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ASSESSING DIETARY INTAKE, EATING AND EXERCISE ATTITUDES, AND
FITNESS LEVELS IN COLLEGE-AGED STUDENTS

By
Katie J. James

A THESIS

Presented to the Faculty of
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Major: Nutrition and Health Sciences
Under the Supervision of Professor Wanda M. Koszewski

Lincoln, NE

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ASSESSING DIETARY INTAKE, EATING AND EXERCISE ATTITUDES, AND
FITNESS LEVELS OF COLLEGE-AGED STUDENTS

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University of Nebraska, 2010

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BACKGROUND The transition from high school to college can be a stressful lifestyle change for young adults. During this transition students develop a variety of health attitudes and behaviors that may have a negative impact on their overall wellbeing.

OBJECTIVE To determine the correlation of BMI to dietary intake, fitness level and eating and exercise attitudes of college students.

SETTING Participants completed an eating and exercise attitude survey, 2-day diet recall, and performed three fitness tests at a Midwestern University through their Campus Recreational Center.

PARTICIPANTS 772 students between the ages of 18-25 from a Midwestern University between the years of July 2004-July 2009.

METHODS Calculations were performed to determine the subject's BMI and Mean Adequacy Ratio (MAR). Rankings for three areas of fitness were based on tables provided by the YMCA Fitness Testing and Assessment Manual Fourth Edition.

RESULTS The mean age of the subjects studied was 19.8 ± 1.5 with seventy-seven percent of the total population being 20 years old or younger. There was a mean BMI of 23.5 ± 4.9 with sixty-six percent ($n=507$), having a BMI that placed them in the normal classification. Around 72 percent ($n=559$) had a MAR score of less than 80

indicating an inadequate consumption of nutrients. When the MAR scores of the total population were compared to BMI no significant correlation was found ($p=.970$). On the Eating Attitudes Questionnaire, only 13 percent scored greater than 4 indicating disordered eating patterns. Results showed that BMI had a significant positive correlation with the Eating Score. As BMI increased the subjects' cardiovascular fitness levels decreased.

CONCLUSIONS AND IMPLICATIONS The majority of college students studied did have a BMI in the normal range yet, most did not consume an adequate diet. Any education programs targeted to this population should include information about nutrition facts labels, portion sizes, exercise recommendations, and body image.

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CHAPTER 1

INTRODUCTION

Lifestyle and Stressors for College Students

Transitioning from high school to college and the years following can be extremely stressful times for young adults. For many this is the first time they have held certain responsibilities and freedoms. First-year students have to deal with changing familial and societal roles which involve greater independence. They also face more difficult courses that demand a greater amount of dedication and time management skills. Many research studies have found that this transition adjustment to college life is considered a chronic stressor throughout the students' collegiate career (1).

Stress has both acute and chronic affects on the body. Common physical stress symptoms include irritability, muscular tension, inability to concentrate, and a variety of physical reactions such as headaches and accelerated heart rate (10). Other effects of stress that students experience include loss of sleep, strain on social relationships, and lowered self-esteem. All of these affects can have negative consequences on their day-to-day interactions and experiences.

There are many ways that college students try and manage this stress that directly affects their lifestyles and health. Binge drinking, heavy smoking and substance abuse are just a few of the unhealthy behaviors many college-aged students partake in to deal with the many stressors they face. Diet and exercise habits are influenced by these behaviors and other unhealthy stress management techniques preformed by students. These unhealthy techniques can ultimately increase the student's risk of developing a chronic disease in the future.

Health Related Trends among College Students:

Many different health behaviors have been seen when examining the college-aged population. Many students participate in heavy binge drinking episodes to deal with the enormous amount of stress they experience from balancing school and work as well as for the social benefits they receive. Bars and house parties are frequently attended by young adults who are testing the waters of their new found freedoms from living away from home for the first time. Although the majority of students consider themselves social drinkers, for some abuse of alcohol becomes problematic and various areas of their lives such as work, academics, and social relationships begin to suffer.

Lack of adequate amount of sleep is another unhealthy behavior seen in this population typically due to both late hour party sessions on the weekends and the many “all nighters” pulled to finish projects or study for an exam. When asked, 91% of college students feel as though they don’t get enough sleep during the night and wake up not feeling refreshed (1). Increased tobacco use as well as illegal substance abuse is increasing in college students and is becoming more of a problem (2). These health trends have a large effect on the overall wellbeing and quality of life of the student not only during college but that it can overtly carry with them for many years after.

Purpose:

The purpose of this study was to use data collected by The University of Nebraska-Lincoln to examine Body Mass Index (BMI) trends in college students in relationship to dietary intake, eating and exercise attitudes and fitness levels. Results from this study will help reveal needs for interventions in these specified areas.

Objective:

1. To determine the correlation of BMI to dietary intake, fitness level and eating and exercise attitudes of college student.

CHAPTER II

REVIEW OF LITURATURE

Dietary Patterns among College Students

The college years are often the first time that students, living away from home, are faced with many different food choices that may result in poor eating habits. College students typically consume a diet lacking in fruits, vegetables, and dairy products (11-12). Their diet is usually high in fat, sodium, and sugar because of frequent snacking and consumption of fast food. Students with lower BMIs have been found to consume more vegetables, especially green leafy vegetables whereas those with higher BMIs report a higher intake of all meats which are high in saturated fat (2). Findings also suggest that students did not meet the recommended intake of a minimum of 20g of dietary fiber per day, which along with these other poor eating habits mentioned may play a significant role in future risk of disease (3). While high BMI can lead to negative self-esteem and low self evaluation, triggering risky behaviors such as uncontrollable dieting and/or overeating, being overweight is linked to anxiety and depression and also can adversely affects one's quality of life (13). To control weight, it is a common practice among college students to develop a habit of skipping meals. These dietary patterns increase nutritional risk and unwanted weight gain that follow the students after graduation (2).

Students generally skip breakfast or have something they can prepare in their dorm room, eat quickly, or carry to class. Most students tend to snack throughout the day. Snack foods chosen tend to be chips, crackers, or sweets that most keep in their dorm room or apartments that they have purchased from dining halls and convenience

stores (16). These behaviors could be linked to the perception that students have that their college environment is one that makes unhealthy foods more available than healthy foods.

Physical Activity Benefits and Behaviors

The health benefits of physical activity described in the US Surgeon General's Report on Physical Activity and Health provide compelling reasons to adopt and maintain an active lifestyle (4). Some physical benefits of regular exercise in college-aged students include increased muscular strength, prevent and manage high blood pressure and bone loss, improve blood cholesterol levels and reduce the risk of heart disease by improving blood circulation. Increased self-esteem, increased energy level, ability to fall asleep quicker, and stress management are other benefits of daily physical activity.

However, even with these known benefits according to the 2000 National College Health Assessment, 57% of male and 61% of female college students reported that they preformed no vigorous or moderate exercise on at least 3 of the previous 7 days. It has been shown that participation in physical activities declines substantially between high school and young adulthood (5). When students feel the pressure of an increasingly demanding schedule, they eliminate planned exercise. Students reported that working out is not difficult when part of a routine, but becomes a challenge with other responsibilities, lack of accountability, and feelings of laziness (16). Having social support from friends encourages students to be physically active, and they report that exercising with friends is socially rewarding (16). Healthy People 2010 have recognized post-secondary educational institutions as settings where physical activity should be promoted among young adults. However, first investigation and determination of consistent correlates that

can differentiate physically active students from those who engage in sedentary behavior must be provided (5).

Although college students have specific time constraints related to their academic schedules, they also have considerable discretionary time. The choices they make about how to spend this time influence their level of physical activity, and various factors influence these choices. Recent findings reported that college students spend 150 minutes per day watching television and playing video games and 162 minutes per day on the computer (16). Research shows that self-efficacy, perceived enjoyment of physical activity, and self-motivation were some of the strongest influences on college students' involvements in physical activity (6). High self-esteem usually results in a high physical activity participation level. Having fun was one of the primary reasons for college students to exercise.

Obesity Trends

Obesity rates in the United States have more than doubled in the past fifty years, with 34% of adults considered obese in 2005. This astonishing high number is causing health care providers to frantically educate on the fact that obesity is directly related to a number of health conditions, such as type 2 diabetes, heart disease and hypertension. Increases in obesity levels are commonly attributed to small prolonged increases in energy intake resulting in a gradual consistent yearly weight gain. In young adults this has been estimated to be approximately 0.2 to 0.8 kg per year (20). It is important for young adults to understand the classifications of BMI and how these classifications can affect overall health. Table 14 shows the general BMI classifications which for adults ages 20 to 74 years of age.

Table 1: Classification of Overweight and Obesity by BMI	
Classification	BMI
Underweight	≤ 18.5
Normal	18.6-24.9
Overweight	25-29.9
Obese I	30-34.9
Obese II	35-39.9
Morbid Obese	> 40

Department of Health and Human Services, Public Health Service, National Institute of Health, National Heart, Lung and Blood Institute. Practical Guide: Identification, Evaluation, Treatment of Overweight and Obesity in Adults. NIH Publication Number 00-4084, 2000 (33).

A life course approach to obesity management suggests that risk factors and experiences earlier in one's life may impact long-term health and disease outcomes, with strategies aimed at altering early risk factors of youth leading to possible prevention of these obesity-related medical complications in later adulthood (19). For this reason, it is important to gain a better understanding of critical periods for individuals to become overweight or obese to implement healthy nutrition and physical activity education programs.

“Freshman 15”

An epidemic of overweight and obesity is evident among all age groups, including children and adolescents. The greatest increases in weight seem to occur in persons between the ages 8 and 29 years, based upon results of the Behavioral Risk Factor Surveillance System (9). There is a belief that weight gain is inevitable for first-year postsecondary students that continues to be perpetuated among young adults. In a

recent study on first-year college students, more than 90% were aware of the “Freshman 15” (8). Research suggests that excess weight gain during the freshman year is due to an increase in calories due to poor dietary choices and a decline in physical activity. Dietary and activity patterns of many college students predispose them to future health problems and weight gain and patterns of unhealthy behaviors during this transitional year from high school may contribute to overweight and obesity in adulthood (7).

Because the United States is moving farther from, rather than toward, the physical activity and body mass index goals established in Healthy People 2010, it is important to understand the influence that college life has on these trends. In terms of energy balance, behavioral changes during the freshman year leave open the possibility that students may passively increase their energy intake and/or decrease their physical activity, giving rise to the “Freshman 15” (7).

Although many studies have found that there is a significant increase in weight amongst adolescents from high school to the end of their first year of college, the mean weight increase has been less than 15 making the “Freshman 15” more a myth than reality. Factors that may contribute to the perpetuation of this myth include overeating in buffet-style cafeterias, using free time to participate in activities other than physical exercise, increased alcohol consumption, and making poor choices of what foods, where, and how much to eat (7). This myth does not, however, weaken the belief that the college environment promotes changes in many aspects of a student’s life in which physical activity and dietary behaviors in the majority of American college students who do not meet recommended levels contribute to unhealthy weight gain and future health problems.

Dieting Attitudes in College Students

It has been shown that an individual's attitudes or perceptions greatly affect their behavior. First year college students are placed into a new environment which can lead to a development of, or continuation of, negative thoughts in regards to body image and dietary patterns. Both the risk for and prevalence of disordered eating is strongly correlated with concern about body weight, body image and extreme weight control behaviors (14). Analysis of dieting attitudes shows that 12% of students reported to having disturbed eating attitudes and 20% flagged for anorexic symptomatology.

Many research studies have shown a difference in the prevalence of disordered eating patterns and negative body image amongst different ethnicities. Caucasian and African-American women hold very different definitions of beauty and body perception. Disordered eating has been found to be most common among young, Caucasian women. Caucasian young adults often appear to be more concerned about body weight and have more negative body cognitions than any other ethnic group (13).

Peer groups can have a great deal of influence on college students' eating attitudes and behaviors. Within the college community there are subgroups of students sometimes at greater risk of developing or continuing eating-related problems, such as those in sororities or in collegiate athletics. Those in sororities report greater use of diet pills, elimination of high fat foods and weight concerns interfering with social relationships (14). Women living in sorority houses have a greater fear of becoming fat, greater body dissatisfaction and weight preoccupation, as well as higher concern with dieting (17). Both male and female college athletes feel an immense pressure to perform at high levels. In certain sports, a specific weight class or body shape is linked to this

high performance. This leads college athletes to become more obsessed with weight and weight control. Among men, the frequency of eating disorder risks tended to be the highest in those who participated in inter-collegiate athletics and the relation of suicidal thoughts to risk for eating disorder was highest for the female athletes (14).

The media as been seen to target and greatly influence the college age group. The media portrays an ideal thinness which plays into students' desire to want to fit in and be accepted. This pressure plays a decisive role in triggering negative self evaluation, weight control, unhealthy eating behavior, and the development of eating disorders among college females (13,15). A common message in the media is "fat is bad." This fear of eating certain types of foods can be a precursor for a disordered eating pattern, and may lead to a decrease in highly needed nutrients (14).

Physical Activity Perceptions among College Students

Very little research exists on the perceptions and attitudes of college students and exercise. Most college males and females say that they have dramatically decreased the amount of physical activity from high school to college and that they are unhappy about this decline. Students are fairly confident that they could work out more if they needed to and most know how to improve their fitness levels. However, even with this concern about a reduction in physical activity levels and awareness on how to increase it, a majority of those studied had not implemented changes to their exercise habits nor did they formally record their exercise (16).

There is evidence to suggest that print, broadcast and electronic media both present and reinforce the value of the thin ideal for women and the muscular ideal for

men through ideal images(17). The ideal male body image, as portrayed by the media, appears to have grown steadily more muscular over the years. This thrive to achieve the “perfect body” has led to an increase in body dissatisfaction and low self-esteem. An increasingly national problem in males is that of muscle dysmorphia. Men with this syndrome worry that they look small, even though they are actually muscular. College males with muscle dysmorphia have been shown to avoid beaches, swimming pools, locker rooms and other places where their bodies might be seen. They typically exercised compulsively, and many used anabolic steroids thus risking adverse medical and psychiatric effects (18).

CHAPTER III

METHODOLOGY

The goal of this study was to identify relationships between MAR scores, fitness level rankings, and eating and exercise attitudes with Body Mass Index (BMI) in college students. The data for this project was collected through the use of a 2-day diet recall, eating and exercise attitudes questionnaire, and a multitude of fitness tests. This study was designed to produce results that would identify a need for an easily administered assessment tool to be used to screen college students for more in-depth nutrition and health education. IRB approval was granted in December 2009 and updated in December 2010 after the completion of the appropriate application (Appendix A).

Subjects:

All University of Nebraska-Lincoln college students who participated in the Campus Recreational Wellness Program from July 2004 to July 2009 were eligible to participate in this study. A minimum age of 18 and maximum age of 25 years old was set to represent the traditional profile of a college student. Both males and females were used in the study.

Data Collection Tools:

Participants in the University of Nebraska-Lincoln Campus Wellness Program receive a packet of information upon registering. This packet includes a Waiver and Release form that all participants signed before they were allowed to continue with the program. A Personal Training/Wellness Assessment form was provided with health

history information questions in regards to past, present, and future exercise patterns. A Medical History Report Form was included in the packet with a statement letting the participants know that a physician referral may be required before engaging in a fitness assessment or personal training session if it is necessary. An Informed Consent Form for exercise testing was provided which the subject signed before they could participate in any exercise tests. The nutrition consultation included a Weight History Form, a dietary recall assignment, 2-day Diet Analysis Form and an eating and exercise attitudes questionnaire. A Personal Profile has been established for each subject. The profile includes blood pressure, cardiovascular assessment, strength assessment, flexibility assessment, and body composition of the subject. Examples of these documents can be found in the Appendices B1 through C4.

Data Collection Procedure:

Data has been collected for a period of time dating back to as early as 1995 and has been stored in a database on a computer and in boxes located in the UNL Campus Recreational Center, however only data collected from July 2004-2009 was used in this study. No personal contact was made with the participants and the researcher. Shinya Takahashi, Coordinator of Strength and Condition at Campus Recreation, worked with his staff to administer the fitness assessments for the participants. Individuals were tested in three areas: muscular fitness, flexibility, and cardiovascular endurance. Participants were tested for their cardiovascular endurance by performing a YMCA 3-minute step test, a stationary bike test, or 1 of 3 protocols for a treadmill test. For flexibility, all participants were tested using a sit-and-reach box protocol. Muscular strength and endurance was tested using max push-ups and a timed 1-minute sit-up test. The tests

results for these two tests were combined to produce one score for muscular fitness. Protocols for each of these tests can be found in Appendices E-1 through E-7. Their results were then entered into a computer software program TriFit700 which ranked the participants as being superior, excellent, fair, good, poor, or very poor.

Karen Miller, the Registered Dietitian at Campus Recreation, worked with her staff to enter in the foods listed by the participants in the 2-day diet recalls into the computer software 2005 EHSA Food Processor 8.4 for analysis. For this research, only data collected during July 2004 to July 2009 was used. The data from these two computer programs has been reviewed and transferred into an Excel spreadsheet for access. Only complete data was used and no individual names recorded.

Data Analysis

Height and weight were collected from each subject and was used to calculate BMI. The following formula was used for BMI calculation because the weights were in pounds and heights in inches:

$$\text{BMI} = [\text{weight in pounds} / (\text{height in inches})^2] * 703.$$

The mean adequacy ratio (MAR) was used in this study to evaluate the intake of selected nutrients relative to the recommended values determine the adequacy of the subjects' diet. In order to determine the nutrient adequacy of the diet, the nutrient adequacy ratio (NAR) was calculated for each nutrient. NAR was calculated as the intake of a nutrient divided by the recommended intake for that nutrient (RNI). The MAR score was then calculated by summing each NAR (truncated at 100%) divided by the number of nutrients. For both NAR and MAR a value of 100% is the ideal since it means that the intake is the same as the requirement. The nutrients used in this study to

establish the MAR score were: Protein, Calcium, Folate, Iron, Magnesium, Fiber, Sodium, Fat, Carbohydrate, and Vitamins A, E, K, B1, B2, B3 and C.

Multiple tests were performed by the subjects in different areas of fitness. Individuals were scored based on their performances and these scores were used in determining their fitness rankings. The subject's scores were compared to tables provided by the YMCA Fitness Testing and Assessment Manual Fourth Edition (32). Individual scores for each fitness test were dropped and only their rankings of Superior, Excellent, Good, Fair, Poor, or Very Poor were used in this study. The YMCA fitness ranking tables can be found in Appendices F-1 through F-4.

Statistical Analysis:

The 2-day dietary recall, eating and exercise attitudes form, and fitness testing results were coded and entered into the Excel spreadsheet. This was then transferred into SAS at the NEAR center at the University of Nebraska-Lincoln with the help of a statistician. The eating and exercise questionnaire, fitness classes, and MAR score were analyzed and compared to BMI. The confidence level is set at ($p < .05$).

CHAPTER III

RESULTS

Description of Participants

This research study included the review of data collected from 2004-2009 from the University of Nebraska-Lincoln Campus Recreation Center. Approximately 772 college students were used in this study aging from 18-25 years old. Of the total subjects 59 percent (n=455) were female and 41 percent (n=317) were male. A majority of the subjects were within the designated freshmen age of 18 to 19 years old with 51 percent representing this classification. The variables for this study were compared using the total population as well as subjects were separated into those 20 and younger and subjects 21 and older. Students 20 and younger make up 77% (n=592) of the total population. The remaining 13% (n=180) represents subjects 21 years of age and older. The mean age for this study was 19.8 ± 1.5 years. Table 1 which can be seen below represents the demographics of the participants used in this study.

Height and weight were measured for each subject and BMI was calculated and recorded. There was a mean BMI of 23.5 ± 4.9 with the majority of the students studied, sixty-six percent (n=507), having a BMI that placed them in the normal classification. Only 29 percent (n=227) were considered to be overweight or obese. Table 2 shows the number of students that fall into each BMI classification.

Table 2: BMI Classifications for College Students participating in Campus Recreation Wellness Program.		
Classifications	n =	%
Underweight ≤ 18.5	38	5
Normal 18.6-24.9	507	66
Overweight 25-29.9	168	22
Obese I 30-34.9	42	5
Obese II 35-39.9	10	1
Morbid Obese > 40	7	1

The researcher made no distinction of the highest level of education completed or income level of the subjects involved with this study. The highest level of education completed before college is presumed to be high school and should have had a minimal affect on the BMI and other variables used in this study. Likewise, the level of income was not collected from the subjects, as the researcher was looking for relationships between BMI and fitness levels, dietary intake, and eating and exercise attitudes only. Thus, the researcher did not control for differences in income level or the highest completed level of education and what influences they may have on BMI.

Dietary Intake and BMI

The distribution of nutrient intakes was analyzed and recorded for the total population. The mean for total calories consumed is 2065 ± 738 . The percentages of

macro and micronutrients were compared to recommended levels for this age group. The nutrients analyzed were Protein, Folate, Calcium, Vitamin B1, B2, and B3, Magnesium, Vitamin K, Vitamin C, Iron, Sodium, Carbohydrate, Fiber, Fat, Vitamin A and Vitamin E. There were numerous nutrients with means that exceeded the recommend amount with percentages of more than 100% consumed in one day. These nutrients were Protein, Vitamin A, Vitamin B1, B2, and B3, Iron, Vitamin C and Sodium. The nutrients with means below 100% and not meeting the recommend daily intake were Folate, Calcium, Magnesium, Vitamin K, Carbohydrate, Fiber, Fat, Vitamin E, and Total Calories. Table 3 shows each nutrient analyzed and the mean percentage associated with it.

Table 3: Percent Distributions of Recommended Amounts of Nutrients Based on RDI's	
Nutrient	Mean Percentage Based on RDI's*
Total Calories	84.9
Protein	162.1
Vit A	184.7
Vit B1	129.8
Vit B2	159.7
Vit B3	127.6
Vit C	132.6
Folate	89.7
Ca	96.2
Fe	138.7
Mg	59.4
Vit K	48.6
Carbohydrate	82.1
Fiber	55.4
Fat	92.1
Vit E	38.2
Sodium	243.2
* Recommended Daily Intakes: Food and Nutrition Board	

These nutrients were used in calculating the MAR score to represent the adequacy of the dietary intake of the subjects. A MAR score of 80 or more is considered an adequate intake of dietary nutrients while a score of less than 80 is considered inadequate. Of the subjects used, 72% (n=559) scored less than 80. Only 28% (n=213) had a MAR score of 80 or more indicating an adequate consumption of nutrients. The distribution of MAR scores can be seen in Table 4.

Table 4: Distribution of MAR Scores of College Students Participating in Campus Recreation Wellness Program 2004-2009.	
Score	n =
< 80	559
≥ 80	213
* < 80 = Inadequate ≥ 80 = Adequate	

When the MAR scores of the total population were compared to BMI no significant correlation was found (p=.970). After separating the data into subjects 20 and younger and those 21 and older, again no significant correlation was found (p=.605) and (p=.593) respectively. Tables 5, 6, and 7 illustrate these results.

Table 5: Total Population Correlations: BMI, MAR, Eating, PA Score (n=772)					
		BMI	MAR	Eating Score	Exercise Score
MAR	Pearson Correlation	-0.001	1	-0.089	0.087
	Sig. (2-tailed)	0.970		0.013	0.016
	N	772	772	772	772
Eating Score	Pearson Correlation	0.123	-0.089	1	0.381
	Sig. (2-tailed)	0.001	0.013		0
	N	772	772	772	772
Exercise Score	Pearson Correlation	0.063	0.087	0.381	1
	Sig. (2-tailed)	0.081	0.016	0	
	N	772	772	772	772

Table 6: ≤ 20 yrs old Correlations: BMI, MAR, Eating, PA Score (n=592)					
		BMI	MAR	Eating Score	Exercise Score
MAR	Pearson Correlation	0.021	1	-0.095	0.096
	Sig. (2-tailed)	0.605		0.20	0.019
	N	592	592	592	592
Eating Score	Pearson Correlation	0.105	-0.095	1	0.391
	Sig. (2-tailed)	0.01	0.020		0.00
	N	592	592	592	592
Exercise Score	Pearson Correlation	0.09	0.096	0.391	1
	Sig. (2-tailed)	0.029	0.019	0.00	
	N	592	592	592	592

Table 7: ≥21yrs old Correlations: BMI, MAR, Eating, PA Scores (n=180)					
		BMI	MAR	Eating Score	Exercise Score
MAR	Pearson Correlation	-0.043	1	-0.075	0.023
	Sig. (2-tailed)	0.563		0.316	0.755
	N	180	180	180	180
Eating Score	Pearson Correlation	0.19	-0.075	1	0.348
	Sig. (2-tailed)	0.011	0.316		0.00
	N	180	180	180	180
Exercise Score	Pearson Correlation	0.018	0.023	0.348	1
	Sig. (2-tailed)	0.808	0.755	0.00	
	N	180	180	180	180

Eating Attitudes and BMI

Subjects answered a questionnaire with 10 True/False questions about eating perceptions. A score of 5 or more False answers results in the individual being flagged for disordered eating patterns. For age group 1, those 20 years old or younger, there was a mean score of 2.98 ± 2.01 and a mean score of 2.91 ± 2.01 represents age group 2. Seventy-seven percent of the entire population had a score of 4 or less ($n=598$) with only 13 percent scoring greater than 4 and indicating disordered eating patterns. Table 8 shows the percent of each score for the total population.

Table 8: Distribution of Eating Attitudes Score (n=772)		
Score	n=	Percent
0	82	11
1	126	16
2	141	18
3	140	18
4	104	14
5	82	11
6	53	7
7	24	3
8	10	1
9	5	1
10	1	1
* Score ≥ 5 Flagged		

A Pearson Correlation was done in regards to BMI and Eating Attitudes Score. Results showed that BMI had a significant positive correlation with the Eating Attitudes Score of .123 ($p=.001$) for the entire population. As BMI increased so did the total score on the Eating Attitudes Questionnaire. This also held true in both age groups with

positive significance in group 1 with .105 ($p=.010$) and in group two .190 ($p=.011$).

These results can be seen in Tables 5, 6, and 7.

There was a negative correlation with $-.089$ ($p=.013$) with MAR and Eating Attitudes Score in the total population showing that as the MAR score decreased the score on the Eating Attitudes Questionnaire increased. This same trend occurred in age group 1. There was a significant negative correlation with $-.095$ ($p=.020$) in subjects 20 years old or younger. However, there was no significant correlation in age group 2 ($p=.316$). Tables 5, 6, and 7 highlight these results.

Exercise Attitudes and BMI

A similar questionnaire to the Eating Attitudes Questionnaire was given to the subjects to assess exercise perceptions. There were 10 True/False questions asked with a score of 5 or more True answers being flagged for disordered exercise patterns. There was a mean score of 2.29 ± 2.02 for age group 1, and for those 21 and older there was a mean score of 1.81 ± 1.78 . For the total population 84% ($n=660$) had a score of 4 or less. Only 16 percent ($n=112$) scored 5 or above resulting in being flagged. Exercise Attitudes distribution scores are shown in Table 9.

Table 9: Distribution of Exercise Attitudes Score in Total Population (n=772)

Score	n=	Percent
0	157	20
1	210	27
2	137	18
3	89	11
4	67	8
5	54	7
6	28	4
7	17	2
8	11	1
9	2	1
10	1	1
* Score \geq 5 Flagged		

A Pearson Correlation was performed on BMI and Exercise Attitudes Scores. No significant correlations were found in the total population as well as in age group 2 ($p=.081$), ($p=.808$) respectively. However, in subjects ≤ 20 years old there was a positive correlation with .090 ($p=.029$) showing that as BMI increased so did the score on the Exercise Attitudes Questionnaire. Refer to Tables 5, 6, and 7 for these results.

The researcher felt it necessary to report that after further data analysis was done the data showed significant correlations between MAR scores and the scores on the Exercise Attitudes Questionnaire. In the total population, there was a positive correlation of .087 ($p=.016$) showing that as the MAR score increased so did the Exercise Attitudes score. The same trend shows in subjects ≤ 20 years old with a positive correlation of .096 ($p=.019$). When looking at age group 2 there was no significant correlation ($p=.755$) between MAR scores and Exercise Attitudes scores. Even though the results show a

significant difference between BMI and the variables these correlations were not very strong.

Fitness Levels and BMI

The subjects in this study performed a variety of exercise protocols to test their fitness levels. Their performance on these tests categorized them into different rankings in three areas: cardiovascular endurance, muscular fitness and flexibility. For each of these areas the subjects were given a ranking of Superior, Excellent, Good, Fair, Poor, or Very Poor. Fifty percent of the total population had a ranking of Good or higher in the Cardiovascular Endurance category. In the Muscular Fitness category, 49% of the population had a ranking of Superior, Excellent, or Good and in the Flexibility category 82% had a similar ranking. Table 10 illustrates the percentages of the rankings for each fitness category.

Table 10: Fitness Level Class Ranking Percentages (n=772)			
Category	Cardiovascular %	Muscular Fitness %	Flexibility %
Superior	24	0	59
Excellent	17	7	15
Good	9	42	8
Fair	10	38	5
Poor	13	10	9
Very Poor	27	3	4

Spearman's correlation was used to analyze the data to find correlations between Fitness Levels and BMI. There was a negative correlation of $-.203$ ($p=.000$) between

BMI and the Cardio Category showing that as BMI increased the subjects' cardiovascular fitness levels decreased. A similar correlation of $-.122$ ($p=.001$) was found with BMI and flexibility. As BMI increased, the subjects' flexibility levels decreased. Table 11 shown below highlights these results.

Table 11: Correlations: BMI and Fitness Levels (n=772)		
		BMI
Cardio Category	Correlation Coefficient	-0.203
	Sig. (2-tailed)	0.00
	N	771
Muscular Fitness Category	Correlation Coefficient	-0.053
	Sig. (2-tailed)	0.138
	N	772
Flexibility Category	Correlation Coefficient	-0.122
	Sig. (2-tailed)	0.001
	N	772

The population was again split into age group 1 and 2 and analyzed for correlations with BMI. A significant negative correlation $-.146$ ($p=.000$) was found in BMI and Cardiovascular Category in subjects 20 years old or less. There was also a significant negative correlation $-.089$ ($p=.031$) found between BMI and Flexibility Category in age group 1. These results show that as BMI increased both cardiovascular and flexibility levels decreased in subjects ≤ 20 years old. These results are shown in Table 12.

In age group 2, there was a significant negative correlation of $-.332$ ($p=.000$) between BMI and Cardiovascular Category. There was no significant correlation between BMI and Muscular Fitness Category or Flexibility Category ($p=.798$), ($p=.101$) respectively. In subjects 21 or older as BMI increased there was a decline in their

cardiovascular fitness levels, however no significant relationship was found with BMI and strength or flexibility. These results are shown in Table 13 below.

Table 12: ≤20 Correlations: BMI and Fitness Levels (n=592)		
		BMI
Cardio Category	Correlation Coefficient	-0.146
	Sig. (2-tailed)	0.00
	N	591
Muscular Fitness Category	Correlation Coefficient	-0.032
	Sig. (2-tailed)	0.436
	N	592
Flexibility Category	Correlation Coefficient	-0.089
	Sig. (2-tailed)	0.031
	N	592

Table 13: >21 Correlations: BMI and Fitness Levels (n=180)		
		BMI
Cardio Category	Correlation Coefficient	-0.332
	Sig. (2-tailed)	0.00
	N	180
Muscular Fitness Category	Correlation Coefficient	-0.019
	Sig. (2-tailed)	0.798
	N	180
Flexibility Category	Correlation Coefficient	-0.123
	Sig. (2-tailed)	0.101
	N	180

CHAPTER V

DISCUSSION, CONCLUSION AND LIMITATIONS

Literature has previously shown that college students participate in various behaviors that are unhealthy including consuming diets high in fat, sodium and sugar and low in fruits and vegetables. Students also participate in decreased physical activity and increased alcohol consumption, all of which can contribute to the weight gain that has been reported during the college years. Many studies investigated this weight gain that has been commonly referred to as the “freshman 15,” but the research has shown this is more of a myth than reality. Negative attitudes relating to diet and exercise also play a big role in the overall wellbeing of college aged students. With 80 percent of college females restricting their diet and the prevalence of students being diagnosed with over-exercising syndrome increasing, the need to have the “perfect” body is showing adverse affects on health that may continue through later walks of life.

This research study used a variety of data collected by the university campus recreational center between the years of 2005 and 2009. By determining the current health trends among students, health professionals and educators can effectively develop tools and programs to teach students healthy lifestyle behaviors. College is said to be the key time for development of healthy lifestyle habits due to the students’ greater freedom and control over their lifestyles and thus has been recognized as a critical period for health assessment and education (5).

Dietary Patterns in College Students

The college years are often the first time that students, living away from home, are faced with many different food choices that may result in poor eating habits. It has been shown that college students typically consume a diet lacking in fruits, vegetables, and dairy products (11-12). In the current study, a few of the vitamins and minerals found in fruits, vegetables and dairy products, such as Vitamin E, Magnesium, Vitamin K and Calcium had mean percents below the recommended daily values (Table 3). Research has shown that students do not meet the recommended intake of a minimum of 20g of dietary fiber per day which supports the findings of this study where the mean average of fiber was only 55 percent of the recommended amount.

Students generally skip breakfast or have something they can prepare in their dorm room, eat quickly, or carry to class. Most students tend to snack throughout the day on foods such as chips, crackers, or sweets. These eating habits play a significant role in the overall diet consumed by students. This study calculated MAR scores from the dietary analysis performed from the foods recorded on the 2-day dietary recalls. The majority of students (72 percent) scored 80 or less indicating an inadequate diet (Table 4). This along with the other poor eating habits mentioned may play a significant role in future risk of disease. It is important then to gain a better understanding of when and how a student is eating so better nutrition education can be provided.

Previous research has found that students with lower BMIs consume more vegetables, especially green leafy vegetables whereas those with higher BMIs report a higher intake of all meats which are considered high in saturated fat(2). This study did

not look at individual foods but more so of overall nutritional intake with the calculation of MAR scores. BMI did not significantly correlate to these MAR scores.

Registered Dietitians need to play close attention to the specific nutrients college students have shown to be lacking in. They then can focus on promoting certain foods that will help increase the consumption of these nutrients and help the students develop a more overall adequate diet. It is also important for Registered Dietitians to also be aware of the dietary patterns of college students, such as skipping meals and snacking throughout the day, which most college students follow. This can help them to better advise the students in how to fit a balanced diet into their lifestyles.

Physical Activity Behaviors in College-aged Students

The health benefits of physical activity described in the US Surgeon General's Report on Physical Activity and Health provide compelling reasons to adopt and maintain an active lifestyle. However, even with these known benefits according to the 2000 National College Health Assessment, 57% of male and 61% of female college students reported that they performed no vigorous or moderate exercise on a least 3 of the previous 7 days (5). Healthy People 2010 have recognized post-secondary educational institutions as settings where physical activity should be promoted among young adults.

American college students are on average not getting the recommended amount of physical activity in per week. This decline in physical activity from high school to college can cause a decrease in fitness levels. In the current research, fifty percent of the total population studied received a ranking of Good or higher for their cardiovascular endurance. For muscular fitness, 49 percent of the population had a ranking of Superior, Excellent, or Good and when looking at flexibility, 82 percent had a similar ranking

(Table 10). It is important for students to become aware of how much physical activity is recommended and the reasons for these recommendations. Students who adopt healthy exercise behaviors early on will gain a more holistic level of fitness. This increase in fitness levels will allow the students to be able to continue a more physically productive and higher quality lifestyle and help decrease their chance of developing future risk of chronic diseases.

Obesity rates in the United States have more than doubled in the past fifty years, with 34% of adults considered obese in 2005. Increases in obesity levels are commonly attributed to small prolonged increases in energy intake resulting in a gradual consistent yearly weight gain. In young adults this has been estimated to be approximately 0.2 to 0.8 kg per year (20). It is important for young adults to understand the classifications of BMI and how these classifications can affect their fitness levels. This study showed that as students had a higher BMI their cardiovascular endurance and flexibility decreased (Table 11). Adopting and maintaining a healthy weight will directly affect an individual's overall health and fitness levels, therefore it is important students be educated on the benefits and variety of ways to become more physically active.

Dietary Attitudes in College Students

It has been shown that an individual's attitude or perception greatly affects their behavior. First year college students are placed into a new environment which can lead to a development of, or continuation of, negative thoughts in regards to body image and dietary patterns. Analysis of dietary attitudes shows that 12% of students reported to having disturbed eating attitudes and 20% flagged for anorexic symptomatology (14). In

the current study, thirteen percent of the subjects studied were flagged for having disordered eating attitudes (Table 8).

Peer groups can have a great deal of influence on college students' eating attitudes and behaviors. Within the college community there are subgroups of students that are at greater risk of developing or continuing eating-related problems, such as sororities and collegiate athletics. It's been reported that women living in sorority houses have a greater fear of becoming fat, greater body dissatisfaction and weight preoccupation, as well as higher concern with dieting (17). Both male and female college athletes feel an immense pressure to perform at high levels and in certain sports, a specific weight class or body shape is linked to this high performance which can lead college athletes to become more obsessed with weight and weight control.

In certain ethnic groups a larger body size and shape is directly related to negative body image attitudes and unhealthy weight control. The greatest prevalence of disordered eating occurs in young Caucasian girls. This study analyzed correlations between BMI and the score of the Eating Attitudes Questionnaire. Results showed that as BMI increased so did the total eating attitudes score (Tables 5-7). This illustrates that as students become more overweight or obese their attitudes about food become unhealthier. Differences in ethnic and cultural opinions on body size needs to be taken into account when body image topics are discussed with the college student population.

The media has been seen to target and greatly influence the college age group. The media portrays an ideal thinness which plays into students' desire to want to fit in and be accepted. A common message in the media is "fat is bad." This fear of eating certain types of foods can be a precursor for a disordered eating pattern, and previous

studies have shown that this may lead to a decrease in highly needed nutrients (14). Similar results were seen in the current research. The mean percentage for fat was 92% and a mean of 82% of total carbohydrate were reported by subjects. These below recommended percentages may be due to the increase in low-fat and low-carbohydrate diets being followed by college students.

This study showed that the adequacies of the students' diets were correlated with their eating attitudes within certain groups. In the total population, it was found that as the MAR score decreased the score on the Eating Attitudes Questionnaire increased. This indicates that as the subjects eating perceptions became unhealthier their diet became more inadequate in overall nutrient intake. When the population was split into the separate age groups, this same trend occurred in age group 1 but did not occur in subjects 21 and older (Tables 5-7).

Physical Activity Perceptions Among College Students

Very little research exists on the perceptions and attitudes of college students and exercise. There is evidence though that suggests print, broadcast and electronic media present and reinforce the value of the thin ideal for women and the muscular ideal for men through ideal images (17). The ideal male body image appears to have grown steadily more muscular over the years as the ideal female body image, as portrayed by the media, has shown to have grown thinner. This thrive to achieve the "perfect body" has led to an increase in body dissatisfaction and low self-esteem. In the current study, subjects were asked to answer 10 True/False questions relating to physical activity perceptions. If a subject marked 5 or more True answers they were flagged for

disordered exercise patterns. For the total population 84% (n=660) had a score of 4 or less and only 16% (n=112) scored 5 or above resulting in being flagged (Table 9).

Most college students say that they have dramatically decreased the amount of physical activity from high school to college and that they are unhappy about this decline. This transition from having highly structured physical activity in high school to more freedom in choosing to exercise during discretionary times throughout the week has impacted the weight gain shown during the freshman year of college. In this study a Pearson correlation was performed in order to find any correlations between BMI and the scores on the Exercise Attitudes Questionnaire. In subjects ≤ 20 years old results showed that as BMI increased so did the score on the Exercise Attitudes Questionnaire. These results suggest that during the freshman year of college, students who have an increase in BMI will have a higher incidence of developing disordered exercise patterns (Tables 5-7).

This study further analyzed the data to look for significant correlations between MAR scores and the scores on the Exercise Attitudes Questionnaire. In the total population, as well in age group 1, the data showed that as the MAR score increased so did the Exercise Attitudes score. This indicates that as the subjects' diet became more adequate in overall nutrient intake, their incidence of developing disordered exercise patterns increased. When looking at age group 2 there was no significant correlation thus these trends do not hold true in subjects 21 years old or higher (Tables 5-7).

Conclusion

Based on the data collected in this study, a few key themes presented themselves and should be taken into account when developing nutrition or exercise education programs designed for college-aged students. First of which was that many of the results found in this study differed between the two separate age groups used. In students 20 years old and younger the adequacy of their diet was found to be correlated to their attitudes about food and body image. This was not true in the students who were 21 and older suggesting that the diet of the freshman and sophomore students were more impacted by negative eating attitudes. Results from the current research also found that in the younger students, the adequacy of their diet was correlated to their attitudes about exercise whereas in the students 21 years old and older no correlation was found. These differences could be due to the large amounts of stress freshman and sophomore students may feel during the transitional period between high school and college and the effects of unhealthy stress management techniques utilized.

Secondly, educational programs need to target changing the attitudes and perceptions of the students in order for diet and exercise behavior changes to occur. Many of the results found in this study indicated that negative attitudes about food and exercise directly correlated with their behaviors. Understanding where these attitudes stem from and what situations encourage unhealthy perceptions will give educators a valuable insight into how to impact the student's diet and exercise behaviors.

Lastly, past research, including the present study, uses BMI as the primary comparison variable. Body Mass Index does not separate muscle mass from fat mass and

therefore may not be the best tool to use in this population. Results from this study showed that placing all the emphasis on one number does not give the entire picture of a student's total health. Registered Dietitians and other health care providers need to take into account other indicators such as fitness levels, blood pressure, cholesterol, and triglyceride levels when evaluating overall health and emphasizing the need for behavior changes in this population.

Limitations

While this study will be invaluable in providing insight into trends that are present within this population, some limitations exist that should be taken into consideration. First of all, the sample may not be a true representation of the population. Beginning in January 2009, the Nutrition 100 class at the University of Nebraska-Lincoln was required to participate in the UNL Campus Recreation Wellness Assessment. This class is open to all students at the university however it is a prerequisite for students in the Nutrition or Exercise Science fields. These individuals may be more conscious about how they eat and how much they exercise which could skew the data. Although only one semester of the Nutrition 100 class's data was used in this study, it needs to be noted.

The 2-day diet recall that was used to find the percentages of nutrients consumed as well as to calculate the MAR scores was self-reported by the subjects. Although the directions were stated very clearly, individual bias could have interfered with what was reported. Also, the lack of understanding and being aware of proper serving sizes may have skewed what was reported by the subjects. The Eating and Exercise Attitudes

Questionnaire was also self-reported which could have impacted the accuracy of the data if the subjects were not fully honest in their answers.

The software used to enter the foods from the 2-day diet recall may have also caused some inconsistencies. A larger more complete database was unavailable due to an older version of Food Processor being used. This caused the individuals entering in the food items to sometimes have to choose different items than what was reported if it wasn't listed in the program. Even though very similar foods were picked to represent what was reported, it still is not exact and should be taken into consideration.

Another limitation of this study was discrepancy in the cardiovascular testing protocols. From 2005-2008, a subject completing this part of the Wellness Assessment would be able to choose if they wanted to do the YMCA 3-minute Step Test, Stationary Bike Test, or any one of the three Treadmill Test protocols. Because not every student was asked to perform the same test this could skew the cardiovascular fitness results. Starting in January 2009, all students were required to perform the YMCA 3-Minute Step Test and this will continue to be enforced in the future.

Implications for Further Research

An area that may be valuable to pursue for future research would be the use of dietary supplements and ergogenic aids. The use of these products are becoming more wide spread and normalized and more information about the types and frequencies consumed has yet to be collected from this population. Ideally, incorporating students in collegiate athletics and those that are not may provide a better understanding of the prevalence of supplement use.

It may also be beneficial to collect data on the times and frequencies students are eating. It has been mentioned that it is a common behavior for students to snack throughout the day and sometimes skip meals. It would be beneficial then to gain a better picture of when and how often students typically eat so more accurate nutrition education could be utilized for this population.

Further research should be done in this population to determine the prevalence of over-exercising syndrome and the exercise attitudes that correspond. Although this study briefly touched on exercise attitudes, it did not address how these attitudes correlate to types and amounts of exercise or fitness levels.

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APPENDIX A

Institutional Review Board Letter of Approval



February 5, 2009

Katie James
Department of Nutrition and Health Sciences
401 N 44th St #1108 Lincoln, NE 68503

Wanda Koszewski
Department of Nutrition and Health Sciences
120C LEV UNL 68583-0806

IRB Number: 2009029552EP
Project ID: 9552
Project Title: Assessing Dietary Intake, Eating Attitudes and Exercise Patterns in College Students

Dear Katie:

This letter is to officially notify you of the approval of your project by the Institutional Review Board (IRB) for the Protection of Human Subjects. It is the Board's opinion that you have provided adequate safeguards for the rights and welfare of the participants in this study based on the information provided. Your proposal is in compliance with this institution's Federal Wide Assurance 00002258 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Date of EP Review: 01/06/2009

You are authorized to implement this study as of the Date of Final Approval: 02/05/2009. This approval is Valid Until: 02/04/2010.

We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

- Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- Any breach in confidentiality or compromise in data privacy related to the subject or others; or
- Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by

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the research staff.

For projects which continue beyond one year from the starting date, the IRB will request continuing review and update of the research project. Your study will be due for continuing review as indicated above. The investigator must also advise the Board when this study is finished or discontinued by completing the enclosed Protocol Final Report form and returning it to the Institutional Review Board.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,
Mario Scalora, Ph.D.
Chair for the IRB

APPENDIX B-1

Waiver and Release of Liability Form

Main Form
University of Nebraska-Lincoln
Campus Recreation

WAIVER AND RELEASE OF LIABILITY for Campus Recreation Activities

DISCLAIMER: The UNIVERSITY OF NEBRASKA is NOT RESPONSIBLE for any injury or loss of property to any person suffered while warming up, practicing, traveling, playing, or participating in **Campus Recreation Activities** for any reason whatsoever, including ordinary negligence.

This **WAIVER** and **RELEASE OF LIABILITY** was executed this ____ day of _____, 2____, at Lincoln, Lancaster County, State of Nebraska by _____, **(Releasor)** in favor of the **UNIVERSITY OF NEBRASKA and its Regents, Officers, Employees, Instructors, Staff, agents, operators, successors, and assigns (University)**.

The **Releasor** wishes to participate in **Campus Recreation Activities**. In consideration for the privilege of participation in the program, the **Releasor** consents and agrees to the following:

1. **Releasor** certifies that he/she is physically capable of participating in Campus Recreation Activities and that he/she will take responsibility for physical fitness and capability to perform under normal conditions of Campus Recreation Activities. **Releasor** is encouraged to get his/her physician's opinion prior to participating in any Campus Recreation Activities. In the event of a medical emergency, the University of Nebraska or its representatives have my permission to take whatever measures they deem reasonable to render assistance and that I and/or my family will be financially responsible for any expenses involved.
2. **Releasor** realizes that participation in Campus Recreation Activities involves certain risks and danger and is a vigorous activity involving severe respiratory and cardiovascular stress. **Releasor** has hereby been made aware that participation in Campus Recreation Activities has the following non-exclusive list of certain risks which I accept: death; head, eye, neck, and spinal injury resulting in complete or partial paralysis; brain damage; heart attack; blisters; cuts; lacerations; abrasions; concussions; contusions; strains; sprains; dislocations; fractures; cold and heat injuries; water immersion; drowning; lightning strikes; injury to bones, joints, muscles, internal organs; and environmental conditions. In addition, I understand and accept the incidental risks of travel to and from the site of activity; participation at sites that may be remote from available medical assistance; and the possible reckless conduct of other participants.
3. Consequently, while understanding that the **University** has taken precautions to provide organization, supervision, and equipment for reasonable safety, **Releasor** assumes joint and personal responsibility for safety while participating in Campus Recreation Activities. Pursuant to that joint and personal responsibility, **Releasor** agrees to comply with the instructions and direction of representatives and staff members of Campus Recreation. **Releasor** understands that failure to abide by the instructions and rules may result in his/her termination from the activity. **Releasor** accepts personal responsibility to ensure that any equipment needed to participate in the Campus Recreation Activities and used by the **Releasor** is safe and functioning properly and to refrain from causing loss or damage to the property of the **University** and Campus Recreation. **Releasor** realizes that he/she is solely responsible for any personal equipment, supplies, or property he/she may choose to use during the duration of the activity.
4. **Releasor** further agrees to indemnify and hold harmless the **University** for any and all claims or actions as a result of engaging in, using **University** facilities and equipment, or receiving instruction for Campus Recreation Activities or any activities incidental thereto whatsoever, whenever, or however the same may occur.
5. **Releasor** acknowledges that photographs and digital images may be taken during participation. **Releasor** understands and agrees that the images may be published and used by the University.

6. **Releasor** is aware that if he/she uses a vehicle not operated by the **University** for transportation to, at, or leaving the activity site, the **University** is **NOT** responsible for any damage caused by or arising from **Releasor's** use of such vehicle. Furthermore, **Releasor** acknowledges that he/she is solely responsible for any action he/she takes outside the scope of those actions permitted by the **University** for purposes of the particular activity regardless if occurring before, during, or after the duration of the activity. **Releasor** agrees to follow University policies when operating a University owned vehicle.
7. In consideration of participation in Campus Recreation Activities, **Releasor** hereby **RELEASES** and covenants not-to-sue the **UNIVERSITY** for any and all present and future claims resulting from ordinary negligence on the part of the **UNIVERSITY** for property damage, personal injury, or wrongful death arising as a result of my engaging in, using **University** facilities and equipment, or receiving instruction for Campus Recreation Activities or activities thereto, wherever, whenever, or however the same may occur. **Releasor hereby voluntarily waives** any and all claims or actions resulting from ordinary negligence, both present and future, that may be made by **Releasor's family, estate, personal representative, heirs, or assigns.**

I have read and understand that this **WAIVER** is intended to be as broad and inclusive as permitted by the laws of the State of Nebraska and agree that if any part is held invalid, the remaining parts of this **WAIVER AND RELEASE** will continue in full force and effect as intended. I further agree the venue for any legal proceeding shall be in the State of Nebraska.

I understand the rights that I am **waiving** and that I am freely signing this **WAIVER AND RELEASE**. I have read and fully understand that by signing this agreement I am giving up legal rights and remedies, which may be available to me for ordinary negligence of the **University**. I further agree to follow and abide by the regulations and rules of the **UNIVERSITY** as they pertain to Campus Recreation Activities and to reimburse and make good to the **UNIVERSITY** any loss, damage, or cost the **UNIVERSITY** may have to pay as a result of my participation in the program.

RELEASOR (Signed)

RELEASOR (Printed)

 University ID #

 Date

The following is for informational purposes only:

 Emergency Contact

 Contact Phone #

 Contact Address, City & State

Releasor's Gender: M F

Releasor's Age: 19 years of age or older (circle)

Yes No

APPENDIX B-2

Personal Training/Wellness Assessment Form

Prefer meeting at: ☐ City ☐ East Campus Recreation

PAID: \$ _____ RECEIPT #: _____

PURCHASED DATE: _____

PACKET RECEIVED DATE: _____

06/1

University of Nebraska-Lincoln
Campus Recreation

Personal Training / Wellness Assessments
Health History Information

First Name: _____ Last Name: _____

Gender: M F

UNL#: _____ Date of Birth: ____/____/____ Age: _____

Height: _____ Weight: _____

Phone #: _____ (H) _____ (cell or work)

Address: _____ (Zip) _____

Email: _____ Membership Type: Student Faculty Staff Other

1. List 3 reasons why you signed up for a personal wellness assessment or personal training:

a. _____

b. _____

c. _____

2. What do you want exercise to do for you? Please attach a weight of importance (from the scale below) to of the following statements.

Extremely
Important
5

4

Somewhat
Important
3

2

Not at all
Important
1

____ Improve cardiovascular fitness

____ Reduce body fat

____ Tone body

____ Increase strength

____ Other: _____

____ Improve performance in a specific sport _____

____ Improve ability to cope with stress

____ Improve flexibility

____ Increase energy level

____ Motivation/Enjoyment

3. What type of exercise interests you? (please check all that apply)

____ Walking

____ Cycling

____ Climbing

____ Stairmaster/Elliptical

____ Group Exercise

____ Racquet Sports

____ Jogging

____ Yoga/Pilates

____ Team Sports

____ Swimming

____ Strength Training

____ Other: _____

4. Select one statement that most closely describes your own level of physical activity:

____ I am not physically active and I do not plan on becoming so.

____ I have been thinking about becoming physically active, but I haven't done anything about it yet.

____ I am physically active once in a while, but not regularly.

____ I have become involved in regular physical activity within the past 6 months.

____ I participate in regular physical activity and have done so for more than six months.

If not currently active: I was physically active in the past, but not now. ____ Yes ____ No

5. How much time per week are you willing to devote to an exercise program?

Minutes/day: _____ Days/week: _____

6. a. I currently participate in the following activities:

ACTIVITY	DAYS/WEEK	MINUTES/SESSION	# OF MONTHS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

b. Please check if you are currently training for muscular strength/endurance:

What strength training equipment do you use?

- ☐ free weights
☐ weight machines (ie. Cybex, Nautilus)
☐ equipment from water workouts
☐ fitness classes
☐ super circuit
☐ Other _____

How many sets per muscle group do you perform

☐ 1-3 sets ☐ 4-6 sets ☐ 7+ sets

How many repetitions do you perform?

☐ < 6 ☐ 6-10 ☐ 8-12
☐ 12-15 ☐ 15-20 ☐ > 20

c. Describe your strength training workout (feel free to attach a copy of your current program).

d. Which areas do you emphasize during your workout?

☐ chest ☐ shoulders ☐ back ☐ low back ☐ biceps
☐ triceps ☐ hamstrings ☐ calves ☐ quadriceps ☐ abdominals

7. How do you spend the majority of your time in each day?

☐ sitting at a desk ☐ walking ☐ driving ☐ standing ☐ carrying loads ☐ other: _____

8. Indicate how you normally deal with daily stress:

(not coping well) 1 2 3 4 5 6 7 8 9 10 (coping well)

Indicate your energy level:

(not very high) 1 2 3 4 5 6 7 8 9 10 (extremely high)

9. What motivates you to exercise?

10. What are your fitness goals?

11. If you have purchased personal training visits:

Please indicate trainer preference: ☐ Male ☐ Female ☐ No Preference

What days/times are best for you to meet with your trainer?:

Approximately how many weeks do you plan to have a personal trainer?

12. If you have not purchased personal training visits, are you interested in working with a trainer?

APPENDIX B-3

Medical History Report Form

08/06

University of Nebraska-Lincoln
Campus Recreation
 MEDICAL HISTORY REPORT FORM

Name	UNL ID #	/ / D.O.B.	Age
Emergency Contact Person's name		Phone #	

**American Heart Association / American College of Sports Medicine
 Health/Fitness Facility Pre-participation Screening Questionnaire**

Assess your health needs by marking all true statements.

History

You have had:

- _____ a heart attack
- _____ heart surgery
- _____ cardiac catheterization
- _____ coronary angioplasty (PTCA)
- _____ pacemaker/implantable cardiac defibrillator/rhythm disturbance
- _____ heart valve disease
- _____ heart failure
- _____ heart transplantation
- _____ congenital heart disease

Symptoms

- _____ You experience chest discomfort with exertion.
- _____ You experience unreasonable breathlessness.
- _____ You experience dizziness, fainting, blackouts.
- _____ You take heart medications.

Other health issues:

- _____ You have musculoskeletal problems.
- _____ You have concerns about the safety of exercise.
- _____ You take prescription medication(s).
- _____ You are pregnant.

Please elaborate on any of the above statements that you have marked. A physician referral for exercise may be required before a fitness assessment or personal training session.

Cardiovascular risk factors

- _____ You are a man older than 45 years.
- _____ You are a woman older than 55 years or you have had a hysterectomy or you are postmenopausal.
- _____ You smoke.
- _____ Your blood pressure is >140/90.
- _____ You don't know your blood pressure.
- _____ You take blood pressure medication.
- _____ Your blood cholesterol level is >240 mg/dL.
- _____ You don't know your cholesterol level.
- _____ You have a close blood relative who had a heart attack before age 55 (father or brother) or age 65 (mother or sister).
- _____ You are diabetic or take medicine to control your blood sugar.
- _____ You are physically inactive (ie, you get <30 minutes of physical activity on at least 3 days per week).
- _____ You are >20 pounds overweight.

A physician referral may be required before engaging in a fitness assessment or personal training session. A client will be informed if he/she requires a medical clearance.

_____ None of the above is true.

You should be able to exercise safely without consulting your healthcare provider in almost any facility that meets your exercise program needs.

These responses are accurate and true to the best of my knowledge.

Signature: _____

Date: _____

APPENDIX B-4

Informed Consent for Exercise Testing Form

08/06

University of Nebraska-Lincoln
Campus Recreation
Fitness and Wellness Services

Informed Consent for Exercise Testing

General Testing Guidelines:

1. Please dress in comfortable and loose clothing (preferably shorts and t-shirt) and athletic shoes.
2. Refrain from consuming a heavy meal, alcohol, caffeine, or using tobacco products within 3 hours of testing.
3. Avoid significant exercise on the day of the assessment.

The Initial Consultation/Fitness Assessment session begins with a current fitness evaluation, consisting of: resting heart rate, blood pressure, body composition, flexibility, cardiovascular endurance, and muscular strength and endurance. Following your fitness assessment, an exercise specialist will assist you with developing personalized fitness goals based on your test results and make exercise program recommendations. This session will take about 1 hour 15 minutes.

The Sport Conditioning Evaluation session begins with an assessment to evaluate sport components such as agility, vertical leap, horizontal jump, speed, muscular strength and endurance, flexibility or balance. Based on the evaluation, training exercises and drills tailored to sport-specific performance will be suggested. This session will take about 1 hour 30 minutes.

Fitness Retesting Sessions are recommended after 3 months to evaluate your progress on your custom program and/or redefine your fitness goals.

Please initial to indicate that you have read and understand the following statements:

- _____ The testing protocols for the fitness evaluations are based on guidelines established by the American College of Sports Medicine and the National Strength and Conditioning Association. Testing procedures will be explained to you prior to the start of each test. Each physical assessment is voluntary; you may inform the exercise specialist if you would prefer to not have a particular test performed. During the testing, you will likely experience some fatigue with particular tests. **Please immediately report to the exercise specialist any excessive fatigue, shortness of breath, or chest discomfort during testing. You may request that a test be terminated at any time.**
- _____ Please make sure you have filled our health history forms as accurately as possible and inform your exercise specialist if you have any health concerns or injuries that would prevent you from engaging in a particular test. As previously stated, a physician's release may be requested by the exercise specialist prior to performing the assessment.
- _____ A skinfold body composition test will be performed for fitness assessments. Please be advised that the results of this test are highly variable and that there is a wide range of body fat percentages that are healthy. Some individuals express distress with body composition results that they consider to be "too high." If you believe that the results of a body composition test would negatively affect your self-esteem and body image, we recommend that you NOT participate in the test at this time. **Please initial if you desire to participate in the body composition assessment.**

To be completed the day of testing:

I voluntarily consent to engage in this fitness assessment and fully understand that there are minimal risks involved for apparently healthy individuals. I have had the opportunity to discuss the procedures and ask questions. All information obtained during this test will be treated and confidential and will not be shared, with the exception of with another Campus Recreation fitness staff member (i.e. personal trainer or strength and conditioning coordinator).

Participant Signature _____

Date _____

APENDIX B-5

Physician Medical Clearance Form

**University of Nebraska-Lincoln
Campus Recreation
Fitness and Wellness Services**

Physician Medical Clearance Form

Physician Name _____ Phone # _____ Fax # _____

Participant Name _____

I give permission for my physician to disclose any information relevant to my participation in Campus Recreation Fitness and Wellness Services.

Participant Signature _____

Dear Dr. _____,

_____ has expressed interest in participating in a fitness assessment protocol, including a cardiovascular test (sub maximal bicycle or step test), sit and reach flexibility, abdominal curl and push-up tests. This individual would also like to engage in exercise sessions at our facility, which would include personalized aerobic, strength training and flexibility exercise protocols.

Currently, this participant exhibits the following health concerns or risks:

Signature of Fitness Professional _____

Report of Physician

_____ I know of no reason why the client may not participate.

_____ I believe the client can participate, but I urge caution because:

_____ The client should not engage in the following activities:

_____ I would like to see this client before they engage in physical activity.

Physician's Signature: _____ **Date:** _____

Please return to Shinya Takahashi, Strength and Conditioning Coordinator
University of Nebraska-Lincoln
55 Campus Recreation
PO Box 880232
Lincoln, NE 68588-0232
Fax#: (402) 472-8080
Voice#: (402) 472-6170

APPENDIX C-1

Weight History Form

Nutrition Consultation

University of Nebraska, Lincoln
Campus Recreation
Fitness and Wellness Services

Perry Scheer

Please circle the name of your instructor

For questions, please contact:
Karen Miller, MS, RD, LMNT
Coordinator for Nutrition Education
(402) 472-3467
(402) 472-0880

**University of Nebraska, Lincoln
Campus Recreation
Fitness & Wellness Services
Weight History**

Name: _____ UNL ID #: _____

Daytime Phone: _____ Home Phone: _____

Gender: M F Date of Birth: _____ Age: _____

Height: _____ Current Weight: _____ Goal Weight: _____

Highest weight as an adult and at what age? (18 years or older) _____

Lowest weight as an adult and at what age? (18 years or older) _____

Have you ever been at your goal weight? _____ If yes, when and for how long? _____

Please list any pertinent family or personal weight management history or issues. _____

Medication/Supplement: _____

Identify one question about nutrition that you would like answered: _____

Please state one nutrition related goal: _____

Women Only: Do you menstruate monthly? Yes No

APPENDIX C-2

Dietary Recall Assignment

Dietary Recall Assignment

- Please keep track of everything you eat and drink for two days. Be sure to include meals, snacks and beverages.
- Please record how the items are prepared—i.e. baked, fried, broiled, etc.
- Please record the approximate serving size—i.e. $\frac{1}{2}$ cup, 1 cup, 3 ounces, etc. (Use the Helpful Hints chart below).
- If you know brand names, please include that information.
- The most accurate way to keep food journals is to record it as soon after eating as possible.

Helpful and Fun Hints for Estimating Serving Sizes

Use the following estimates to equate serving sizes with everyday items:

3 ounces meat, poultry, pork or fish	= palm of your hand = deck of cards = cassette tape
$\frac{1}{2}$ cup of cooked rice, potatoes, pasta or vegetables.	= tight fist of hand = tennis ball = billiard ball
1 medium fruit	= tight fist of hand
1 ounce of cheese	= your thumb = four dice = ping pong ball
1 medium potato	= computer mouse

APPENDIX C-3

2-Day diet Analysis Form

APPENDIX C-4

Eating/Exercise Attitude Questionnaire

True	False	Food and Exercise Inventories
_____	_____	I rarely talk negatively about my body.
_____	_____	I do not weigh myself more than once a week.
_____	_____	If appearance didn't matter in our society, I would still exercise the same amount that I do now.
_____	_____	I rarely compare my looks or body to others.
_____	_____	I rarely feel guilty/anxious after eating a high fat/high caloric food.
_____	_____	I can accept a compliment about my appearance.
_____	_____	If I had to do things that were unhealthy (fasting, laxatives, throwing up, excess exercise) in order to change (or maintain my weight), I would choose not to do them.
_____	_____	I feel happy or content, for the most part, with my life at this time.
_____	_____	I wouldn't panic if I gained (or lost) a few pounds.
_____	_____	For the most part, I am satisfied with my body shape and size.

Source: The Randman Center of Philadelphia, Eating Disorders Treatment Center

True	False	
_____	_____	The way my body looks to me depends on whether I have exercised that day or not.
_____	_____	I often exercise when I have an injury or don't feel well.
_____	_____	I feel anxious if I miss even one workout.
_____	_____	I feel depressed and/or irritable if I miss exercising for three days or more.
_____	_____	I find myself continually adding newer and stricter goals to my exercise routine.
_____	_____	I will dramatically alter my schedule in order to work out.
_____	_____	The thought of cutting back on my workout scares me.
_____	_____	I give up social engagements to exercise.
_____	_____	I monitor how many calories I burn every time I work out.
_____	_____	I consider exercise more of a chore than an activity.

Source: Appearance Obsession: Learning to Love the Way You Look by Joni B. Johnston, Psy.D.

APPENDIX D-1

YMCA 3-Minute Step Test Protocol

YMCA Step Test

Cardiorespiratory Assessment

American College of Sports Medicine. *ACSM's guidelines for exercise testing and prescription*. 5th ed. Baltimore: Williams and Wilkins, 1995.

Cooper, C.B. & Stoner T.W (2001). *Exercise testing and interpretation; a practical approach*. Cambridge, United Kingdom: Cambridge University Press

Equipment

- 12" aerobic step or bench
- Metronome
- Stop watch

Method of Stepping

- On the first count (sound cue from the metronome), step up on to the step with one foot.
- On the second count, subjects step up with the opposite foot, extending both legs and the back.
- On count 3, the first foot is returned to the floor.
- On count 4, the second foot returns to the floor.
- This four step cycle is repeated in time with the metronome for the duration of the test.

Pre-test Procedure

- Measure a 15 second resting HR at the carotid artery.
- Do not assume the client is able to locate the pulse.
- Do not begin test if HR is elevated.
- Provide the client adequate time to warm-up and stretch.
- Describe and demonstrate the stepping method.
- Provide 15-30sec practice before the test is administered.

Test Procedure

- Male and female subjects perform the test at 24 cycles or 96 sounds per minute.
- The test lasts for 3-min.
- Recovery heart rate is recorded for *1-minute* beginning precisely 5 s after the 3-min stepping period has ended. Client should be seated while taking heart rate, with arm below the heart.
- For the test to be valid, both legs and the back must come to full extension at the top of each step after count 2.

APPENDIX D-2

Balke Protocol

Treadmill protocols

BALKE PROTOCOL

<u>Time</u>	<u>Speed</u>	<u>%Elevation</u>
1st	3.3mph	0
2nd	3.3mph	2
3rd	3.3mph	3

- **Speed is constant at 3.3mph**
- **Elevation increases**
- **1% each minute.**

15^{nth}	3.3mph	15*
-------------------------	---------------	------------

This protocol may be suitable for untrained individuals.

***The ramp of the treadmill can be elevated up to 15%**

APPENDIX D-3

Modified Balke Protocol

Treadmill protocols

MODIFIED BALKE **PROTOCOL**

<u>Time</u>	<u>Speed</u>	<u>%Elevation</u>
1st	3.4mph	0
2nd	3.4mph	2
3rd	3.4mph	4
4th	3.4mph	6
5th	3.4mph	8
6th	3.4mph	10
7th	3.4mph	12
8th	3.4mph	14

***Speed is constant at 3.4mph. Elevation increases 2% each minute.**

**** The ramp of the treadmill can be elevated up to 15%.**

*****This protocol may be suitable for moderately trained individuals.**

APPENDIX D-4

Ellestad Protocol

Treadmill protocols

ELLESTAD PROTOCOL

<u>Time</u>	<u>Speed</u>	<u>%Elevation</u>
0-3	1.7mph	10
3-5	3.0mph	10
5-7	4.0mph	10
7-10	5.0mph	10
10-12	6.0mph	15
12-14	7.0mph	15
14-16	8.0mph	15

* The ramp of the treadmill can be elevated up to 15%.

**This protocol may be suitable for well trained individuals.

APPENDIX D-5

Sit and Reach Protocol

Sit-and-Reach Flexibility Test Trunk Flexion Flexibility Assessment

American College of Sports Medicine. *ACSM's health-related physical fitness assessment manual*. Baltimore: Lippincott Williams & Wilkins, 2005
YMCA. *YMCA fitness testing and assessment manual*. 4th ed. 2000

Equipment

- Sit-and-Reach box (red boxes are equivalent to yardstick/tape measure protocol)

Method

- Hold the legs straight with the knees in the extended position.
- Slowly bend forward with the neck flexed.
- Push the marker as far as possible

Pre-test Procedure

- Provide the client with a light warm-up and adequate time to stretch.
- Remove shoes.

Test Procedure

- Client sits with feet 10-12 inches apart and flat against the box.
- Overlap the hands with the middle fingers even.
- Slowly stretch and push the marker as far as possible.
- Ensure that the knees of the client stay extended, but they should not be pressed down.
- Avoid bouncing and jerking movements.
- Once furthest distance is reached, hold for 2 seconds.
- Record the score from the front of the marker block.
- Take the best score of 2 trials

Percentile Rankings (Inches)

Percentile	Age		18-25		26-35		36-45		46-55		56-65		>65	
	Gender		M	F	M	F	M	F	M	F	M	F	M	F
90			22	24	21	23	21	22	19	21	17	20	17	20
80			20	22	19	21	19	21	17	20	15	19	15	18
70			19	21	17	20	17	19	15	18	13	17	13	17
60			18	20	17	20	16	18	14	17	13	16	12	17
50			17	19	15	19	15	17	13	16	11	15	10	15
40			15	18	14	17	13	16	11	14	9	14	9	14
30			14	17	13	16	13	15	10	14	9	13	8	13
20			13	16	11	15	11	14	9	12	7	11	7	11
10			11	14	9	13	7	12	6	10	5	9	4	9

The following may be used as descriptors for the percentile rankings: well above average (90), above average (70), average (50), below average (30), and well below average

APPENDIX D-6

Push-up Max Test Protocol

Muscular Endurance Assessments

Push-up Test

Method

- Muscular endurance is measured by the maximal number of push-ups performed consecutively without rest

Test Procedure

- Both males and females start in the down position.
- Males use the standard position of hands pointing forward and directly under the shoulder, back straight, head up, and toes as pivot point.
- Females use the modified position of leg together, lower leg in contact with mat with ankles plantar-flexed, back straight, hands shoulder width apart, head up, and knees as pivot point.
- The “down” position is when the chin touches or comes within a fist length of the ground. The stomach should not touch the ground. The maximal number of push-ups performed consecutively without rest is counted as the score.
- The back should stay straight.
- In the “up” position, the arms should be straight and elbows locked.
- The test is terminated when the client can no longer complete another push-up or fails to maintain proper technique.

APPENDIX D-7

1-Minute Sit-Up/Curl Up Test Protocol

Curl-up Test

Equipment

- A stopwatch or clock with a sweep second hand to time the crunches.
- A mat or padding.
-

Method

- Muscular endurance is measured by the maximal number of curl-ups performed in 1-minute.

Test Procedure

- The client assumes a supine position with knees bent at 90 degrees. The palms should be face down and resting on top of thighs.
- The lower back should be flattened on the ground.
- When time begins each curl-up is counted when the hands slide up the thigh and touch the knee. (Four 6-in. strips of self-adherent Velcro can be placed rough-side up, perpendicular to the body. Place strips 3.5 in. apart.) The shoulder blades should come off the mat.
- Feet should stay firmly placed on the ground and knees should stay at a 90 degree angle.
- The lower back and shoulders should reach the starting position (the mat) after each curl-up. The head does not have to touch the mat.
- Do not assist the client by holding their feet in place.
- The client performs as many curl-ups as possible during the 1-minute.

APPENDIX E-1

Cardiorespiratory Class Rankings

Table 3.2
YMCA 3-Minute Step Test:
Post-Exercise 1-Minute Heart Rate (beats/minute)

Age (years) Gender	18-25		26-35		36-45	
	Male	Female	Male	Female	Male	Female
Excellent	50-76	52-81	51-76	58-80	49-76	51-84
Good	79-84	85-93	79-85	85-92	80-88	89-96
Above average	88-93	96-102	88-94	93-101	92-98	100-104
Average	95-100	104-110	96-102	104-110	100-105	107-112
Below average	102-107	113-120	104-110	113-119	108-113	115-121
Poor	111-119	122-131	114-121	122-129	116-124	124-132
Very poor	124-157	135-169	126-161	134-171	120-163	137-169

Age (years) Gender	46-55		56-65		Over 65	
	Male	Female	Male	Female	Male	Female
Excellent	55-82	63-91	60-77	60-92	59-81	70-92
Good	87-93	95-101	86-94	97-103	87-92	96-101
Above average	95-101	104-110	97-100	106-111	94-102	104-111
Average	103-111	113-118	103-109	113-118	104-110	116-121
Below average	113-119	120-124	111-117	119-127	114-118	123-126
Poor	121-126	121-132	119-128	129-135	121-126	128-133
Very poor	131-159	137-171	131-154	141-174	130-151	135-155

Note: Pulse is to be counted for 1 full minute after 5 minutes of stepping at 24 steps per minute on a 12-inch bench.
Source: YMCA Fitness Testing and Assessment Manual, 4th ed. 2000. Reprinted and adapted with permission of the YMCA of the USA, 121 N. Wacker Drive, Chicago, IL 60606.

APPENDIX E-2

Push-Up Class Rankings

TABLE 5-5 FITNESS CATEGORIES BY AGE GROUPS AND GENDER FOR PUSH-UPS*

Category	Age									
	20-29		30-39		40-49		50-59		60-69	
	M	F	M	F	M	F	M	F	M	F
Excellent	36	30	30	27	25	24	21	21	18	17
Very good	35	29	29	26	24	23	20	20	17	16
	29	21	22	20	17	15	13	11	11	12
Good	28	20	21	19	16	14	12	10	10	11
	22	15	17	13	13	11	10	7	8	5
Fair	21	14	16	12	12	10	9	6	7	4
	17	10	12	8	10	5	7	2	5	2
Needs improvement	16	9	11	7	9	4	6	1	4	1

*The Canadian Physical Activity, Fitness & Lifestyle Approach: CSEP-Health & Fitness Program's Health-Related Appraisal and Counseling Strategy, 3rd ed. Reprinted with permission from the Canadian Society for Exercise Physiology, 2003.

APPENDIX E-3

Male Fitness Class Rankings

YMCA of the USA

Physical Fitness Evaluation Profile

Norms—Men 18-25

Name _____ Dates: T1 _____ T2 _____ T3 _____

Rating	% ranking	Resting HR	% fat	3-min step	PWC max (kgm)	Max VO2 (mL/kg)	Flexibility	Bench press	Half sit-ups
Excellent	100	40	3	50	3390	100	28	64	99
	95	51	5	71	2365	75	23	49	83
	90	54	7	76	2100	65	22	44	77
Good	85	57	8	79	1945	60	21	41	72
	80	58	9	82	1835	56	20	37	66
	75	59	10	84	1750	53	20	34	61
Above average	70	61	11	88	1670	50	19	33	57
	65	63	11	90	1595	49	18	30	54
	60	65	12	93	1530	48	18	29	52
Average	55	66	13	95	1460	45	17	28	49
	50	67	14	97	1405	44	17	26	46
	45	69	15	100	1355	43	16	24	43
Below average	40	70	16	102	1310	42	15	22	41
	35	71	17	105	1265	39	15	21	40
	30	72	18	107	1215	38	14	20	37
Poor	25	74	19	111	1165	36	13	17	35
	20	77	20	114	1110	35	13	16	33
	15	78	21	119	1060	32	12	13	29
Very poor	10	82	23	124	980	30	11	10	27
	5	87	27	132	880	26	9	5	23
	0	103	35	157	645	20	2	0	14

Actual Scores T1 _____ T2 _____ T3 _____

T2 _____ T3 _____

T3 _____

T1 T2 T3

Actual Weight _____

Target Weight _____

Blood Pressure _____/_____/_____

APPENDIX E-4

Female Fitness Class Rankings

YMCA of the USA

Physical Fitness Evaluation Profile

Norms—Women 18-25

Name _____ Dates: T1 _____ T2 _____ T3 _____

Rating	% ranking	Resting HR	% fat	3-min step	PWC max (kgm)	Max VO2 (mL/kg)	Flexibility	Bench press	Half sit-ups
Excellent	100	42	9	52	2460	95	29	66	91
	95	55	15	75	1690	69	24	49	76
	90	57	17	81	1470	59	24	42	68
Good	85	59	18	85	1345	56	22	38	64
	80	61	19	89	1270	52	22	34	61
	75	63	19	93	1200	50	22	30	58
Above average	70	64	20	96	1150	47	21	28	57
	65	65	21	98	1105	45	20	26	54
	60	67	21	102	1055	44	20	25	51
Average	55	68	22	104	1025	42	19	22	48
	50	69	23	108	990	40	19	21	44
	45	71	23	110	955	39	19	20	41
Below average	40	72	24	113	925	38	18	18	38
	35	73	25	116	885	37	18	17	37
	30	76	26	120	850	35	17	16	34
Poor	25	77	27	122	815	33	16	13	33
	20	80	29	126	775	32	16	12	32
	15	81	30	131	720	30	16	9	28
Very poor	10	84	32	135	665	27	14	6	25
	5	88	35	143	575	24	12	2	24
	0	104	43	169	500	15	7	0	11

Actual Scores T1 _____ _____ _____ _____ _____ _____ _____ _____

 T2 _____ _____ _____ _____ _____ _____ _____ _____

 T3 _____ _____ _____ _____ _____ _____ _____ _____

T1 T2 T3

Actual Weight _____ _____ _____

Target Weight _____ _____ _____

Blood Pressure _____/_____/_____ _____/_____/_____ _____/_____/_____