lose weight. The amount of exercise a person thinks they accomplish may also be unrealistic and inaccurate. Self-reported physical activity has been shown to not be an accurate representation of physical activity, and wearing an accelerometer is preferred.[17]

1.7 Study Rationale

College students are at high risk of unwanted weight gain and associated body image issues that can inhibit healthful lifestyle choices.[7] A healthful lifestyle, which includes being physically activity, can help students succeed in everyday life. The focus of the current study was to observe the self-selected body size figures for oneself, the self-selected body size figures for a healthy, overweight and obese figure, and the relationship between body size figure and physical activity in a small sample of college students so that interventions can be fashioned to assist students to become more involved in exercise and be healthy through physical activity.

Chapter 2

Methodology

2.1 Goal and Objectives

The goal of this study was to observe self-selected body size figures and the relationship of selected body size to physical activity in young adult college students. Associations among gender and anthropometrics were observed. Accelerometer data were compared to self-reported physical activity to see how accurately participants can assess their own amount of physical activity.

2.2 Study Design

This honor's thesis was a cross-sectional, observational study design, which included sophomores recruited to participate as part of a large multistate 2-year study, Get Fruved. Only selected data from the University of Maine 2015 spring study were used for this project. Assessments included measured and self-reported physical activity and self-selected body size figures. The Institutional Review Board for the Protection of Human Subjects approved the study.

2.3 Participants

The participants in this study were traditional sophomores (n=34) between the ages of 18-24 years.

2.4 Recruitment and Eligibility

Student researchers recruited students by handing out flyers with study and contact information in places common to sophomores, such as dining facilities, and attending university-sanctioned events such as sports games. The recruitment script and flyers can be found in Appendix A. Students were recruited for a 2-year study with five assessment times, spring and fall 2015, spring and fall 2016, and spring 2017. Screening eligibility included being at least 18 years old, and a first year or sophomore who planned to be at the university through spring of 2017; no more than 60% of either gender could participate in an effort to have a fairly equal gender mix. Screening occurred when a student was given the flyer to ensure first year or sophomore status, and again before they were contacted by email. Eligible students received a notification email to sign up for two-hour assessment times. This email can be found in Appendix B.

2.5 Research Protocol

All students came to the Lynch Clinical Nutrition Laboratory in Hitchner Hall where they signed the consent form (Appendix C) to be study participants. Anthropometric measurements were taken, including height, weight, neck circumference, hip circumference, waist circumference, and blood pressure. Only height and weight were used for the current study. The protocol on how to perform and document measurements can be review in Appendix D. All measurements were recorded on the Data Collection Form and all measurements were taken twice to ensure accuracy. This form assured the participant had completed the consent, documenting all anthropometric data, the accelerometer serial number, and any areas of concern/error or comments. The form also included a drop out date (if applicable) and student contact information. The student then

filled out an online survey described below. Online survey questions used for this study can be review in Appendix E. Snacks and water were offered. After the survey was taken, the participants were fitted with accelerometers to measure physical activity that they wore for seven days and then returned.

2.6 Compensation

During baseline measurements in spring 2015, the participants were compensated $25 for completing the survey ($10) and physical measurements ($15). They were aware that if they completed four more assessments over the next two years, they would receive an additional $220. Complete compensation information can be seen in the consent form in Appendix C.

2.7 Instruments and Data Collection

The following instruments were administered online at baseline. Copies of the instruments are in the Appendixes as stated below. These instruments took about 10 minutes, but they were part of the larger survey that took about an hour to complete.

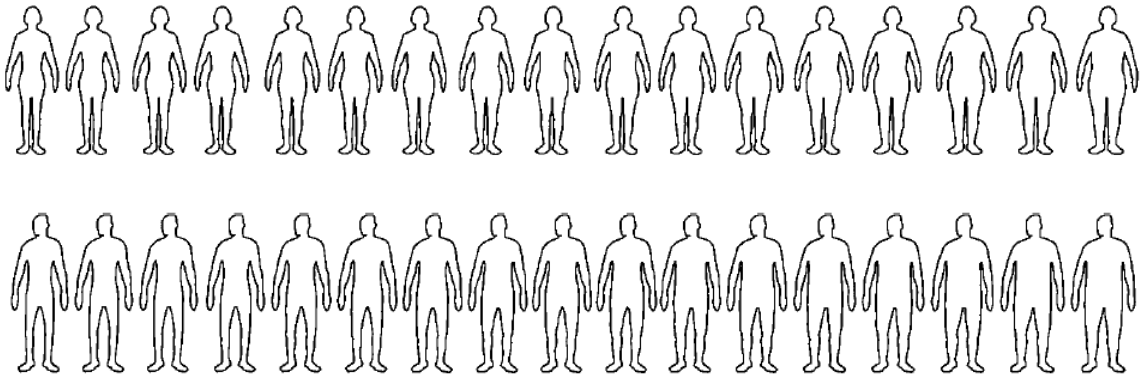
International Physical Activity Questionnaire (IPAQ) (Appendix E)

The short version of the IPAQ is a 7-item instrument used to measure physical activity. This questionnaire was developed by an International Consensus Group between 1997 and 1998 and was tested for reliability (α=.8) and validity in 12 countries during 2000[18].

Body Image Assessment Scale-Body Dimensions (BIAS-BD) Instrument (Appendix F)

The BIAS-BD Instrument was developed by Gardner et al[19] and was tested for reliability (α=.76) and validity on 207 undergraduates in 2009. A 2-item scale consisting of 17 male contour-line figures and 17 female contour-line figures is used to measure one's perceived body size, ideal size, and body dissatisfaction (Figure 2.1). Each figure is drawn to reflect known anthropometric body dimensions. The body images reflect sizes ranging from 60% below average to 140% above average for the American population, and each figure is 5% above or below its adjacent figure. The scores for body size and ideal size are the percentage score of the selected figure, converted to BMI scores based on well-established national norms for the general population. The conversions from the body size scale to the BMI are in Table 2.2.

Figure 2.1 Contour-line figures for Body Image Assessment Scale-Body Dimensions[1]



[1]Gardner RM, Jappe LM, Gardner L[19]

Figure 2.2 Corresponding Body Mass Index[1] to the Body Image Assessment Scale-Body Dimensions[1]

Size	Male	Female	
60%	16.7	16.9	
65%	18.0	18.3	
70%	19.5	19.7	
75%	20.9	21.2	
80%	22.2	22.6	
85%	23.6	24.0	
90%	25.0	25.4	
95%	26.4	26.8	
100%	27.8	28.2	Average U.S. adult
105%	29.2	29.6	
110%	30.6	31.0	
115%	32.0	32.4	
120%	33.4	33.8	
125%	34.8	35.3	
130%	36.1	36.7	
135%	37.5	38.1	
140%	38.9	39.5	

[1]Gardner RM, Jappe LM, Gardner L[19]

Demographics Questions (Appendix G)

The demographics instrument contains 15-items, consisting of questions about age, gender, race, housing situation, relationship status, work hours, GPA, scholarships and financial aid, athletics, and vegetarianism.

Activity Level: Accelerometers (Appendix H)

The accelerometer used in this study was the ActiGraph GT3XE, a monitor with a solid-state triaxial accelerometer to collect motion data on three axes for increased analytic capabilities. It was worn around the waist on an elastic belt for 24 hours a day (except during bathing and swimming) for seven consecutive days to measure activity levels. With each accelerometer, directions and an activity log were provided to ensure

proper use and logging if the participant took the device off.[20] After wear time, accelerometer data were downloaded and integrated into 10-second epochs. Compliance standards required the subjects wear the accelerometer for at least three valid week days and one valid weekend day. A day was considered valid if the subject wore it for a minimum of 18 hours during waking hours. Non-wear time was defined as at least 60 consecutive minutes of zero activity counts.[16]

The Actigraph GT3X contains an integrated ambient light sensor that supplies valuable information on the subject environment. The GT3x is also equipped with an inclinometer to determine the participant's position and identify periods when the device has been removed. Vigorous activity (VPA), moderate activity (MPA), light activity (LPA), and sedentary time (ST) were computed.

Physical Assessments: Height and weight (Appendix D)

Standardized protocols for conducting physical assessments were developed by the principal investigator of the Get Fruved multistate study. Protocols were included in a manual and accompanying DVD. This researcher was trained on the protocols and conducted physical assessments for the study. The Data Collection Form (Appendix D) was used to collect data before it was transferred to an online data system. The following assessments were taken:

Body Weight

Weight was measured to the nearest 0.1 kg using calibrated digital scales. It was measured twice and retaken if the two measurements were not within 0.2 kg, and the results were averaged. Weight was measured in light clothing without shoes or socks.

Height Measurement

Height was measured without shoes and socks and to the nearest 0.1 cm using a stadiometer. Subjects were asked to stand touching the stadiometer at four points: heels, buttocks, shoulder blades, and back of head. The slide of the stadiometer was to rest firmly, not pressing on the head, so hair was to be loose. Subjects were asked to breathe in and out as the measurement was taken and look straight ahead. Two measurements were taken and averaged, and a third measurement was required if there was more than 0.2 cm difference in the two measurements.

Body Mass Index

Height and weight were entered into the online data management system and body mass index (BMI) was automatically calculated.

2.8 Student Research Training

Physical assessment protocols, training videos, and Inter-rater Reliability (IRR) training documents were used to train all researchers (Appendix I). IRR is the degree of agreement among the different student researchers. After training, researchers participated in completed assessments on five volunteer students and physical measurements were tested for homogeneity among the different researchers. Based on Pearson correlation, 0.80 agreement was needed between the student researcher and the expert, a doctoral student. Retraining was needed until the specified agreement was met. IRR training was required for all student researchers and was completed in April 2015 before assessments were conducted. This researcher was also trained on how to initialize

and put accelerometers on each participant. Protocol for how to initialize accelerometers can be found in Appendix J.

2.9 Data Analysis

Statistics were generated at the University of Maine with help from Jonathan Moyer using the R program (version 3.2.3). R is a free software environment for statistical computing and graphics. Complimentary packages were used in conjunction with R including dpylr (a grammar of data manipulation), ggplot2 (graphics for data analysis), tidyr (tidies data with spread and gather functions), RStudio (integrated development for R), pander (an R pandoc writer), and gridExtra (miscellaneous functions for "grid" graphics).

Accelerometer data were downloaded and integrated by Emily Huber, a graduate student under Dr. Jessica Meendering, study consultant for research using accelerometers at the University of South Dakota. Mean daily minutes of accelerometer derived sedentary time and physical activity were evaluated for each subject's waking hours. Data were then presented as mean (standard deviation) and median. Differences between accelerometer data, IPAQ, BIAS-BD, and demographic data were then examined through statistical analysis.

Statistical tests included descriptive linear regression to test for association between variables, and Fisher's exact test to test for significance of associations when the sample is small (Table 3.4). Scatterplots were made to show the relationships. Outliers were removed for the analysis. Statistical significance was set at $P \leq 0.05$.

Chapter 3

Results

3.1 Sample Characteristics

The sample's characteristics are presented in Table 3.1 below. Of the University of Maine students (n=34), 11 (32%) were male and 23 (68%) were female. All were between 18 and 22 years old and were either in their first year or second year of college. The majority lived on campus (n=22, 65%), were in-state students (n=22, 65%), and were not student-athletes (n=25; 74%). Over half of the participants worked (n=19, 56%), were in committed relationships (n=20, 61%), had scholarships to attend school (n=21, 62%), and had not received Pell grants (n=19 ,63%).

3.2 Physical Activity

Of the 34 participants, 24 (71%) had accelerometer data that were useable. Males were more likely to have useable accelerometer data with 9 of the 11 males having complete data (82%), compared to only 15 of the 23 females (65%) having complete data. Within Table 3.3 is the amount of sedentary time and the different levels of physical activity derived from accelerometer-generated data, reported in mean minutes over an 18-hour period per day. Most mean minutes of time during the assessed period were spent in sedentary time (ST) (mean=816.8 min/18 hrs). Out of the 18-hour recording period, 13 hours was spent in sedentary time. The most amount of time spent moving was light physical activity (LPA) (mean=213.8 min/18 hrs; ~3.5 hr.). The mean amount of

moderate-vigorous physical activity (MVPA) was 50.38-min/18 hrs, and of that time, only 7.3 mean min/18 hrs was vigorous physical activity (VPA). Compared to the

Table 3.1 Participant Demographics[1] (n=34)

Demographic Category	Number of participants	Total/Percentage (%)
Gender		
➢ Male	11	32%
➢ Female	23	68%
Age		
➢ ≤20 years old	18	55%
➢ >20 years old	15	45%
Year in College		
➢ Freshman	14	41%
➢ Sophomore	20	59%
Living Arrangement		
➢ On Campus	22	65%
➢ Off Campus	12	35%
Relationship Status		
➢ Committed	20	61%
➢ Single	13	39%
Work Hours		
➢ 1-9 hours/wk.	8	23%
➢ 10-19 hours/wk.	7	21%
➢ 10-29 hours/wk.	4	12%
➢ Don't work	15	44%
GPA		
➢ <3.5 GPA	19	56%
➢ ≥3.5 GPA	15	44%
Athlete		
➢ Non-athlete	25	74%
➢ Student athlete	9	26%
Scholarship		
➢ No scholarship	11	32%
➢ Yes scholarship	21	62%
Pell Grant		
➢ No Pell grant	19	63%
➢ Yes Pell grant	11	37%
Resident Status		
➢ In state	22	65%
➢ Not in state	12	35%

[1]Taken from demographics survey (appendix G)

American Physical Activity Guidelines,[21] only 12% of the participants met the guidelines for VPA, but 83% reached the MVPA guidelines (table 3.4). When actual BMI (computed from anthropometric measurements) was compared to the figure the participant's self-selected as representing their own body size in the BIAS-BD scale (corresponding BMIs seen in figure 2.2), the majority of both females and males accurately picked the figure that reflected their actual BMI (60.9%, 63.6% respectively). However, if female and male participants did not accurately describe their BMI, they were more likely to overestimate (34.8%, 27.3% respectively) their BMI rather than underestimate (table 3.2).

Table 3.2 Categorization of Males and Females by Actual Body Mass Indices (BMIs) and BMIs Corresponding to Self-Selected Current Body Size[1]

	Correct[2]	**Overestimated**	**Underestimated**	**Total**
Female				
Number	14	8	1	23
Percentage	60.9%	34.8%	4.3%	100%
Male				
Number	7	3	1	11
Percentage	63.6%	27.3%	9.1%	100%
Total	21	11	2	34

[1]Fisher's exact test performed for differences between males and females (P=0.58). No difference between genders.
[2]Participants who accurately selected body figure with corresponding BMI consistent with their actual BMI.

Table 3.3 Accelerometer-Derived[1] Mean±SD Sedentary Time and Physical Activity of Participants

Total Time Minutes/18 hrs[2,3]	
Sedentary Activity	
Mean ± SD	816.8 ±76.6
Median	822.6
Level of Physical Activity	
Light Physical Activity	
Mean ± SD	213.8 ± 59.6
Median	204.6
Moderate Physical Activity	
Mean ± SD	43.05 ± 21.4
Median	40.8
Vigorous Physical Activity	
Mean ± SD	7.3 ± 15.0
Median	2.4
Moderate-to-Vigorous Physical Activity	
Mean ± SD	50.4 ± 28.6
Median	44.9

[1]n=24 participants with usable accelerometer data
[2]Based on 3-day mean of 18hrs/day activity
[3]Days and time of total physical activity per week measured by accelerometer

Table 3.4 Percent of Participants (n=24) Meeting American Physical Activity Guidelines[1,2]

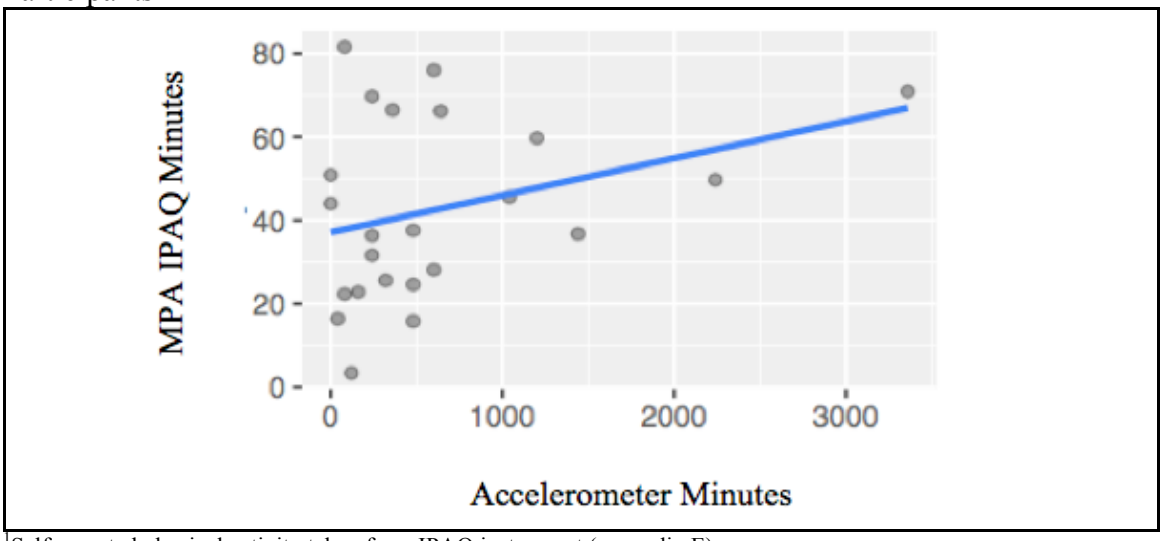
Guideline	Number of participants	Percentage (%)
Meet VPA Guideline		
➢ Yes	3	12%
➢ No	21	88%
Meet MVPA Guideline		
➢ Yes	20	83%
➢ No	4	17%

[1]http://health.gov/paguidelines/guidelines/adults.aspx[21]
[2]Based on 3-day mean of 18hrs/day activity computed from accelerometer data (n=24)

In addition to using the accelerometer data, IPAQ data were also used to see if self-reported physical activity was consistent with actual physical activity. When self-reported moderate physical activity was compared to the measured moderate physical activity,

there was not a significant relationship between reported and measured physical activity (MPA, p=0.13). For this sample, participants were not able to self-report their physical activity accurately when compared to the measured physical activity by the accelerometer (figure 3.1).

Figure 3.1 Self-reported[1] vs. Measured[2] Moderate Physical Activity (MPA) in Participants[3]



[1]Self-reported physical activity taken from IPAQ instrument (appendix E)
[2]Measured physical activity taken from accelerometer data (appendix H)
[3]When self-reported moderate physical activity was compared to the measured moderate physical activity, there was not a significant relationship between reported and measured physical activity (MPA, p=0.13)

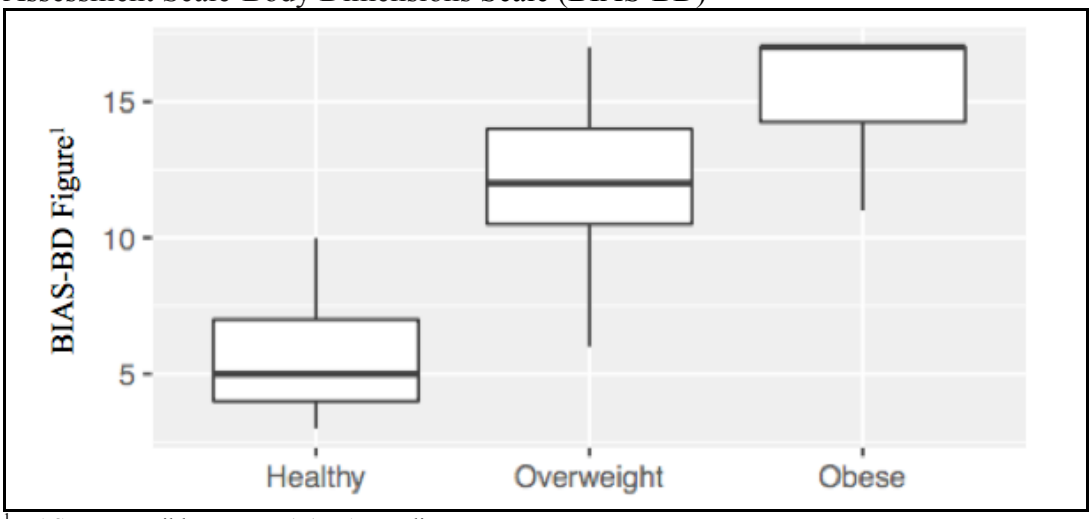
Those that were above the trend line underestimated their PA (40%, n=9), while those below the trend line overestimated their PA (60%, n=14).

3.3 Perceptions of Body Figures

The BIAS-BD selections for healthy, overweight, and obese body figure for each gender are seen below in Figure 3.2 and Figure 3.3. When comparing participants' self-selected body size (based on the BIAS-BD drawings) to the figure they selected as a healthy body figure, there were significant findings for the females. As self-selected

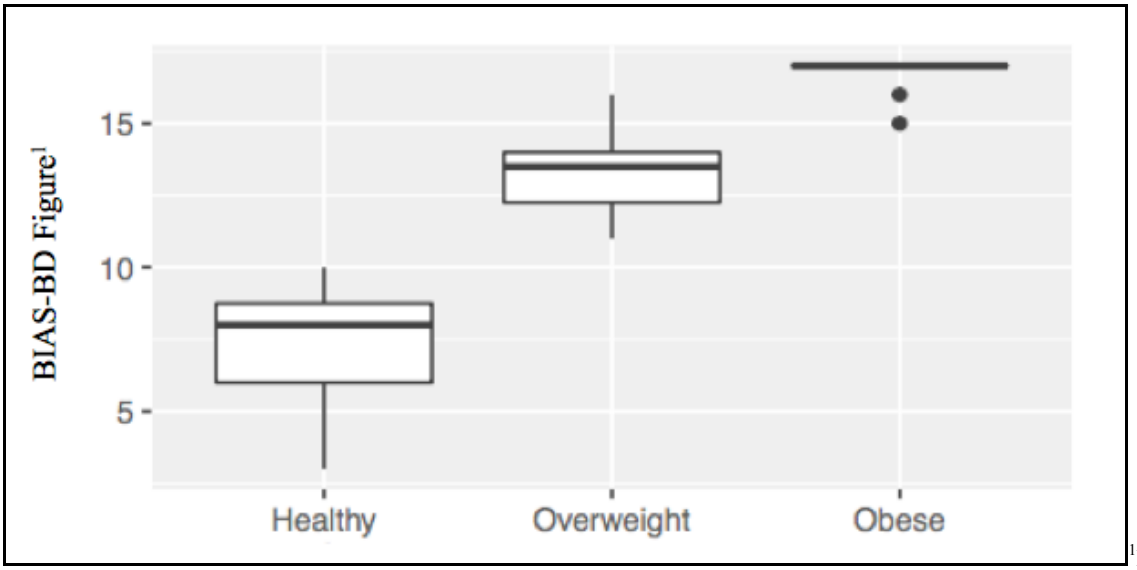
body figure increased, the body figure females selected as healthy increased (slope = 0.28, p=0.025) (Figure 3.4). When looking at males' self-selected body figure and body figures they selected as healthy, the trend was similar to that of the females but was not significant (slope = 0.32, p=0.059) (see Appendix K).

Figure 3.2 Selections for Healthy, Overweight, and Obese for Females on Body Image Assessment Scale-Body Dimensions Scale (BIAS-BD)[1,2]



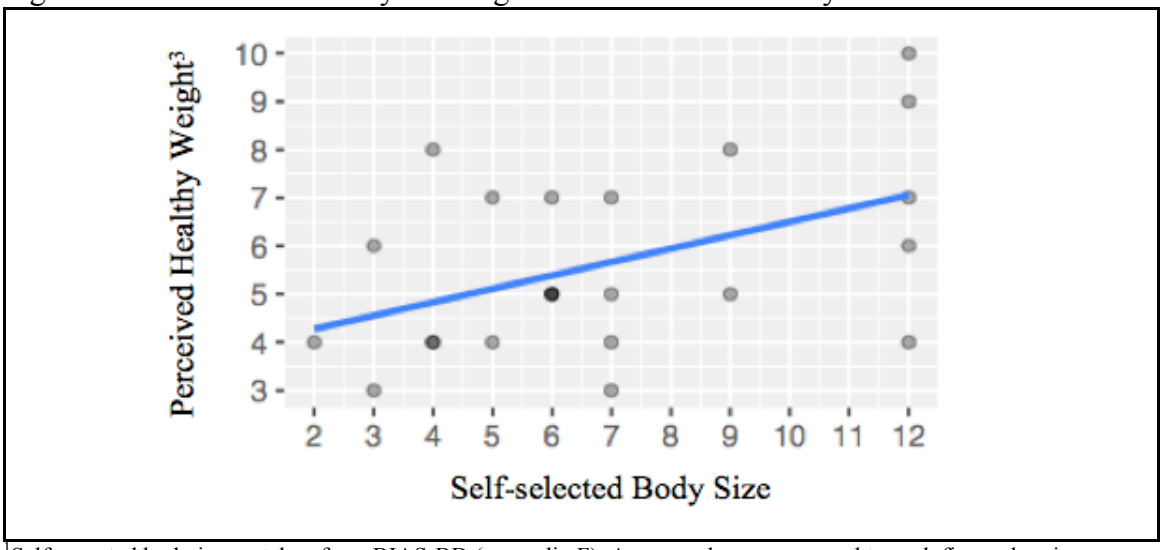
[1]BIAS-BD, possible answers 1-17, Appendix F.
[2]Actual healthy range is figures 3-6, actual overweight range is figures 7-10, and actual obese range is figures 11-17

Figure 3.3 Selections for Healthy, Overweight, and Obese for Males on BIAS-BD Scale[1,2]



[1]B
IAS-BD, possible answers 1-17, Appendix F.
[2]Actual healthy range is figures 3-6, actual overweight range is figures 7-10, and actual obese range is figures 11-17

Figure 3.4 Self-selected[1] Body Size Figure vs. Perceived Healthy[2] for Females[4]

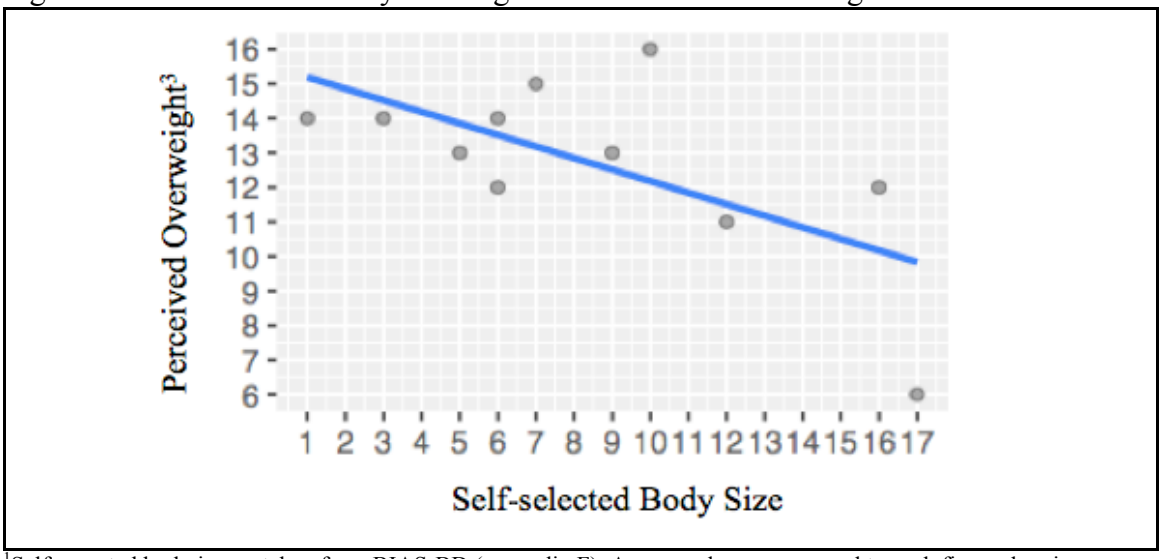


[1]Self-reported body image taken from BIAS-BD (appendix F). Axes numbers correspond to each figure drawing (possible numbers 1-17)
[2]Perceived healthy weight taken from BIAS-BD (appendix F) (possible numbers 1-17).
[3]Actual healthy range is figure numbers 3-6 (Appendix F).
[4]As self-selected body figure increased, the body figure females selected as healthy increased (slope = 0.28, p=0.025)

Different results were seen for perceptions related to overweight and obese images. For females there were no relationships between self-selected body size and the figures they selected as overweight and obese, however, for males there was. For both the overweight

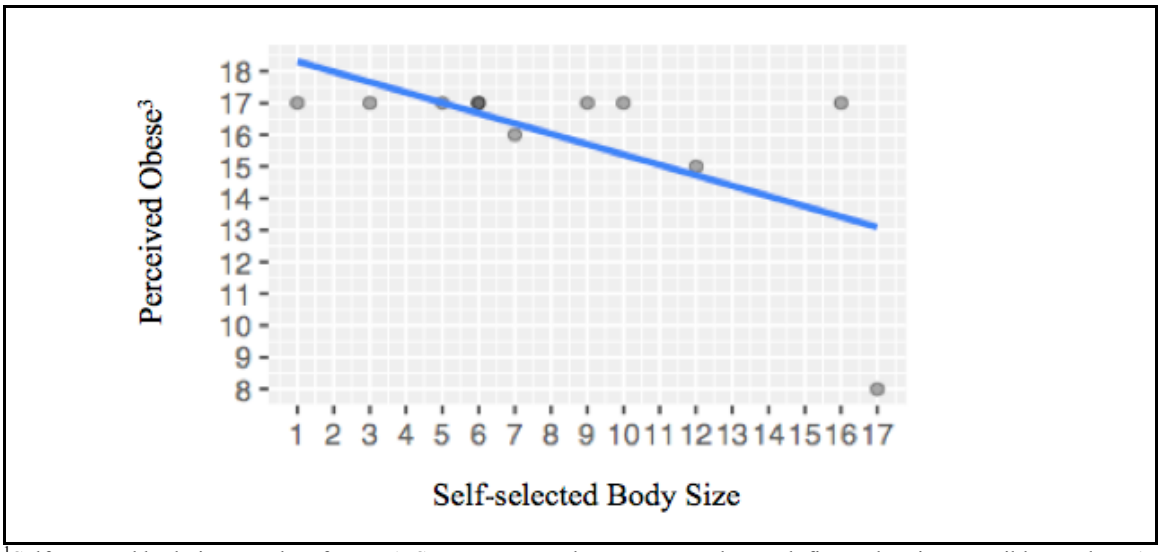
and obese selections, as self-selected body size increased, males' perceptions of the body figure for an overweight person (slope = -0.33, P=0.034) (figure 3.6) and an obese person (slope = -0.33; P=0.045) (figure 3.7) decreased. There was an outlier, which when removed, no association was evident. With a larger sample size, the original association might be confirmed (see appendix K).

Figure 3.6 Self-selected[1] Body Size Figure vs. Perceived Overweight[2] for Males[4]



[1]Self-reported body image taken from BIAS-BD (appendix F). Axes numbers correspond to each figure drawing (possible numbers 1-17)
[2]Perceived overweight taken is from BIAS-BD (appendix F) (possible numbers 1-17).
[3]Actual overweight range is figure numbers 7-10 (Appendix F).
[4] As self-selected body size increased, males' perceptions of the body figure for an overweight person decreased (slope = -0.33, P=0.034)

Figure 3.7 Self-selected[1] Body Size Figure vs. Perceived Obese[2] for Males[4]



[1]Self-reported body image taken from BAIS-BD; axes numbers correspond to each figure drawing; possible numbers 1-17 (Appendix F)
[2]Perceived obese taken from BAIS-BD (Appendix F).
[3]Actual obese range is figure numbers 11-17 (Appendix F).
[4]As self-selected body size increased, males' perception of the body figure for an obese person decreases (slope = -0.33; P=0.045)

3.4 Body Size Figure and Physical Activity

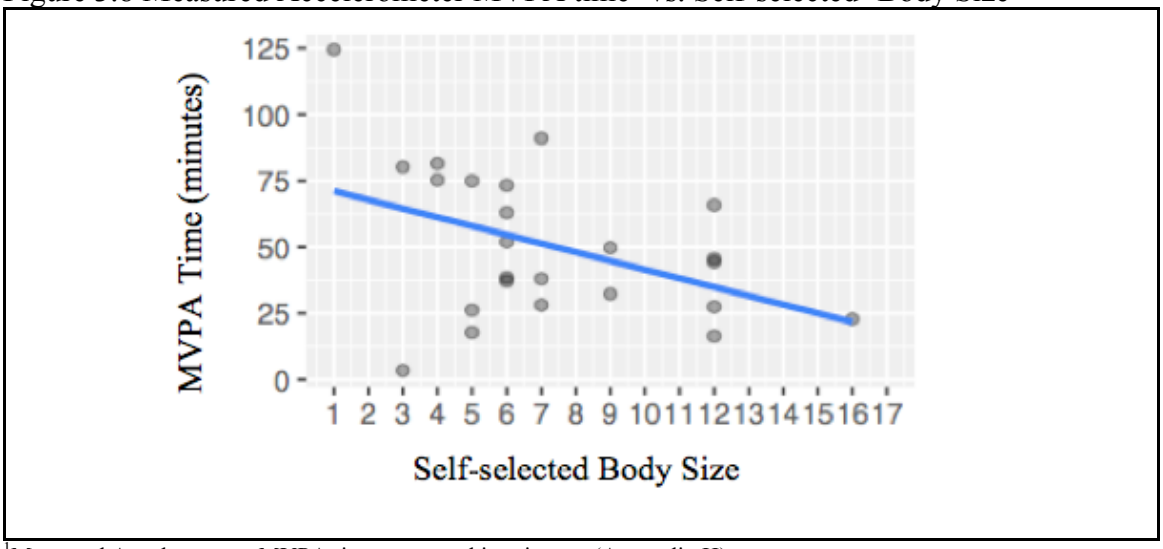
When accelerometer-derived physical activity levels were compared to self-selected body size, there was a significant relationship between MVPA and self-selected current body size. As the self-selected body size increased, the amount of time doing MVPA decreased (slope = -3.295, p=0.04) (Figure 3.8).

3.5 Body Size Figure and Demographics

When comparing selected demographic characteristics to self-selected current body size, there was a significant relationship. Participants whose perception of a healthy body size image increased as their perception of their own body size increased were more likely to be a non-athlete (p=0.008), live on campus (p=0.008), work at least 1 hour/week

(p=0.01), have a GPA of less than 3.5 (p=0.01), have a scholarship to attend school (p=0.01), and be in a committed relationship (p=0.03). Those participants whose perception of overweight or obese body size decreased as their perception of their own body size increased were more likely to have GPAs of 3.5 or higher (p=0.04 and p=0.002, respectively).

Figure 3.8 Measured Accelerometer MVPA time[1] vs. Self-selected[2] Body Size[3]



[1]Measured Accelerometer MVPA time measured in minutes. (Appendix H)
[2]Self-selected body size from BIAS-BD (appendix F); axes numbers correspond to each figure drawing (possible numbers 1-17)
[3]As the self-selected body size increased, the amount of time doing MVPA decreased (slope = -3.295, p=0.04)

Chapter 4

Discussion

4.1 Body Figures, BMI, and Physical Activity

The goal of this study was to investigate the relationship between physical activity and self-reported body size figure among young adult college students. Association and differences among gender and anthropometrics were also studied. The majority of the data were collected through the survey, which included the IPAQ, BIAS-BD, and demographics. The rest was collected through the ActiGraph GT3XE accelerometer and anthropometric measurements. Of the 34 participants, 24 (71%) were compliant in wearing the accelerometers so that a 3-day mean could be generated for analyses; more males (82%) than females (65%) were compliant in wearing the accelerometers.

Despite the small sample size, many of the findings were similar to those done with larger sample sizes.[10,11,13,14,17] Self-reported physical activity did not correlate with physical activity measured with accelerometers (P=0.13). Downs and colleagues[17] found similar findings, as self-reported moderate to vigorous physical activity (MVPA) was significantly higher than physical activity measured through accelerometers. While the IPAQ has been reported to have good reliability (α=.8) and has been validated in 12 countries,[18] there appears to be reason for caution when relying solely on the IPAQ to determine physical activity levels. In fact, following a systematic review of the literature, Lee and colleagues[22] reported a correlation between the short form of the IPAQ (as was used in the current study) and objective measures of physical activity was lower than the acceptable standard. Quick and colleagues[23] also found that the reported short form of IPAQ did not correlate with the long version of IPAQ, which used weighted exercise

intensity and days/week. In this study, when comparing the long and short IPAQ versions a higher percent of participants (43%) had low levels of physical activity using the long version in comparison to the short version (2.7%). Accelerometers or the long version of the IPAQ are more accurate methods for measuring physical activity and should be used if budget allows.

Current findings about males' versus females' self-selected body size figures and physical activity were also consistent with previous reports about the relationship between body image and physical activity. Kopcakova et al[10] found that poor body image could be a barrier for physical activity and males were more likely to participate in more physical activity and have a healthier body image than females. Zaccagni et al[11] found that females were more likely to think they looked larger than they actually did compared to males (81% vs. 38.4%, respectively). Males have actually been more likely to want bigger figures.[11,13,14] Based on current results, as accelerometer-measured MVPA decreased, self-selected body figures increased, which is an indication that higher perceived body size is a barrier for higher levels of physical activity.

In addition, a slightly lower percent of females accurately selected body figures consistent with their BMIs (60.9%) when compared to males (63.6%). Also, the percent of females overestimating their BMIs was higher than for males (34.8% vs. 27.3%, respectively). The concern is that misperceptions in accurately depicting ones' own body size has been linked to the development of eating disorders.[13,14] Those who accurately selected body size figures consistent with their BMIs, which was the majority of the current sample, show they had an accurate depiction of themselves and, therefore, were likely to have a healthy body image.

Finally, when comparing participants' self-selected body size (from the BAIS-BD drawing) to the figure they selected as healthy, overweight, or obese, there was only a relationship in the selections made by the females. Although each figure in the BIAS-BD corresponded to a certain BMI, the person taking the survey was not thinking about personal BMI. Instead they were asked to pick the figure or size that best described what they looked like and what a healthy person, overweight person and obese person looked like. As self-reported body size figure increased for females, selection of a healthy body figure size increased. The implication is that as females' BMIs increase, their perception of the body size of a healthy person gets larger. Conversely, as the males' BMIs increased, their depiction of what an overweight or obese person looked like got smaller. Though the current sample was too small to make generalizations, there is the suggestion that perception is not reality when considering body size figures for healthy, overweight, and obese persons and we may change what we think others look like to satisfy our own opinion of what we ourselves look like.

Eliminating barriers to physical activity can be very difficult with societal pressures for thinness and discrimination against the obese. Messages as to what an ideal person should look like are seen everywhere, both online and in print, and can be a barrier to being physically active for those with a poor body image.[5] Along with poor body image come depression, anxiety, and poor concentration, which can lead to even less motivation to take care of oneself.[6]

4.2 Sources for change

While there were similarities with the current study and other studies,[10,11,13,14,17] limitations of the current study should be addressed. For optimal data, the sample size could have been larger, as previously mentioned to confirm the findings and increase the likelihood of being able to generalize the findings. In addition, the figure drawings from the BIAS-BD scale were very close in size and lacked details, which may have led to misinterpretation of what a healthy, overweight, or obese person looked like. However, the majority of participants did accurately select which figure looked like them. In the future, it is anticipated that the Get Fruved principal investigators will use a different instrument going forward.

4.3 Conclusion

In conclusion, the findings from the current study were educational. Firstly, self-reported IPAQ data was not consistent with measured accelerometer data. Secondly, as the participants self-selected body size increased, their perception of what a healthy body size looked like increased for females and there was a trend to see the same in males. Inversely, as the males' self-selected body sizes increased, their perception of what an overweight or obese person decreased. The data were not significant when comparing self-selected body size and what an overweight or obese person looked like for females. Thirdly, when accelerometer physical activity levels were compared to self-selected body size, there was a significant relationship between MVPA and self-selected current body size. As the self-selected body size increased, the amount of time doing MVPA decreased. This shows that increased self-selected body size could be a barrier to physical

activity. Lastly, participants whose perception of a healthy image increased as their perception of their own body size increased were more likely to be a non-athlete, live on campus, work at least 1 hour/week, have a GPA of less than 3.5, have a scholarship to attend school, and be in a committed relationship. Those participants whose perception of overweight or obese persons decreased as their perception of their own body size increased were more likely to have GPAs of 3.5 or higher. The findings in this study can be used by university wellness staff to remove barriers to physical activity and in creating programs to encourage college students to stay active and healthy.

Reference List

1. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. *Journal of the American Medical Association*. 2012;307(5):491–97.
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999–2010. *Journal of the American Medical Association*. 2012;307(5):483–90.
3. Centers for Disease Control and Prevention. Summary health statistics for U.S. adults: National Health Interview Survey, 2010. Hyattsville, MD: National Center for Health Statistics. Vital and Health Statistics 10(252); 2012.
4. Contento IR, Koch PA, Lee H, Sauberlie W, Calabrese-Barton A. Enhancing personal agency and competence in eating and moving: formative evaluation of a middle school curriculum- choice, control, and change. *J Nutr Educ Behav* 2007;39:S179-S186.
5. Schwartz MB, Brownell KD. Obesity and Body Image. *Body Image*. 2004:43-56.
6. *Body Image*; Planned Parenthood, 2014. Web.
7. Graham, MA, & Jones AL (2002). Freshman 15: Valid theory or harmful myth? *J Am Coll Health*, 50,171-173.
8. Nelson RK, Horowitz JF, Holleman RG, Swartz AM, Strath SJ, Kriska AM, Richardson CR. Daily physical activity predicts degree of insulin resistance: a cross-sectional observational study using the 2003-2004 national health and nutrition examination survey. *Int J Behav Nutr Phys Act*. 2013;10:10.
9. Gardner RM, Morrell JA, Watson DN, Sandoval SL. Eye movements and body size judgments in the obese. *Int J Eat Disorder*. 1990;9:5,537-544.
10. Kopcakova J, Veselska ZD, Geckova AM, Dijk JP, Reijneveld SA. Is being a boy and feeling fat a barrier for physical activity? The association between body image, gender and physical activity among adolescents. *Int J Environ Res Public Health*. 2014;11:11167-11176.
11. Zaccagni L, Masotti S, Donati R, Mazzoni G, Gualdi-Russo E. Body image and weight perceptions in relation to actual measurements by means of a new index and level of physical activity in Italian university students. *J Transl Med*. 2014;12:42.
12. Korn L, Gonen E, Shaked Y, Golan M. Health perceptions, self body image, physical activity and nutrition among undergraduate students in Israel. *Plos One*. 2013;10:1371.
13. Bratland-Sanda S, Sundgot-Borgen J. Symptoms of eating disorders, drive for muscularity and physical activity among Norwegian adolescents. *Eur Eat Disoders Rev*. 2012;20:287-293.

14. Thornborg U, Mattsson M. Rating body awareness in persons suffering from eating disorders: a cross sectional study. *Adv Physiotherapy*. 2010;12:24-34.
15. Aubrianne RE, Swartz AM, Klos LA. Associations between lifestyle physical activity and body image attitudes among women. *Women Health*. 2013;53:3,282-297.
16. Sorenson AR, Kattelmann KK, Meendering JR, Kabala CM. Mathews DR, Olfert MD, Colby SE, Franzen-Castle L, White AA. Assessment of physical activity in 9- to 10- year-old children participating in the family-centered intervention. *Top Clin Nutr*. 2015;00:00,1-8.
17. Downs A, Hoomissen JV, Lafrenz A, Julka DL. Accelerometer-measured versus self-reported physical activity in college students: implications for research and practice. *J Am Coll Health*. 2013;62:3.
18. Craig CL. the IPAQ Consensus Group, & the IPAQ Validity Reliability and Validity Study Group. International Physical Activity Questionnaire (IPAQ): 12-country reliability and validity. *Med Sci Sports Exerc* 2003;35:1381-1395.
19. Gardner RM, Jappe LM, Gardner L. Development and validation of a new figural drawing scale for body-image assessment: The BIAS-BD. *J Clin Psych*. 2009;65:113-122.
20. Valkova H, Qu L, Chmelik F. An analysis of the physical activity of special Olympic athletes with the use of an accelerometer. *J US-China Med Sci*. 2014;11:176-187.
21. American physical activity guidelines. Office of Disease Prevention and Health Promotion. Health.gov. March 2, 2016 Published. Web. March 9, 2016 Accessed.
22. Lee PH, Macfarlane DJ, Steward SM. Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. J Behav Nutr Physical Activity, 2011:8,115.
23. Quick V, Byrd-Bredbenner C, Shoff S, White AA, Lohse B, Horacek T, Kattlemann K, Phillips B, Hoerr S, Greene G. A streamlined, enhanced self-report physical activity measure for young adults. *Int J Health Promto Educ*. 2016:17;40.

Appendix A

Fruved: 32 Student Recruitment Script

"Hi! I am a student researcher working on a new USDA nutrition study aimed at improving college students' health and health promotion on college campuses. There are 8 campuses across the nation in the study, which lasts for 2 years. You will get paid up to $260 for being in the study. You must be a first year or sophomore student. You will be asked to complete online surveys and have some physical measurements taken including height, weight, and blood pressure. Assessments start in January 2015.
We need your help and believe it will be a benefit to your and other college students' future health! Please let me know if you are interested in more information. These flyers have the contact information."

Fruved NUTRITION STUDY

WHO First year and sophomore students at least 18 years of age.

WHAT Two year nutrition study about health behavior. You will be measured (height, weight, blood pressure) and do online surveys.

WHEN Assessments start January 2015.

WHERE On campus in Hitchner Hall.

EARN Earn up to $260 over the two year study.

If interested in more information, contact Dr. Adrienne White at awhite@maine.edu or Moira Burke at moira.burke@maine.edu.

This study has been approved by the Institutional Review Board (IRB) of the University of Maine.

Designed by Chelsea Rosenau of South Dakota State University

Appendix B

Subject Line: Let's Get FRUVED!

Dear XXX,

Congratulations! You are eligible to participate in University's research study, Get Fruved. Thank you for choosing to participate in this project and helping to improve the healthfulness of college campuses for future students.

You will receive your first stipend of $25 at the first assessment. Click the link below to view the dates and times available to schedule your two-hour time block for the assessment. Please sign up for a time space by the end of Month, Day, Year.

Please let me know if you have any questions.

Sincerely,

Assessment Coordinator
Control site Fruved email address

Appendix C

Consent Form for 35 Participants

PURPOSE OF STUDY

Thank you for your interest in the College Nutrition Study. **This research study is about college students' health-related behavior and the healthfulness of the campus environment.** There are eight universities that are part of this study: Dr. Adrienne White is the principal investigator here at the University of Maine and the other universities that are part of the study are Auburn University, Syracuse University, Kansas State University, South Dakota State University, University of Florida, University of Tennessee, and West Virginia University.

CAN I PARTICIPATE?

You are eligible to participate if you are:

- ✓ 18 years old or older
- ✓ a first year or sophomore student who plans to be at the University of Maine through Spring 2017

WHAT WILL I BE ASKED TO DO?

You will be asked to have physical measurements taken and complete online surveys over the next 3 years. There will be one assessment per semester, beginning in spring 2015. Also, they will be done in year 2 and year 3 of the study, in the fall and spring of each year.

- Measurements will include your height, weight, waist circumference, hip circumference, neck circumference and blood pressure. The measurements will take about 30 minutes to complete. We ask that you wear light clothing (preferably t-shirt and shorts or non-compression yoga pants). You will be asked to remove your shoes and socks and remove any items from your pockets. You will be measured in a private area by trained researchers. In addition you will be asked to wear a monitor, called an accelerometer, to measure physical activity over a seven-day period.
- A photograph of your face will be taken by a trained researcher for use with facial imagery software. Researchers are using these photographs to mathematically analyze face shape and are comparing face shape to height and weight, and neck, waist and hip circumferences. Researchers hope to determine if facial shape is an accurate indicator of body mass index (BMI).
- The surveys include questions about dietary intake, physical activity, sleep, stress, food security, green eating and demographics and will take about 45 minutes each time to complete. Example questions are the survey include:
    - In the last month, how often have you been upset because of something that happened unexpectedly?
    - I use the university's exercise facilities and equipment
    - I would describe my satisfaction with my family life as…
    - Each time you ate **fruit,** how much did you usually eat?
    - What is your current gender identity?

    - How often did you have a drink containing alcohol in the past year?
    - In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
- An additional online survey will be a food intake measure for the foods you eat in a 24-hr period for 3 different times in the 7 day period each time you wear the accelerometers.
- You will be asked to provide your University ID, name and email. The identifying information will be used to match the data you provide and to communication with you over the 3 year study.

BENEFIT

There may be no direct benefit to you, however, you may be benefited by the physical measurements taken twice each year and looking at your food intake over the 3 year study. Findings from this study may help researchers to understand **health-related behavior of students at the University of Maine and in** the future, lessons learned about what makes a university campus as healthy as possible can be applied within the university system.

COMPENSATION

In spring 2015 you will be compensated $25 for completing the survey ($10) and physical measurements ($15). In year 2, you will receive $40 for the fall 2015 assessment and $55 for the spring 2016 assessment for a total of $95. In the 3rd year, you will receive $65 in the fall of 2016 and $75 in the spring of 2017 for a total of $140. Basic information (your name and address, date of payment, value of payment, my name as researcher) will be given to a University office for tax reasons. For student employee of UMaine this information will be sent to the Human Resources Department. The value of the compensation may be added as wages and subject to taxation.

RISKS

Risks to participation are minimal, primarily related to your time, inconvenience, perhaps feeling uncomfortable during physical assessments or by some of the questions. You may contact the Counseling Center for any concerns (581-1392).

The data could be intercepted during the completion and transmission of the online surveys. This risk will be reduced by using an encrypted transmission for online surveys.

VOLUNTARY

Participation is voluntary. If you leave the study for any reason, you will not be eligible for the incentives described above.

CONFIDENTIALITY

All data collected will be held in confidence and stored securely.

- Hard copy data will be housed at each student's own university in researchers locked laboratories and uploaded onto a secure, password protected website maintained at the University of Tennessee. The website you will use for the survey is password protected for both the participants and researchers. The survey

will be stored in a database on the secured server maintained by the University of Tennessee.

- When data collection is complete, data will be removed from the server and transferred to disks and maintained at the University of Tennessee. To secure data and maintain confidentiality, an https encrypted website is being used for this study and data are encrypted when transmitted. Your confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.
- The de-identified data will be combined with de-identified data from a variety of university locations and will be available to a variety of researchers, potentially from many different locations, for other analyses on related topics for an indefinite period of time.
- When data are presented for scientific purposes, data will be reported in summary format, and no names or other identifiable information will be used.
- Identifiable information will be kept only by your own university and used for communication with you over the study period and to disperse incentives. It will be destroyed after 4 years.
- Facial photographs are identifiable and measures will be taken to protect your photographs. You will be asked to hold your participant photo ID while the photograph is taken. Your name and identifying data will not be attached to the photograph. The list with participant IDs and participant photo IDs will be associated with your name and will be kept locked in our laboratory at the University of Maine. Photos will be uploaded to a password protected software database (SmugMug), which is only accessible by trained researchers. The photographs will be destroyed within seven years at the end of the study by closing the account and deleting electronic files.

QUESTIONS

If you have any questions or concerns about what this study involves, please contact Dr. Adrienne White at awhite@maine.edu. Contact the human subjects' representative, Gayle Jones (gayle.jones@umit.maine.edu) if you have concerns about your rights as a research participant. This study has been approved by the Institutional Review Board (IRB) of the University of Maine.

Your signature below indicates that you have read, understand the above information, and that you agree that you will participate in the College Nutrition Study. You will receive a copy of this form for your records.

_____ _____

Printed Name Signature

_____

Date

Appendix D

Physical Assessment Procedures & Protocols:

General Study Procedures

- All scales must be calibrated prior to use and calibrated periodically during measurement.
- Each anthropometric measurement must be taken at least twice and recorded immediately (consider having a recorder available to facilitate this process and reduce errors).
- Each measurement must be entered into the online database. It is recommended that this be done either during or at the end of each day of measurement.
- An independent observer must verify that the data recorded on the Data Collection Form and the data recorded in the Excel database are the same. This observer should initial both copies, verifying that the data are correct. Corrections need to be noted under comments.
- Be mindful of the units of measurement used. For example, if the balance beam scale has both metric and English measures, assessors must be clear about which notch on the beam goes with which type of measure—metric should be used.
- All height and weight data must be reported in metric units: centimeters and kilograms, respectively. Waist, hip, and neck circumference will be recorded in centimeters.

Weight Assessment

Body weight is the most common anthropometric measurement used, and has the advantages that it is safe, non-invasive, and inexpensive. Weight measurement is easy to train to unskilled people, and weight reflects past changes and assesses growth and can be used to identify malnutrition.

Required Item(s) for Weight Assessment

- Balance beam (Figure 1) **or** digital scale (Figure 2)
- Standardized weights for calibration
- Stool or chair to allow participant to remove shoes and socks
- Extra t-shirts and shorts available, if needed
- Nearby restroom facilities

Figure 1. Balance Beam Scale

Figure 2. Digital Scale

Important Notes

- Due to natural weight fluctuations that occur during the day, it is desirable to weigh the participant at the same time of day (within 2 hours) for each assessment. Participants will be asked to have no more than a light meal in the three hours prior to the assessments.
- To measure weight accurately, scales should be recalibrated on a regular basis and each time a scale is moved to a different location. Please review your scale manual for proper calibration techniques or contact an appropriate representative.
- The current recommendations for taking weight are to have the participant facing away from the balance beam or digital readout to reduce panicking and moving their hands and body.
- Educate your staff about the importance of not commenting on the participant's weight and not responding if the participant does comment. Staff can say, for example, "thank you for helping us with this measurement."
- **Please ensure the same scale is used for all weight measurements.**

Weight Assessment Protocol

1. Zero the scale. Balance beam scales must be level prior to weighing the participant. The scale must be on a hard, flat surface, not on carpet.
2. Ask participants to empty their bladder prior to being weighed. This is required of all participants.
3. Ask participants to remove excess clothing, shoes, and socks prior to being weighed.
4. Ask the participant step up onto scale fully. Staff must make sure that both feet are completely on the scale (See Figure 3).

Figure 3. Feet placement on scale.

5. Ask the participant stand completely still with arms at sides and eyes looking straight ahead.

Figure 4. Beam scale balance

6. Adjust the movable weight on balance beam making sure that it is still and level. (See Figure 4; Skip to item 7 if a digital scale is being used.)
7. Record weight to the nearest 0.1 kg on the data collection sheet.
8. Repeat measurement. If there is > 0.2 kg difference between measurements, repeat until two measurements are within 0.2 kg. These two agreeing measurements will be the official measurements.
9. Record all measurements on the Data Collection Form. Be sure to cross out any unofficial measurements (i.e. those discarded due to excess disagreement).
10. Record the average of the two official measurements to two decimal places (e.g., 0.2 + 0.3 = 0.5/2=0.25).

Height Assessment

The measurement of height is also one of the most fundamental and easily obtained measurements. It is measured using a wall-mounted stadiometer, assuming the person is able to stand unassisted. If using a portable stadiometer, make sure that the "arm" of the instrument is firmly flat and parallel to the wall.

Required Item(s) for Height Assessment

- Wall-mounted or portable stadiometer
- Step stool or chair

Important Notes

1. Be sure that the stadiometer is located in a non-carpeted area.

2. For obese participants, it can sometimes be difficult to have four points of contact with the vertical backboard or wall (see Step 4 below). In this case, it is important to have as many contact points as possible (at least two), making sure the subject is looking straight ahead.

Height Assessment Protocol

1. Ask the participant to remove shoes.
2. Ask the participant to remove hair ornaments, buns, or barrettes that prevent the participant from placing his/her head against the back of the stadiometer.
3. Ask the participant to step completely under the slide of the stadiometer, making sure that the subject is centered with the stadiometer.
4. Ask the participant to stand as straight as possible with feet together and heels, buttock, shoulder blades, and back of head completely touching the wall (or as much as possible). This four-point contact will ensure that body weight is evenly distributed.
5. Be sure that the subject is looking straight ahead and that there is a horizontal plane from the bony socket of the eye to the notch above the projection of the ear (Frankfurt Plane; see Figure 5).

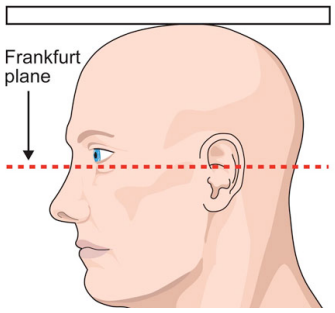


Figure 5. Frankfurt Plane.

6. Ask the participant to take a deep breath in and hold it to straighten the spine and standardize measurement.
7. When the subject inhales, move the height slide to rest lightly on top of the participant's head.
8. Fix the height slide in place and ask the participant to resume normal breathing.
9. Record height to the nearest 0.1 centimeter on the data collection sheet. Be sure to avoid parallax (angular distortion) by bending down, kneeling, or standing on a stool and reading the height value at eye level.
10. Repeat measurement. If there is > 0.2 centimeter difference between measurements, repeat until two measurements are within 0.2 centimeter. These two agreeing measurements will be the official measurements.
11. Record all measurements on the data collection sheet. Be sure to cross out any unofficial measurements (i.e. those discarded due to excess disagreement).
12. Record the average of the two official measurements to two decimal places (e.g., 0.2 + 0.3 = 0.5/2=0.25).

Waist Circumference

The measurements of waist and hip circumference are relatively simple, non-invasive techniques to measure distribution of body fat. Body fat distribution location is associated with risk of certain chronic diseases. The ratio of waist to hip circumference is a tool to assess risk.

Required Item(s) for Assessment of Waist Circumference:

- Stretch-resistant measuring tape.

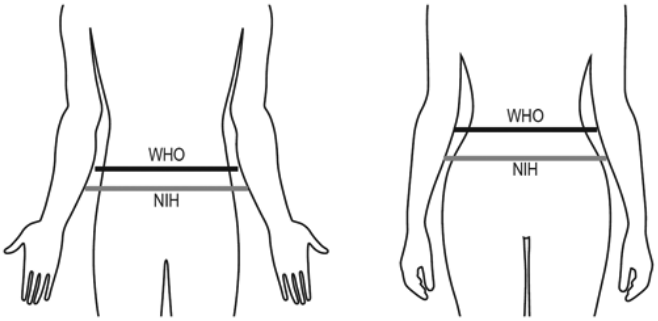
Important Notes:

- The measuring tape should be snug around the body, but not pulled so tight that it is constricting.

Waist Circumference Protocol

1. Ask subject to remove any bulky outerwear (jackets, coats, etc.).
2. Ask subject to stand with arms at sides and feet positioned close together with weight evenly distributed across the feet.
3. Ask the subject to relax and take a few deep, natural breaths before the actual measurement is made (to minimize the inward pull of the abdominal contents during the waist measurement).
4. Measure circumference at the end of normal expiration. The measurement should be measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest.

Figure 1
Waist circumference measurement sites for men and women based on World Health Organization (WHO) and National Institutes of Health (NIH) protocols



Note: Following the WHO protocol, the measure is taken midway between the highest point of the iliac crest and the bottom of the ribcage. Following the NIH protocol, the measure is taken at the highest point of the iliac crest.

5. Record the measurement to the nearest 0.1 cm on the data collection sheet.
6. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.
7. Record the average of the two official measurements to two decimal places.

Hip Circumference

The measurements of waist and hip circumference are relatively simple, non-invasive techniques to measure distribution of body fat. Body fat distribution location is associated with risk of certain chronic diseases. The ratio of waist to hip circumference is a tool to assess risk.

Required Item(s) for Assessment of Hip Circumference

- Stretch-resistant measuring tape.

Important Notes

- The measuring tape should be snug around the body, but not pulled so tight that it is constricting.

Hip Circumference Protocol

1. Ask subject to remove any bulky outerwear (jackets, coats, etc.).
2. Ask subject to stand with arms at sides and feet positioned close together with weight evenly distributed across the feet.
3. Ask the subject to relax and take a few deep, natural breaths before the actual measurement is made.
4. Measure circumference at the end of normal expiration. The measurement should be made at the largest circumference/widest portion of the buttocks. Keep the tape level to the floor.
5. Record the measurement to the nearest 0.1 cm on the data collection sheet.
6. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.
7. Record the average of the two official measurements to two decimal places.

Neck Circumference

A large neck circumference can be associated with obesity-related conditions, and therefore can help assess the risk of chronic conditions such as sleep apnea, diabetes, hypertension, etc. The measurement is non-invasive and can be done quickly by trained researchers.

Required Item(s) for Assessment of Neck Circumference

- Stretch-resistant measuring tape.

Neck Circumference protocols

1. Measurement is taken immediately above the laryngeal prominence (the Adam's Apple).
2. The subject should keep their head up and looking straight ahead. When recording, you need to make sure the tape is not too tight or too loose, is lying flat on the skin.
3. Record the measurement to the nearest 0.1 cm on the data collection sheet.
4. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.
5. Record the average of the two official measurements to two decimal places.

Blood Pressure

The measurement of blood pressure is a fundamental assessment for helping to determine cardiovascular-related risks. With a portable, electronic device, this technique is very simple to conduct and it is easy to train researchers.

Required Item(s) for Blood Pressure Assessment

- 2 Omron HEM 907 XL Intellisense Prof. Digital BP monitor (or other research grade blood pressure machine) (12/22/14)

Important Information

- This procedure needs to take place in a relatively quiet location. The participant should be as still as possible during the readings.

Blood Pressure Assessment Protocol

1. Participant should be sitting quietly for 5 minutes prior, with left (1/19/15) arm resting on the table at heart level.
2. Avoid placing the cuff over clothing or a rolled up sleeve that might constrict the arm.
3. Make sure the cuff is the appropriated size
    a. Cuff width should be ½ to 2/3 the upper arm length.
4. Palpate for the brachial artery pulse point on the left arm (1/19/15).
    a. Found in the antecubital space on the little finger side of the palm-up extended arm.
    b. Gently hyperextending the arm might make this easier to find.
5. Center the bladder over the brachial artery with the lowest edge 2.5 cm above the antecubital space. (If using BP Omron machine, press Start and monitor the progress of the machine; skip to step 13)
6. Obtain palpated systolic pressure and at 30 mmHg
7. Deflate rapidly and wait 30 seconds before reinflating
8. Apply bell head making a light but airtight seal over the palpable artery. The diaphragm end may be adequate, but the bell is preferable and may help block ambient noise.
9. Inflate rapidly to level determined in step 6.
10. Release pressure 2-3 mmHg/sec. (slowly).
11. Listen for onset of 2 consecutive beats, Korotkoff Phase 1, = systolic pressure.
12. Listen for the absence of sound, Korotkoff Phase 5, = diastolic pressure.
13. Deflate cuff, conduct a 2nd reading (repeating steps 1-13). Remove cuff. Record readings.

Assessment Data Collection Form

Participant ID:

Did the Participant Complete-	Consent ☐ Yes ☐ No

	Date			**Date**		
	#1		**#2**	**#1**		**#2**
	AVG			**AVG**		
Height (cm)						
Weight (kg)						
Waist Circumference (cm)						
Hip Circumference (cm)						
Neck Circumference (cm)						
Blood Pressure (mm/Hg)						
Blood Pressure Arm (left or right)						
Photograph Taken?	☐ Yes ☐ No			☐ Yes ☐ No		
Accelerometer Serial Number (1/15/15)						
Computer number (1/15/15)						
Concerns for Error						
Comments						

*Enter these data on _____ website

**Round off the average of the two official measurements to two decimal places

If applicable: If participant dropped-out, list the date:
_____

Participant Contact Form

Subject Name: **Student ID:**	**Phone:**	**Email Address:**
Best Way to Contact: ☐ Email ☐ Call Phone ☐ Text Phone ☐ Other, Please Specify **If we are unable to contact you, who could we contact who would know how to reach you?**		

Appendix E

Q1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
(1) 0 days
(2) 1 day
(3) 2 days
(4) 3 days
(5) 4 days
(6) 5 days
(7) 6 days
(8) 7 days
Choose not to answer

Q2. How much time did you usually spend doing vigorous physical activities on one of those days?
(1) Did not do vigorous physical activities
(2) 10 minutes
(3) 20 minutes
(4) 30 minutes
(5) 40 minutes
(6) 50 minutes
(7) 60 minutes
(8) 70 minutes (1 hr 10 min)
(9) 80 minutes (1 hr 20 min)
(10) 90 minutes (1 hr 30 min)
(11) 100 minutes (1 hr 40 min)
(12) 110 minutes (1 hr 50 min)
(13) 120 minutes (2 hrs)
(14) 130 minutes (2 hrs 10 min)
(15) 140 minutes (2 hrs 20 min)
(16) 150 minutes (2 hrs 30 min)
(17) 160 minutes (2 hrs 40 min)
(18) 170 minutes (2 hrs 50 min)
(19) 180 + minutes (3 hrs or more)
(20) Don't know/not sure
Choose not to answer

Q3. 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.

(1) 0 days
(2) 1 day
(3) 2 days
(4) 3 days
(5) 4 days
(6) 5 days
(7) 6 days
(8) 7 days

Q4. How much time did you usually spend doing moderate physical activities on one of those days?

(1) Did not do moderate physical activities
(2) 10 minutes
(3) 20 minutes
(4) 30 minutes
(5) 40 minutes
(6) 50 minutes
(7) 60 minutes
(8) 70 minutes (1 hr 10 min)
(9) 80 minutes (1 hr 20 min)
(10) 90 minutes (1 hr 30 min)
(11) 100 minutes (1 hr 40 min)
(12) 110 minutes (1 hr 50 min)
(13) 120 minutes (2 hrs)
(14) 130 minutes (2 hrs 10 min)
(15) 140 minutes (2 hrs 20 min)
(16) 150 minutes (2 hrs 30 min)
(17) 160 minutes (2 hrs 40 min)
(18) 170 minutes (2 hrs 50 min)
(19) 180 + minutes (3 hrs or more)
(20) Don't know/not sure
Choose not to answer

Q5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?
(1) 0 days
(2) 1 day
(3) 2 days
(4) 3 days
(5) 4 days
(6) 5 days
(7) 6 days
(8) 7 days
Choose not to answer

Q6. How much time did you usually spend walking on one of those days?
(1) Did not walk
(2) 10 minutes
(3) 20 minutes
(4) 30 minutes
(5) 40 minutes
(6) 50 minutes
(7) 60 minutes
(8) 70 minutes (1 hr 10 min)
(9) 80 minutes (1 hr 20 min)
(10) 90 minutes (1 hr 30 min)
(11) 100 minutes (1 hr 40 min)
(12) 110 minutes (1 hr 50 min)
(13) 120 minutes (2 hrs)
(14) 130 minutes (2 hrs 10 min)
(15) 140 minutes (2 hrs 20 min)
(16) 150 minutes (2 hrs 30 min)
(17) 160 minutes (2 hrs 40 min)
(18) 170 minutes (2 hrs 50 min)
(19) 180 + minutes (3 hrs or more)
(20) Don't know/not sure
Choose not to answer

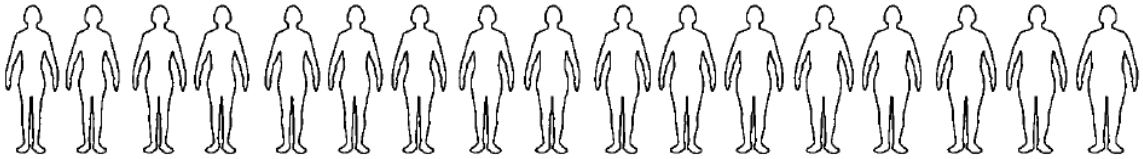
Q7. This question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. During the last 7 days, how much time did you spend sitting on a week day?

(1) 10 minutes
(2) 20 minutes
(3) 30 minutes
(4) 40 minutes
(5) 50 minutes
(6) 60 minutes
(7) 70 minutes (1 hr 10 min)
(8) 80 minutes (1 hr 20 min)
(9) 90 minutes (1 hr 30 min)
(10) 100 minutes (1 hr 40 min)
(11) 110 minutes (1 hr 50 min)
(12) 120 minutes (2 hrs) (12)
(13) 130 minutes (2 hrs 10 min)
(14) 140 minutes (2 hrs 20 min)
(15) 150 minutes (2 hrs 30 min)
(16) 160 minutes (2 hrs 40 min)
(17) 170 minutes (2 hrs 50 min)
(18) 180 + minutes (3 hrs or more)
(19) Don't know/not sure
Choose not to answer

Appendix F

BAIS-BD Drawing Scale:

Females



Males

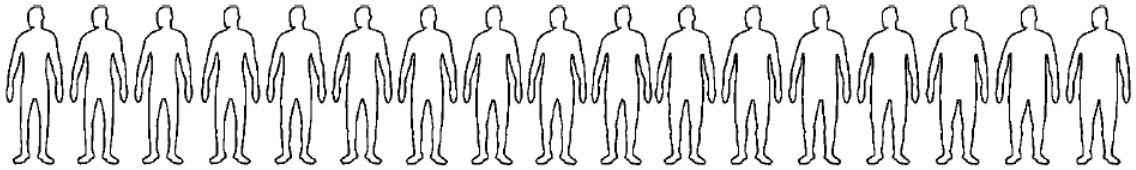


Figure 3. Corresponding BMI

Size	Male	Female	
60%	16.7	16.9	
65%	18.0	18.3	
70%	19.5	19.7	
75%	20.9	21.2	
80%	22.2	22.6	
85%	23.6	24.0	
90%	25.0	25.4	
95%	26.4	26.8	
100%	27.8	28.2	Average U.S. adult
105%	29.2	29.6	
110%	30.6	31.0	
115%	32.0	32.4	
120%	33.4	33.8	
125%	34.8	35.3	
130%	36.1	36.7	
135%	37.5	38.1	
140%	38.9	39.5	

Q1. What figure represents an adult male that is overweight?

1) Image: Adult male overweight image 1
2) Image: Adult male overweight 2
3) Image: Adult male overweight 3
4) Image: Adult male overweight 4
5) Image: Adult male overweight 5
6) Image: Adult male overweight 6
7) Image: Adult male overweight 7
8) Image: Adult male overweight 8
9) Image: Adult male overweight 9
10) Image: Adult male overweight 10
11) Image: Adult male overweight 11
12) Image: Adult male overweight 12
13) Image: Adult male overweight 13
14) Image: Adult male overweight 14
15) Image: Adult male overweight 15
16) Image: Adult male overweight 16
17) Image: Adult male overweight 17
18) Not Male
19) Choose not to answer

Q2. What figure represents an adult male that is obese?

1) Image:Adult male overweight image 1
2) Image:Adult male overweight 2
3) Image:Adult male overweight 3
4) Image:Adult male overweight 4
5) Image:Adult male overweight 5
6) Image:Adult male overweight 6
7) Image:Adult male overweight 7
8) Image:Adult male overweight 8
9) Image:Adult male overweight 9
10) Image:Adult male overweight 10
11) Image:Adult male overweight 11
12) Image:Adult male overweight 12
13) Image:Adult male overweight 13
14) Image:Adult male overweight 14
15) Image:Adult male overweight 15
16) Image:Adult male overweight 16
17) Image:Adult male overweight 17
18) Not Male
19) Choose not to answer

Q3. What figure represents an adult female that is overweight?

1) Image:Female 1
2) Image:Female 2
3) Image:Female 3
4) Image:Female 4
5) Image:Female 5
6) Image:Female 6
7) Image:Female 7
8) Image:Female 8
9) Image:Female 9
10) Image:Female 10
11) Image:Female 11
12) Image:Female 12
13) Image:Female 13
14) Image:Female 14
15) Image:Female 15
16) Image:Female 16
17) Image:Female 17
18) Not Female
19) Choose not to answer

Q4. What figure represents an adult female that is obese?

1) Image:Female 1
2) Image:Female 2
3) Image:Female 3
4) Image:Female 4
5) Image:Female 5
6) Image:Female 6
7) Image:Female 7
8) Image:Female 8
9) Image:Female 9
10) Image:Female 10
11) Image:Female 11
12) Image:Female 12
13) Image:Female 13
14) Image:Female 14
15) Image:Female 15
16) Image:Female 16
17) Image:Female 17
18) Not Female
19) Choose not to answer

Q5. What figure best displays your current body?

1) Image:Female 1
2) Image:Female 2
3) Image:Female 3
4) Image:Female 4
5) Image:Female 5
6) Image:Female 6
7) Image:Female 7
8) Image:Female 8
9) Image:Female 9
10) Image:Female 10
11) Image:Female 11
12) Image:Female 12
13) Image:Female 13
14) Image:Female 14
15) Image:Female 15
16) Image:Female 16
17) Image:Female 17
18) Not Female
19) Choose not to answer

Q6. What figure best displays your current body?

1) Image:Adult male overweight image 1
2) Image:Adult male overweight 2
3) Image:Adult male overweight 3
4) Image:Adult male overweight 4
5) Image:Adult male overweight 5
6) Image:Adult male overweight 6
7) Image:Adult male overweight 7
8) Image:Adult male overweight 8
9) Image:Adult male overweight 9
10) Image:Adult male overweight 10
11) Image:Adult male overweight 11
12) Image:Adult male overweight 12
13) Image:Adult male overweight 13
14) Image:Adult male overweight 14
15) Image:Adult male overweight 15
16) Image:Adult male overweight 16
17) Image:Adult male overweight 17
18) Not Male
19) Choose not to answer

Q7. What figure displays a healthy image of an adult male?

1) Image:Adult male overweight image 1
2) Image:Adult male overweight 2
3) Image:Adult male overweight 3
4) Image:Adult male overweight 4
5) Image:Adult male overweight 5
6) Image:Adult male overweight 6
7) Image:Adult male overweight 7
8) Image:Adult male overweight 8
9) Image:Adult male overweight 9
10) Image:Adult male overweight 10
11) Image:Adult male overweight 11
12) Image:Adult male overweight 12
13) Image:Adult male overweight 13
14) Image:Adult male overweight 14
15) Image:Adult male overweight 15
16) Image:Adult male overweight 16
17) Image:Adult male overweight 17
18) Not Male
19) Choose not to answer

Q8. What figure displays a healthy image of an adult female?

1) Image:Female 1
2) Image:Female 2
3) Image:Female 3
4) Image:Female 4
5) Image:Female 5
6) Image:Female 6
7) Image:Female 7
8) Image:Female 8
9) Image:Female 9
10) Image:Female 10
11) Image:Female 11
12) Image:Female 12
13) Image:Female 13
14) Image:Female 14
15) Image:Female 15
16) Image:Female 16
17) Image:Female 17
18) Not Female
19) Choose not to answer

Appendix G

Q1. How old are you?

1. 18
2. 19
3. 20
4. 21
5. 22
6. 23
7. 24
8. More than 24 years old

Q2. What is your current gender identity?

1. Male
2. Female
3. Trans male/Trans man
4. Trans female/Trans woman
5. Genderqueer/Gender non-conforming
6. Different identity (please state): _____

Q3. Are you Hispanic or Latino?

1. Yes
2. No
3. I don't know/Not sure

Q4. Which one or more of the following would you say is your race?
1. White
2. Black or African American
3. Asian
4. Native Hawaiian or Other Pacific Islander
5. American Indian or Alaska Native
6. Other (please specify) _____

Q5. What is your year in school?
1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Graduate

Q6. Where do you live?
1. Campus residence hall
2. Sorority or fraternity
3. Other university/college housing
4. Off campus housing
5. Parent or guardian's home
6. Other, please specify _____

Q7. Where is the university you attend?
1. Alabama
2. Florida
3. Maine
4. Kansas
5. New York
6. Tennessee
7. South Dakota
8. West Virginia

Q8. How would you define your current relationship status?

1. Single
2. In a committed relationship

Q9. How many hours a week do you work for pay during the school year?
1. I do not work
2. 1 to 9 hours
3. 10 to 19 hours
4. 20 to 29 hours
5. 30 to 39 hours
6. 40 hours
7. More than 40 hours

Q10. My overall GPA is
1. 3.5 - 4.0
2. 3.0 - 3.49
3. 2.50 - 2.9
4. 2.0 - 2.49
5. Under 2.0
6. Prefer not to answer

Q11. Are you a student-athlete?
1. Yes
2. No

Q12. Do you have a scholarship?
1. Yes
2. No

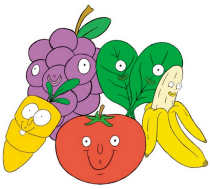
Q13. Do you currently receive a Pell Grant?
1. Yes
2. No

Q14. What is your resident status?
1. In-state student
2. Out of state student
3. International student

Q15. Do you consider yourself to be a vegetarian?
1. Yes
2. No
3. Chose not to answer
4. Don't know

Appendix H

Dear participants of the Get Fruved project,



Thank you for agreeing to participate in the Get Fruved project. This week we will be assessing your physical activity. You will wear a small red device that measures physical activity for the next several days. The device needs to be worn on a belt around the waist 24 hours a day except during bathing or swimming. The device is called an accelerometer. In order to make our data collection process go smoothly, here are a few tips and pointers that will help us to assess your physical activity.

- All participants will be wearing the device shown below:

- The accelerometer should be placed over the right hip using the provided belt, as shown in the picture below:

- The accelerometer has an arrow on it, please make sure this is pointing upwards (towards the sky).
- The belt can be worn above or beneath your clothing.
- The accelerometer CANNOT get wet. Therefore, it needs to be removed in all instances where it would get wet, such as: bathing, swimming, heavy rain.
- The accelerometer should be worn 24 hours a day. Please remember to take the accelerometer off before swimming or bathing and put it back on after swimming or bathing.
- Attached is a physical activity log to help track and monitor activity throughout the week. We ask that you fill out the log each day. Please record what time the accelerometer is put on and taken off.

The accelerometer will be worn from today _____through _____. Please return the accelerometer and activity log on _____ to the main office in Hitchner Hall, room 101 in the box marked "Fruved Accelerometers". Thank you!

Thank you very much for your participation. If you have any questions or concerns, please feel free to contact the Get Fruved campus coordinator below:
Moira Burke
978-395-1995
moira.burke@maine.edu

GET FRUVED PHYSICAL ACTIVITY LOG

NAME: _____

ACCELEROMETER #: _____

DAT	TIME ON	TIME OFF	COMMENTS

*Include in comments if belt was taken off during the day (forgot, swimming, bathing, etc.)
*Also include any circumstances that may affect your physical activity (sick, out-of-town, etc.)

The accelerometer will be worn from today _____through _____. Please return the accelerometer and activity log on _____ to the main office in Hitchner Hall, room 101 in the box marked "Fruved Accelerometers". Thank you!

Appendix I

Assessment IRR Training

Read the following protocols completely and thoroughly before beginning measurements.

Weight:

1. Zero the scale. Balance beam scales must be level prior to weighing the participant. The scale must be on a hard, flat surface, not on carpet.
2. Ask participants to empty their bladder prior to being weighed. This is required of all participants.
3. Ask participants to remove excess clothing, shoes, and socks prior to being weighed.
4. Ask the participant step up onto scale fully. Staff must make sure that both feet are completely on the scale.
5. Ask the participant stand completely still with arms at sides and eyes looking straight ahead.
6. Record weight to the nearest 0.1 kg on the data collection sheet.
7. Repeat measurement. If there is > 0.2 kg difference between measurements, repeat until two measurements are within 0.2 kg. These two agreeing measurements will be the official measurements.
8. Record all measurements on NRI data collection sheet. Be sure to cross out any unofficial measurements (i.e. those discarded due to excess disagreement).
9. Record the average of the two official measurements to two decimal places (e.g., 0.2 + 0.3 = 0.5/2=0.25).

	Person 1	Person 2	Person 3	Person 4	Person 5
Measure 1					
Measure 2					
Measure 3 (if needed)					

Height:

1. Ask the participant to remove shoes.
2. Ask the participant to remove hair ornaments, buns, or barrettes that prevent the participant from placing his/her head against the back of the stadiometer.
3. Ask the participant to step completely under the slide of the stadiometer, making sure that the subject is centered with the stadiometer.
4. Ask the participant to stand as straight as possible with feet together and heels, buttock, shoulder blades, and back of head completely touching the wall (or as much as possible). This four-point contact will ensure that body weight is evenly distributed.

5. Be sure that the subject is looking straight ahead and that there is a horizontal plane from the bony socket of the eye to the notch above the projection of the ear.
6. Ask the participant to take a deep breath in and hold it to straighten the spine and standardize measurement.
7. When the subject inhales, move the height slide to rest lightly on top of the participant's head.
8. Fix the height slide in place and ask the participant to resume normal breathing.
9. Record height to the nearest 0.1 centimeter on the data collection sheet. Be sure to avoid parallax (angular distortion) by bending down, kneeling, or standing on a stool and reading the height value at eye level.
10. Repeat measurement. If there is > 0.2 centimeter difference between measurements, repeat until two measurements are within 0.2 centimeter. These two agreeing measurements will be the official measurements.
11. Record all measurements on the data collection sheet. Be sure to cross out any unofficial measurements (i.e. those discarded due to excess disagreement).
12. Record the average of the two official measurements to two decimal places (e.g., 0.2 + 0.3 = 0.5/2=0.25).

	Person 1	Person 2	Person 3	Person 4	Person 5
Measure 1					
Measure 2					
Measure 3 (if needed)					

Waist Circumference:

1. Ask subject to remove any bulky outerwear (jackets, coats, etc.).
2. Ask subject to stand with arms at sides and feet positioned close together with weight evenly distributed across the feet.
3. Ask the subject to relax and take a few deep, natural breaths before the actual measurement is made (to minimize the inward pull of the abdominal contents during the waist measurement).
4. Measure circumference at the end of normal expiration. The measurement should be made at the measured midpoint between the lower margin of the last palpable rib and the top of the iliac crest.
5. Record the measurement to the nearest 0.1 cm on the data collection sheet.
6. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.
7. Record the average of the two official measurements to two decimal places.

	Person 1	Person 2	Person 3	Person 4	Person 5
Measure 1					
Measure 2					
Measure 3 (if needed)					

Hip Circumference:

1. Ask subject to remove any bulky outerwear (jackets, coats, etc.).
2. Ask subject to stand with arms at sides and feet positioned close together with weight evenly distributed across the feet.
3. Ask the subject to relax and take a few deep, natural breaths before the actual measurement is made.
4. Measure circumference at the end of normal expiration. The measurement should be made at the largest circumference/widest portion of the buttocks. Keep the tape level to the floor.
5. Record the measurement to the nearest 0.1 cm on the data collection sheet.
6. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.
7. Record the average of the two official measurements to two decimal places.

	Person 1	Person 2	Person 3	Person 4	Person 5
Measure 1					
Measure 2					
Measure 3 (if needed)					

Neck Circumference:

1. Measurement is taken immediately above the laryngeal prominence (the Adam's Apple).
2. The subject should keep their head up and looking straight ahead. When recording, you need to make sure the tape is not too tight or too loose, is lying flat on the skin.
3. Record the measurement to the nearest 0.1 cm on the data collection sheet.
4. Repeat measurement. If the measurements are within 1 cm of one another, the average should be calculated. If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated.

5. Record the average of the two official measurements to two decimal places.

	Person 1	Person 2	Person 3	Person 4	Person 5
Measure 1					
Measure 2					
Measure 3 (if needed)					

Be sure to read and follow the following protocols for blood pressure and image capture:

Blood Pressure:

1. Participant should be sitting quietly for 5 minutes prior, with arm resting on the table at heart level.
2. Avoid placing the cuff over clothing or a rolled up sleeve that might constrict the arm.
3. Make sure the cuff is the appropriated size
    a. Cuff width should be ½ to 2/3 the upper arm length.
4. Palpate for the brachial artery pulse point
    a. Found in the antecubital space on the little finger side of the palme-up extended arm.
    b. Gently hyperextending the arm might make this easier to find.
5. Center the bladder over the brachial artery with the lowest egdge 2.5 cm above the antecubital space.
6. Press "Start" and monitor device and reading. Record reading.
7. Allow Omron to deflate and repeat measure a 2nd time.
8. Deflate cuff and remove. Record readings.

IRR Training Analysis

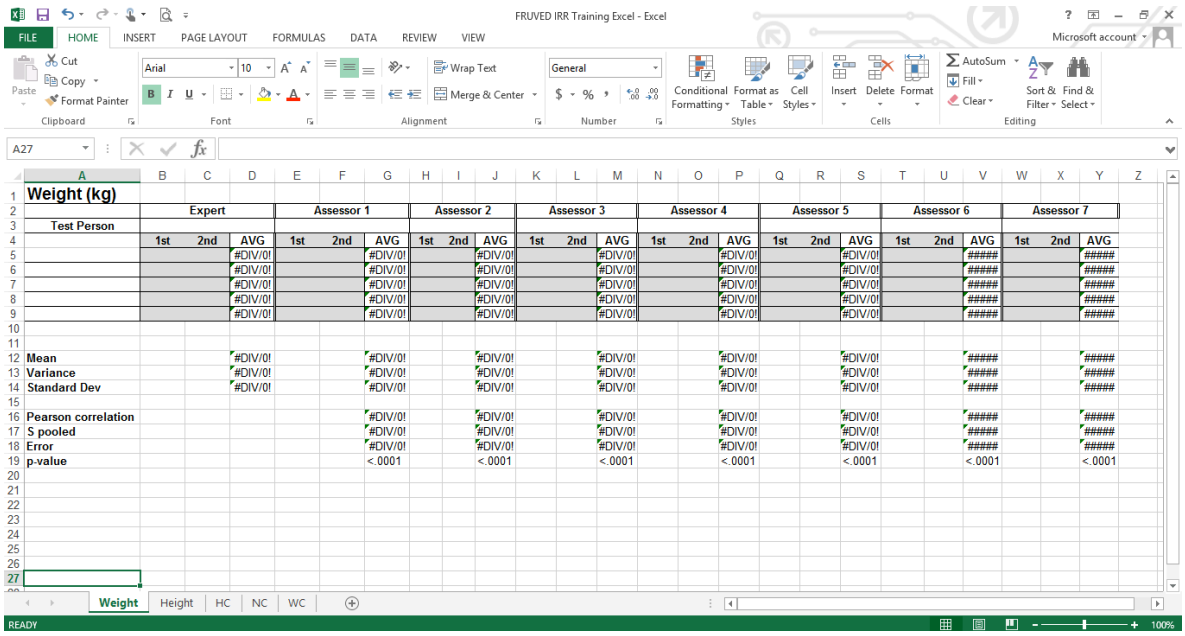
After all researchers have completed the IRR training, measuring each of the 5 volunteers for each physical assessment, the expert will collect the training forms to analyze the trainees' measurements for reliability.

Below is a screenshot of the excel document. There is a separate sheet at the bottom of the document for each physical measurement. Each sheet can compare the expert's measures to up to seven others' at a time. New documents will need to be opened and saved if there are more than seven researchers being trained.

The initials or other identifier of the volunteers should be entered into rows #5-9. The name or initials of the expert and the training assessors (trainee researchers) should go in the blank cells in row #3.

Corresponding measurement values for each person should be entered into the cells. As this occurs, the entered equations in columns D, G, J, M, P, S, V, and Y will automatically compute.

To determine if the researcher passed the training for each physical assessment technique, look at the “Pearson correlation” value, row 16. This computed number must be over 0.8 to be considered passing. If the researcher did not pass, he or she must redo the training for that measurement.



Appendix J

Accelerometer Protocol

These instructions are for the ActiGraph GT3X+ Accelerometer.

(Note: Put participant's ID number on a note with their respective accelerometers in a bag to pick up

Initializing Instructions for GT3X+

1. Plug in the accelerometers you want to initialize into the USB ports on the hub.
2. Open ActiLife software
    a. Select the devices you want to initialize
        i. To initialize all the devices plugged in, click the top box in the heading row
        ii. To only initialize an individual device, click the box corresponding with the specific device's row
    b. Click "Initialize"
3. In "Initialize Devices" pop up window:
    a. Set Sample Rate at 30 Hz.
    b. Do not click the boxes to activate the "Flash LED during delay mode" or "Flash LED during data collection"
        i. If these boxes are already checked, uncheck to deactivate them
    c. Set the "Start Date" and "Start Time"
    d. Check the box to "Use Stop Time"
    e. Set the "Stop Date" and "Stop Time"
        i. Stop Date and Stop Time should be set so that you're recording 7 FULL days of data. (i.e. If you set your Start Date and Start Time for Friday at 12:00am midnight, your Stop Date and Stop Time should be set for the following week's Friday at 12:00am midnight.)
    f. Click "Enter Subject Info:
        i. Enter subject's ID number according to your State
4. In "Enter Subject Information" pop up window:
    a. Add in participant ID under the subject name column
    b. Click "Initialize"
5. In the main ActiLife screen, check the progress of initialization
    a. In the status column, the devices will program from "Initializing…" and "Refreshing…" to "Finished Initializing"
    b. When the status of each device you're initializing says "Finished Initializing", you can unplug the devices from the computer
6. Make sure you keep track of the accelerometer serial number (which will pop up when you initialize) on the data collection form and in the subject ID master spreadsheet and the related ID # of the participants. If initializing multiple accelerometers at the same time it is important to keep track of the devices so you know which device belongs to which subject.Put stickers on each ActiGraphs with

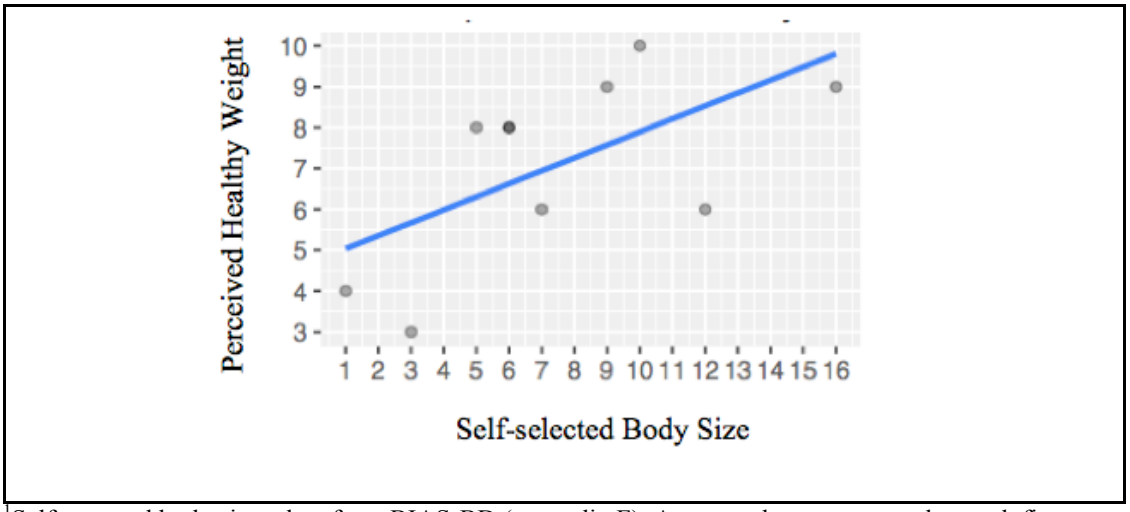
the participant ID number. This sticker will need to be removed and replaced for each participant every time the accelerometer is reused.

Downloading Instruction for GT3X+

1. Plug in the accelerometers you want to download into the USB ports on the hub
2. Open ActiLife software
    a. Select the devices you want to download
        i. To download all the devices plugged in, click the top box in the heading row
        ii. To only initialize an individual device, click the box corresponding with the specific device's row
    b. Click "Download"
3. In "Download Options" pop up window:
    a. Select the Download Location
        i. Create a new folder for your data to be downloaded into
            1. Name the folder relating to your project and the data to be found in it (i.e. Accelerometer Pre_FRUVED)
    b. For the Download Naming Convention select Subject Name (this is the same things as the participant ID) and download date.
    c. Do not check the box to Add biometric and user information
    d. Do not check the box to create AGD File
    e. Click "Download All Devices"
4. In the main screen of ActiLife, check the progress of downloading
    a. In the status column, the devices will progress from "Downloading" and "creating AGD" to "finished downloading" OR "finished downloading AGD file"
    b. When the status of each device says "finish downloading" OR "finished downloading AGD file", the download has been successful

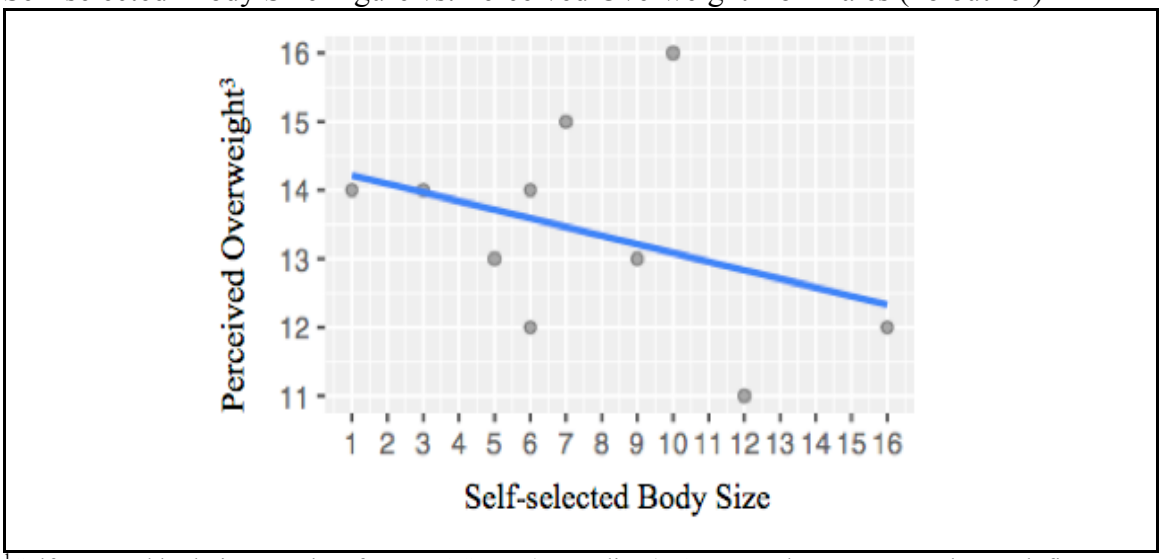
Appendix K

Figure 3.5 Self-reported[1] Body Size vs. Perceived Healthy Body Size Image [2] Unrelated in Males



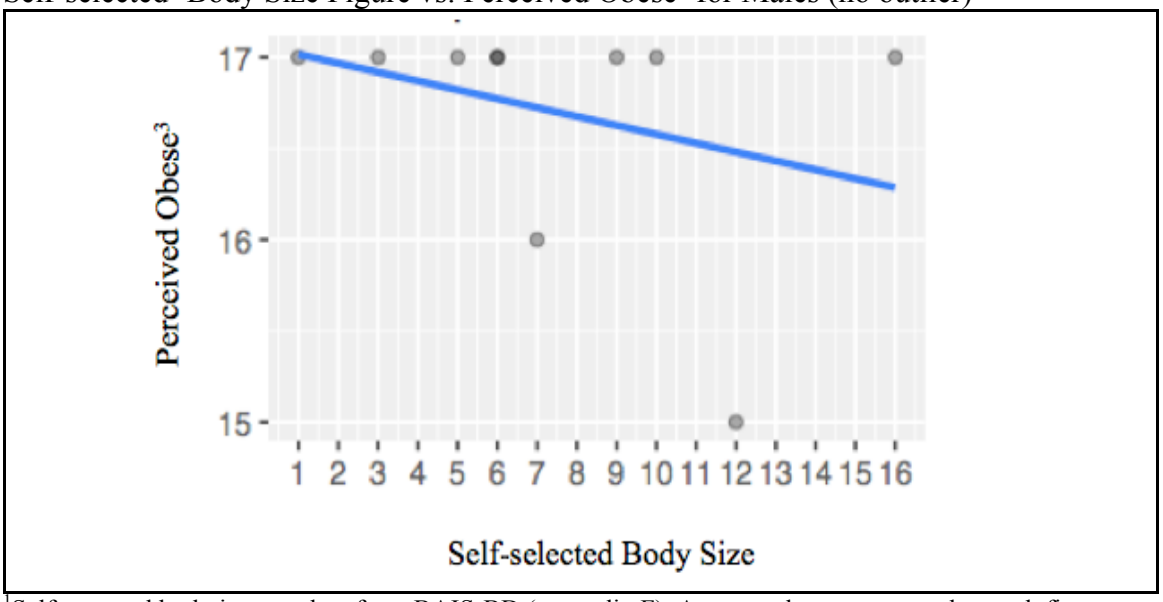
[1]Self-reported body size taken from BIAS-BD (appendix F). Axes numbers correspond to each figure drawing (possible numbers 1-17)
[2]Perceived healthy body size taken from BIAS-BD (appendix F) (possible numbers 1-17).

Self-selected[1] Body Size Figure vs. Perceived Overweight[2] for Males (no outlier)



[1]Self-reported body image taken from BIAS-BD (appendix F). Axes numbers correspond to each figure drawing (possible numbers 1-17)
[2]Perceived overweight taken is from BIAS-BD (appendix F) (possible numbers 1-17).
[3]Actual overweight range is figure numbers 7-10 (Appendix F).

Self-selected[1] Body Size Figure vs. Perceived Obese[2] for Males (no outlier)



[1]Self-reported body image taken from BAIS-BD (appendix F). Axes numbers correspond to each figure drawing (possible numbers 1-17)
[2]Percieved obese taken from BAIS-BD Appendix F).
[3]Actual obese range is figure numbers 11-17 (Appendix F).