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Survey of the Use of Pedometers and Knowledge of Caloric Intake and Expenditure

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SURVEY OF THE USE OF PEDOMETERS AND KNOWLEDGE OF CALORIC INTAKE AND EXPENDITURE

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This Scholarly Project, submitted by Tera Bahl, Holly Freudenberg, Tara Hynek and Lynae Jost in partial fulfillment of the requirements for the degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Graduate School Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

(Graduate School Advisor)

(Chairperson, Physical Therapy)

PERMISSION

Title	Survey of the Use of Pedometers and Knowledge of Caloric Intake and Expenditure
Department	Physical Therapy
Degree	Doctor of Physical Therapy

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ABSTRACT

Background and Purpose. As the prevalence of obesity continues to rise, medical professionals are searching for ways to combat this epidemic. One of the first steps is to assess the activity levels and eating habits of those who are obese and look for ways to modify these two areas in order to assist the obese individual in achieving a desirable and healthy weight. The purpose of this study is to determine if pedometer use, gender, or body mass influence one's knowledge of caloric consumption and expenditure. **Subjects and Methods.** 253 questionnaires were sent out to randomly selected faculty and staff at the University of North Dakota via email. The survey consisted of 18 questions on body composition, activity levels, pedometer usage, knowledge of caloric values and knowledge of caloric expenditure. **Results.** Of the 253 questionnaires sent out, 54 (20.3%) were returned and fit the criteria for inclusion in the study. Due to the low number of pedometer users responding, no analytical statistics were done to compare pedometer users with non-pedometer users. There was no significant difference found in knowledge of caloric intake and expenditure when analyzing by gender or obesity. Many interesting descriptive statistics were gathered regarding the use of pedometers and the subjects eating habits. **Discussion and Conclusion.** In those participants who do use pedometers there were no detrimental effects reported and there were various changes that occurred while using a pedometer that are associated with a healthier lifestyle. More

research is necessary to find if implementing pedometers into daily routines for obese individuals will assist them in maintaining a healthy lifestyle.

CHAPTER I

INTRODUCTION

The overall health of society in the United States is at risk due to the incidence of obesity. Activity levels are decreasing with advances in technology, reliance on automobiles and increased time spent watching television. Furthermore, people are making poor eating choices without knowledge of the increased caloric intake and the effect it has on their health. The prevalence of obesity has reached an all time high. This increased rate of obesity has led to a rise in associated co-morbidities such as diabetes mellitus, coronary vascular disease, hypertension and cancer.

However, there is some debate as to whether diet and exercise alone can combat this rise or if other measures need to be explored. One main concern is that people do not understand how to combat obesity using nutrition and physical activity. Education must be made an integral focus of any plan designed to stop this trend. Additionally, finding a motivating force will encourage persons with obesity to stick to a program. Possibly, a combination of these, with education as the primary focus and pharmacological intervention when necessary can help to curb the rising trend of obesity.

Purpose

The purpose of this study is to determine if pedometer use, gender, or body mass influence one's knowledge of caloric consumption and expenditure.

Significance of the Study

The significance of this study is to identify the knowledge level of caloric intake and expenditure in a cohort of University faculty and staff. This study is the first step in identifying possible environmental changes which may be implemented at the University of North Dakota (UND) to increase knowledge of caloric consumption and expenditure and combat the increasing epidemic of obesity.

Research Questions

Based on our literature review and its findings, a survey was developed to answer the following research questions:

1. Do people who use pedometers have significantly different scores related to knowledge of caloric consumption and expenditure compared to those people who do not own pedometers?
2. Does gender influence one's knowledge of caloric consumption and expenditure?
3. Is there a difference in knowledge levels of caloric consumption and expenditure between obese and non-obese individuals?

It is expected that this study will provide information about people's awareness of caloric consumption in relation to their daily caloric expenditure. Potential benefits of this survey include increased awareness of how to implement beneficial programs on

campus for UND faculty and staff, increased knowledge of pedometer usage on campus and identifying faculty and staff knowledge of their caloric consumption and expenditure.

CHAPTER II

LITERATURE REVIEW

Obesity is a worldwide public health problem that has been drastically increasing in prevalence over the past few decades according to the National Health and Human Nutrition survey completed in 1999. Obesity is expected to displace tobacco as the primary cause of avoidable death.[1] The percentage of overweight adults has risen from 31%-34% and obese adults from 13%-27% over the past 40 years. In 1997, an estimated 97 million adults were overweight or obese in the United States. That number rose to an estimated 120 million overweight or obese adults in 1999.[2] Conservative estimates predict that more than 40% of the United States population will be obese by 2025.[3]

The World Health Organization recognizes obesity as the most seriously neglected health problem worldwide.[4] Obesity is associated with an increased risk of morbidity and mortality, rising health care costs, social stigmatisms and internal psychological challenges. The overall health of society is at risk with the rise in the incidence of obesity. The gains made in the treatment of heart disease, cancer, hypertension and other chronic health diseases are in danger of being cancelled out as the numbers of people who are overweight or obese increase.[4]

A variety of factors including genetics, culture, lifestyle, and the environment contribute to obesity. Although genetics play a role in obesity, this should not distract from the important environmental issues contributing to the high numbers of obese individuals.[5] Trends such as reliance on motor vehicles, increase in sedentary jobs as

technology advancements are made, a rise in number of hours people spend watching television, and poor food choices are common in today's society. Blumenthal and Colleagues reported that the average calorie consumption has risen by 15% from 1984 - 1997 alone.[4] This increase in caloric consumption, coupled with decreased physical activity contribute to obesity.[6]

Body composition, one measure used to determine obesity, refers to the relative percentage of body weight that is fat and fat free tissue.[7] Overall, body composition provides an estimate of lean body mass including muscle, bone, connective tissue and cellular components and can vary with sex, age and activity level.[8]

Body mass index (BMI) is a reliable and valid measure for identifying adults that are at an increased risk of mortality and morbidity secondary to increased weight or obesity. Body Mass Index is used to assess body composition by dividing a persons weight in kilograms by their height in meters squared.[7] Another way to calculate BMI is by dividing height, in inches, by weight, in pounds, and multiplying by 703 . A BMI greater than 25 kg/m^2 for women and 18 kg/m^2 for men is associated with an increase in the risk of health problems; a BMI of greater than or equal to 30 is classified as obese.[2,4,7,10] Overall, waist circumference and BMI are considered the most available and reliable means of identifying obesity.[3,4] Body Mass Index measurements indicate that 44 million Americans are obese.[11] The US National Institute of Health has determined that a person is obese when their body weight exceeds 20% of the sought-after number for their age, sex and body frame.[9]

A study published in the *Journal of the American Medical Association* estimates that poor diet and inactivity contributed to 400,000 deaths as compared to 435,000 deaths

from tobacco use in 2003.[1] Poor diet and inactivity increase mortality by elevating the risk of health problems, most of which can be managed by a change in lifestyle. Hypertension, type II diabetes, dyslipidemia, coronary heart disease, stroke, gallbladder disease, hypercholesteremia, osteoarthritis, sleep apnea, respiratory complications, joint pain, cancer, and back injury are several health problems associated with obesity.[2,3,4,5,19,12]

Costs related to health care and weight loss are rising partly due to the number of obese individuals.[2,4,14] Recent estimates show that obesity related health care costs 100 billion dollars per year, 5.7% of the total United States health expenditure.[2] Additionally, one-third of men and one-half of women are trying to lose weight and spending 38 billion dollars per year on weight loss products alone.[4] Healthcare professionals play a major role in shaping the health of future generations. Clinically, practitioners need to emphasize prevention and early intervention by promoting an active lifestyle through walking, biking, swimming, skating or sports. Obesity is a chronic health condition making long-term management necessary.

Benefits of Exercise

Physical inactivity is a major concern in the United States. More than 60% of Americans do not participate in regular physical activity and 25% of adults are considered inactive.[15] A 2004 article in the *International Journal of Behavioral Nutrition and Physical Activity* reported that physical activity contributed "only approximately 5% of the population's total energy expenditure."[16] As many as 82.5% of adults reported no leisure-time activities while many young adults on college campuses are also not meeting the current physical activity recommendations.[16, 17] Multiple studies also suggest that an

increase in physical activity can decrease the risk of developing colon cancer.[18] A sedentary lifestyle increases the risks of multiple chronic diseases, as previously mentioned, while regular physical activity reduces these risks and increases longevity.[7,15]

Regular physical activity results in improved cardiovascular and respiratory function, decreased total body fat, decreased blood pressure, decreased anxiety and depression, and enhanced work and recreational activities. Physical activity is important for the health of muscles, bones and joints.[15] The benefits of physical activity within the general population are vast, due to the high percentage of sedentary adults in the United States and the impact that physical activity has on reducing disease risk and improving overall health.

Current Activity Recommendations

The American College of Sports Medicine (ACSM) defines physical activity as 'bodily movement that is produced by contraction of skeletal muscle and that substantially increases energy expenditure."[15] The Center for Disease Control, along with the ACSM, recommend that every adult in the United States participate in at least 30 minutes of daily moderate-intensity (enough to burn approximately 200 calories per day) exercise on most days of the week.[11] Current standards set by the US Surgeon General also promote at least 30 minutes of moderate intensity activity every day.[10,20,21,22] The recommendation of 30 minutes of moderate-intensity exercise per day is aimed at individuals who are sedentary. For active individuals, a higher level of exercise intensity provides greater health benefits.[23]

Walking is an effective method of meeting the current physical activity guidelines and is associated with substantial reductions in the incidence of cardiovascular events.

Women who walk briskly for at least 2.5 hours per week have approximately 30 percent risk reduction of developing chronic or debilitating diseases.[23] Bassett et al[22] reported that expending 2000 kcal per week in physical activity may assist in coronary heart disease prevention. This amount of walking also results in a decrease in systolic blood pressure.[24]

How Pedometers Influence Activity Levels and Motivation

Health care professionals are looking for ways to encourage sedentary individuals to increase their activity levels. Motivating these patients to become more active is a key challenge.[20] Walking is one of the most common forms of physical activity, therefore large numbers of health professionals are now turning to pedometers to help encourage sedentary patients to become active.[22] A pedometer-assessed target of 10,000 steps/day has been found as a way for adults to meet the current national physical activity guidelines.[25]

Simple and inexpensive, pedometers are commonly being used to assess movement and activity behaviors.[19, 26] These easily worn, portable instruments provide the user with the number of steps taken per day. Pedometers can provide immediate feedback on activity levels and assist in measuring all daily activity including stairs, walking and chores.[21] Pedometers contain an internal lever that hits with each vertical acceleration of the hip and is thus interpreted into a "step."[20] In laboratory studies, pedometers are extremely accurate but are less predictable in the real world due to varied walking speeds and additional movements such as bends that may be translated into steps. Additionally, pedometers do not take into account physical activity intensity nor

are they able to accurately detect the activity from non-ambulatory activities such as swimming, cycling or weight training.[19]

A goal of 10,000 steps a day has been set as an estimate of daily activity among healthy adults.[19,20,22] This goal correlates to an approximate energy expenditure of 300-400 kilocalories per day depending on body size and walking speeds. In comparison, a person would burn 150 kcal with the 30 minutes of activity recommended by the Surgeon General (an approximation of 3800-4000 steps).[19] The 10,000 step goal may be unattainable for those who are older or suffer from chronic diseases. Additionally, 10,000 steps is probably too low for children who are very active and a key target population in the fight to prevent childhood obesity. Current values indicate that healthy adults take between 7,000 and 13,000 steps per day. For those who do not wear their pedometer during sports and recreation activities, the number of steps per day was around 6,000. This indicates that 6,000-7,000 steps per day is an accurate estimate of normal daily activity not including additional physical activity and recreation. Tudor-Locke has proposed a grouping of activity levels and steps per day (Table 1). The association between steps per day and activity level provides people with a number that makes classifying their activity simple, easy to remember and lays out a concrete goal to attain.

Table 1. Activity Index for Pedometers Based on Steps per Day[19]

Activity Level	Steps per Day
Sedentary	< 5000 steps per day
Low Activity	5000-7499 steps per day
Somewhat Active	7500-9999 steps per day
Active	>10,000 steps per day
Highly Active	>12,500 steps per day

At this time, there is no direct evidence stating that a specific number of steps per day will help to reduce mortality rates.[19] However, studies have shown that individuals who obtain at least 10,000 steps per day have lower blood pressure and less body fat in comparison with their less active peers.[27,28] Moreau et al[24] conducted a study of hypertensive women in which those who were able to increase their number of steps per day to 9,700 had a significant decrease in systolic blood pressure by 11 mm Hg and body mass by 1.3 kg after a period of 24 weeks. Additionally, another study by Swartz and Thompson[37] showed that having sedentary obese women with Type II diabetes complete 10,000 steps per day improved glucose tolerance within 8 weeks, even with no change in body mass or body fat percentage. In a study looking at increasing steps by 2,000-3,000 per day, participants had significant improvements in lipid profiles and total cholesterol over 24 months.[29]

The First Step Program™ encourages participants to use pedometers to achieve self-selected goals of increasing overall daily activity.[26] In a 2001 study by Tudor-Locke, nine participants recently diagnosed with Type II diabetes were recruited for the First

Step Program™. The study compared pedometer use versus the use of a physical activity log for the purpose of seeing which was more beneficial for increasing physical activity. Participants recorded steps at the end of the day versus a number for each daily activity for the log. The results showed that the physical activity log lacked responsiveness to changes in walking behavior detected by the pedometer. Additionally, the pedometer protocol required less participant time to assess their activity therefore allowing them more time to participate in physical activities.

Another program that has gained in popularity is the 10,000 Steps Program™.[21] Components of this program include: a state-of-the-art pedometer, a personal action planner, a log, biweekly motivation cards along with drawings and prizes. An initial pilot program was comprised of 92 participants in 1999 and since then, over 10,000 people have signed up for the Minnesota based program. Results from the pilot study showed 81% of participants increased their physical activity levels, 90% saying the program helped them to maintain their level of activity and 100% saying they would recommend it to others.

The Step Diet™, started in 1992, is a new diet designed to help participants lose weight by counting their daily steps.[30] The program is based on five principles that drive the participant to lose weight and stay active to avoid health risks. This step-by-step program is outlined in a book that also provides tables for energy expenditure based on steps and food calorie values based on steps.

Accuracy and Reliability of Pedometers

The use of pedometers in observational and interventional research has increased over the last ten years. As pedometers become increasingly popular, it is vital that the

validity of pedometers be discussed. Validity is the extent to which an instrument measures what it is intended to measure and is considered an instrument's most important attribute. Validity is often assessed by comparing it to another proven instrument that measures the same thing. There are a variety of pedometers on the market. Some give data as to steps taken while others also include miles and/or kilocalories. There have been multiple research studies to determine the validity of many different brands and types of pedometers.

Pedometers correlate strongly with different accelerometers, especially uniaxial ones (median r = 0.86), and time in observed activity (median r = 0.82).[31,32] The relationship between observed steps taken and pedometer reported steps depended upon monitoring conditions and speed of walking. The highest agreement between measuring tools was apparent during ambulatory activities, such as running and walking, as compared to other activities. There was evidence of reduced accuracy during slow walking. The relationship between pedometer outputs and energy expenditure is complicated by the use of many different measures of energy expenditure and the varying population samples that were studied.[31,32] Overall, the authors of this review concluded: "The accumulated evidence herein provides ample support that the simple and inexpensive pedometer is a valid option for assessing physical activity in research and practice."[31,32]

Other studies have measured the validity of various brands and types of pedometers for measuring steps, distance, and energy expenditure.[33] To establish accuracy, studies may use manual tallying of steps, accelerometers and/or self reports to compare the pedometer readings when establishing accuracy. Accumulated evidence indicates that the output of pedometers is highly representative of that produced by

accelerometers when the output is measured in steps only, not distance or energy expenditure.[33,34] Although the validity of pedometers measuring step counts has been shown, there is less supporting evidence to show that they are accurate measures of distance and energy expenditure.

Reliability is another important aspect of pedometers that must be discussed. A 2003 study by Schneider et al[35] tested the accuracy and reliability of 10 different pedometers over a 400 meter walk. The reliability within a single model of pedometer was greater than r=0.80 with the exception of one model. They also found high intramodel reliability among four of the models they tested[35]. Two studies published in the *European Journal of Applied Physiology and Occupational Physiology* in 1977 had mixed results when studying the reliability of pedometers. One study found pedometers to reflect actual step rate fairly well during running. However, the other study reported that pedometers over estimate the actual step rate during fast walking and running and underestimate steps while walking slowly.[36] These two studies were done several years ago and may not be relevant today as the technology of pedometers has advanced since these studies were completed.

The position of the pedometer on a person's body can affect the readings given by the instrument. Pedometers detect vertical motion; therefore, it must be worn in its upright position on the belt line. There is question as to whether it will accurately tally the steps taken by obese persons and females. However, a study reported in 2003 found that the position of the pedometer on the body did not alter the results when testing was completed with pedometers on the belt line of anterior mid-thigh, lateral hip or posterior

mid-thigh. The same study also determined that a person's BMI did not affect the accuracy of the pedometer at any walking speed.[37]

Pedometers are an accurate and reliable tool for measuring physical activity and can be a valuable tool to measure a person's activity levels. Pedometers are inexpensive and easy to use for consumers. The data on the number of steps a person takes can be used to determine distance and energy expended.

There has been little research into the effect of pedometers on people's health and eating habits. The purpose of this study is to survey those who use pedometers to determine if they are better able to relate caloric intake to energy expenditure and physical activity then those who do not use a pedometer. This is necessary to determine if pedometers are a valuable tool for helping people to become more physically active and make better food choices. In addition, this study will evaluate the influence gender and body mass may have on one's knowledge of caloric consumption and expenditure. This information will be beneficial in deciding whether to distribute educational materials to a specific population or to the public, as a whole.

CHAPTER III

METHODS

This study was designed as a survey focusing on addressing (a) the knowledge of caloric intake and expenditure by University of North Dakota (UND) faculty and staff; and (b) if regular use of a pedometer increased this awareness. The methodology used in this research project included: 1) development of a questionnaire, 2) selecting a random sample of UND faculty and staff members, 3) administering and receiving completed questionnaires, 4) analyzing returned data, and 5) reporting results. This study was approved by the UND Institutional Review Board (IRB) in July 2004 for the use of subjects aged 18 and older. Copies of the IRB application and approval letter are presented in Appendix A. The survey instrument addressed parameters of the study and return of the survey implied informed consent.

Subjects

A sample pool was selected from the faculty and staff of UND. The prospective sample pool was assembled using a random selection process from the UND Faculty and Staff Directory. Only those persons with email addresses were eligible to be selected for the prospective sample pool. With the assistance of Dr. Ed Simanton, an internet account was set up through Information Management Services and a survey was formatted in Microsoft Frontpage. Subjects would receive an email with a cover letter explaining the research project. Consent to participate in the survey was implied when the subject

selected the web link to the survey. The subjects received the link to the survey on two separate occasions and completion of the survey was voluntary. In order to assure confidentiality of the respondent answers, no tracking of surveys was performed.

Instrumentation and Procedure

The survey was designed and formatted using Microsoft Frontpage software. The survey consisted of 18 questions in multiple formats including radio buttons, drop down boxes and tables (Appendix B). Questions included respondent demographics (gender, age, faculty or staff, height and weight) and questions related to knowledge of caloric intake and expenditure, use of a pedometer and frequency of pedometer usage. Additionally, questions regarding campus eating patterns and educational information for healthier choices were included.

Selected subjects received an email containing a cover letter explaining the purpose of the study, any inherent risks, protection of confidentiality and informing them that the return of the survey implies informed consent (Appendix C). A link to the survey was provided at the bottom of the email. Participation by the subject was voluntary and all returned surveys were compiled for analysis. To ensure confidentiality of the subjects' responses, survey responses were compiled on a secure server as an on-line database for data collection. The data received by this database contained no identifying information. Two weeks after the initial email, a follow-up email was sent out thanking the individual if he/she had participated in the survey and encouraging those who had not to please respond (Appendix D).

Data Analysis

Returned surveys were determined to be invalid if respondents selected the same choice for each question. Information received from valid, completed on-line surveys was combined and placed in a Microsoft Excel spreadsheet. Compilation of the responses was done using Statistical Package for the Social Services (SPSS) release 11.5, Chicago, IL.

Descriptive statistics were used to analyze the demographics of the survey respondents in relation to their question responses in the following areas: 1) knowledge of caloric intake; 2) knowledge of caloric expenditure; 3) use of a pedometer; and 4) frequency of pedometer usage.

For data analysis, a point system based on correct and incorrect answers to the survey questions was developed and implemented. When a subject obtained a correct answer on the survey, they received two points. If they chose the next closest answer, they received one point and any other answer that was chosen received zero points. Descriptive statistics of the survey sample were then compiled. Analytical statistics were also compiled using the non-parametric Mann-Whitney U test with α set at $p<.05$ being significant.

CHAPTER IV

RESULTS

Two hundred fifty-three surveys were sent out via email. Of those sent out, 54 (21.5%) were returned and found valid for inclusion in the study. Demographic analysis was performed for all 54 subjects who participated in this study. The subjects consisted of 38 (70.4%) female and 16 (29.6%) male participants between the ages of 21 and 65 years. Thirty-eight (70.4%) of the participants were staff members and 16 (29.6%) were faculty members of the University of North Dakota. Of those surveyed, 11 (20.4%) currently had pedometers and 43 (79.6%) did not (Table 2).

Table 2. Demographics of Survey Participants

	Frequency	Percent
Surveys:		
Sent	253	
Returned	54	21.5
Gender:		
Female	38	70.4
Male	16	29.6
Employment Status:		
Staff	38	70.4
Faculty	16	29.6
Age:		
21-35	14	25.9
36-49	21	38.9
50-65	19	35.2
Body Mass Index:		
<18.5	1	1.9
18.6-24.9	20	38.5
25.0-29.9	20	38.5
≥ 30	11	21.1
*2 participants did not respond		
Pedometer Prevalence:		
Yes	11	20.4
No	43	79.6

Research Questions

There are several research questions to be addressed by this survey. They include differences in scores across many variables including gender, obesity and pedometer use. To determine knowledge of caloric consumption, subjects were asked to identify caloric content of various food items readily available to the campus community (Appendix B, Question #8). To determine knowledge of caloric expenditure, subjects were asked to identify calories burned after walking various distances (Appendix B, Question #9).

Frequency Distribution for Caloric Consumption

The frequency distribution for all participants on the caloric consumption section of the survey demonstrates 12 subjects scored less than or equal to 50 percent of total points possible, 28 subjects scored between 50 and 75 percent of total points possible, and 14 subjects scored greater than or equal to 75 percent of the total point possible (N=54 total subjects). The mean score was 14.0, the standard error of the mean was 0.4, and the standard deviation was 3.2 (Figure 1).

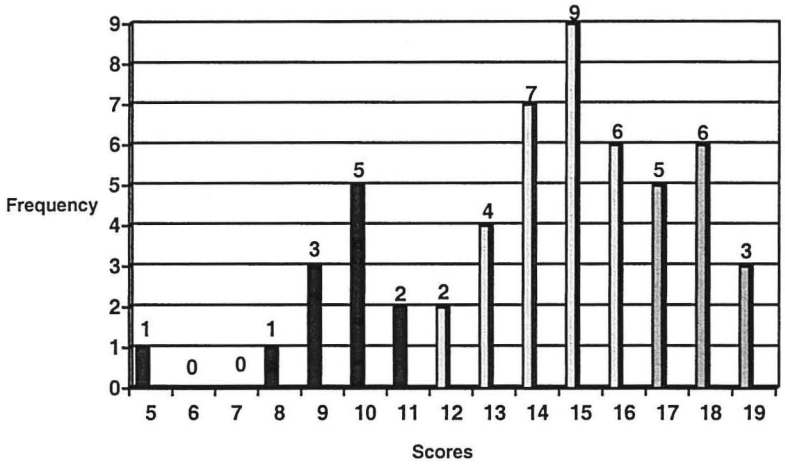

Figure 1. Participants Scores on Knowledge of Caloric Intake

Frequency Distribution for Caloric Expenditure

The frequency distribution for all participants on the caloric expenditure section of the survey demonstrates 11 subjects scored less than or equal to 50 percent of the total point possible, 5 subjects scored between 50 and 75 percent of the total, and 38 subjects scored greater than or equal to 75 percent of the total points possible (N=54 total subjects). The mean score was 5.6, the standard error of the mean was 0.3 and the standard deviation was 3.4 (Figure 2).

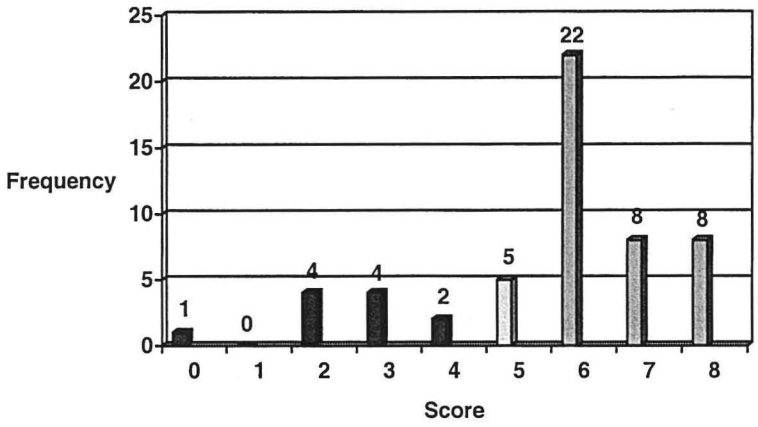

Figure 2. Participants Scores on Knowledge of Caloric Expenditure

Gender and Knowledge of Caloric Consumption

It is important to determine if gender had an effect on knowledge of caloric consumption to consider if one gender has a greater awareness of caloric consumption than the other. The questions related to caloric consumption were analyzed for the influence of gender. There were 38 female and 16 male respondents. A Mann-Whitney U test was performed to analyze the data in order to determine if there was a significant difference in male and female scores. The mean score for females was 13.9 +/- 0.5 while the mean score for males was 14.9 +/- 0.9. No significant difference was found between males and females ($U= 246$, $p= 0.269$). These results suggest the influence of gender is not a significant factor in predicting scores for knowledge of caloric intake.

Gender and Knowledge of Caloric Expenditure

It is also important to determine if gender had an effect on knowledge of caloric expenditure. The results produced from the survey concerning caloric expenditure were

analyzed using a Mann-Whitney U test for the influence of gender. The mean for the 38 female participants was 5.2 +/- 0.3 while the mean for the 16 male participants was 5.2 +/- 0.5. No significant difference was found between males and females (U= 249, p= 0.279). This suggests the influence of gender is not a significant factor in predicting score for knowledge of caloric expenditure.

Obesity and Knowledge of Caloric Consumption

Environmental influences of obesity must be determined in order to properly formulate future interventions. The questions related to caloric consumption were analyzed using a Mann-Whitney U test to determine the influence of obesity. There were 11 participants in the obese category (BMI >30) and 41 participants in the non-obese category (BMI <30). The mean score for the obese subjects was 13.9 +/- 1.0 and the mean score for the non-obese group was 14.5 +/- 0.5. No significant difference was found between groups (U= 200, p= 0.565). This suggests that obese subjects appear to have similar levels of knowledge regarding caloric consumption.

Obesity and Knowledge of Caloric Expenditure

Due to the obesity epidemic it is also important to know if participants are knowledgeable about caloric expenditure. Knowledge of caloric expenditure would assist an individual in choosing weight loss or health promoting activities. The results of the survey questions concerning caloric expenditure were analyzed for the influence of obesity. A Mann-Whitney U test was again used to analyze the data. The mean score for the 11 obese subjects was 5.6 +/- 0.6 and the mean score for the 41 non-obese subjects was 5.8 +/- 0.3. No significant difference was found between groups (U= 225, p=

0.991). The influence of obesity was not found to be a significant factor in predicting scores for knowledge of caloric expenditure.

Use of Pedometers

Our research hypothesis concerning pedometers is whether or not people who use pedometers would have significantly different scores related to knowledge of caloric consumption and expenditure than those people who do not use pedometers. In our group of 54 participants only 20.3%, 9 females and 2 males, reported that they own a pedometer. Because of the low number of pedometer using participants, analytical statistics were not used for this research question. However, other valuable descriptives were gathered from the survey.

Ten of the 11 participant's pedometers recorded the number of steps for the person and 4 of the 11 recorded steps, miles, and calories for the person. Not all pedometers report miles, so it is important that any activity charts are done in steps to cover all pedometer types (Table 3).

Table 3. Information Provided by Pedometer

Information	Number of Respondents	Percent
steps, miles, and calories	4	36.4
steps and miles	2	18.2
steps only	4	36.4
miles only	1	9.1

There were varying frequencies of pedometer use reported, with the majority of participants not using their pedometer on a daily basis (Table 4). Some activity programs focus on a certain number of steps per day but it may be useful to consider providing an

average number of steps taken over three days available as well for those who do not use their pedometer daily.

Table 4. Pedometer Use of Participants

Reported Use	Number of Respondents	Percent
Daily	2	18.2
Weekly	4	36.4
Monthly	3	27.3
Never	2	18.2

The majority of participants who use a pedometer have been using it for 6-12 months (Table 5). This must be considered when looking at the data concerning changes that have occurred following pedometer use. The data may reflect changes that have occurred over several months rather than immediately.

Table 5. Length of Pedometer Use by Participants

Time in Months	Number of Respondents	Percent
<1	3	27.3
1 to 3	1	9.1
3 to 6	0	0
6 to 12	5	45.5
>12	2	18.2

The majority of participants who use a pedometer reported that they walk 2 to 4 miles per day while no participants reported walking less than 2 miles per day (Table 6). This data must be considered when reading the results of other questions about

pedometer use. The fact that each participant walks at least 2 miles per day may play a role in the changes they reported following use of a pedometer.

Table 6. Miles Walked on an Average Day by Pedometer Users

Miles	Number of Respondents	Percent
<2	0	0
2 to 4	6	54.5
4 to 5	3	27.3
5 to 6	0	0
>6	0	0
Did not respond	2	18.2

An increase in activity level following use of a pedometer was reported by the majority of participants while none of the participants reported a decrease in activity level (Table 7). This data suggests that pedometer use increases one's activity level.

Table 7. Activity Level Following Pedometer Use

Activity Level	Number of Respondents	Percent
No increase	2	18.2
Small increase	3	27.3
Moderate increase	3	27.3
Large increase	2	18.2
Decrease	0	0
Did not respond	1	9.1

Among changes incurred following pedometer use, increased energy, decreased stress, and sleeping better were most often reported by participants. No detrimental

consequences were reported following use of a pedometer throughout this study. Refer to table 8 regarding changes reported following pedometer use.

Table 8. Energy, Stress, Sleep and Injuries Following Pedometer Use*

Change Incurred	Number of Respondents	Percent
Increased energy	4	36.4
Decreased energy	0	0
Increased stress	1	9.1
Decreased stress	3	27.3
Sleeping better	4	36.4
Sleeping worse	0	0
More injuries	0	0
Fewer injuries	0	0

*Participants could respond more than once

Although participants reported having an increased appetite while using a pedometer, weight loss was also indicated. Many of the subjects also reported making healthier eating choices following pedometer use (Table 9).

Table 9. Weight and Eating Habit Changes Following Pedometer Use*

Change Incurred	Number of Respondents	Percent
Weight loss	4	36.40%
Weight gain	0	0
Increased appetite	2	18.2
Decreased appetite	0	0
Healthier eating choices	6	54.5
Less healthy eating choices	0	0

*participants could respond more than once

Other Survey Questions

Questions on the survey addressed where people commonly eat as well as what resources and menu choices would be beneficial in assisting them in making healthy food choices. The survey found that 39% of respondents brought their lunch from home while 37% ate at various dining centers on campus (Figure 3). Therefore, interventions to increase the staff and faculty's knowledge of caloric consumption and expenditure, at the University of North Dakota, should not be solely distributed throughout the dining centers.

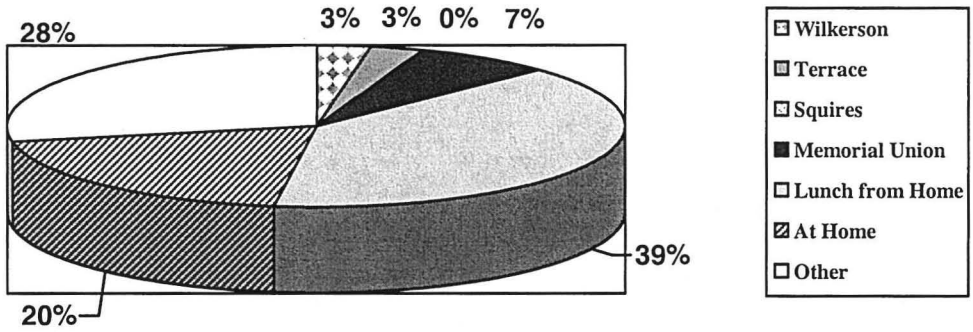

Figure 3. Percentage of UND Faculty and Staff eating at dining facilities

Of those surveyed, 61% ate on campus 0-2 times per week with lunch being the most frequently eaten meal (75%). (Figure 4, Figure 5)

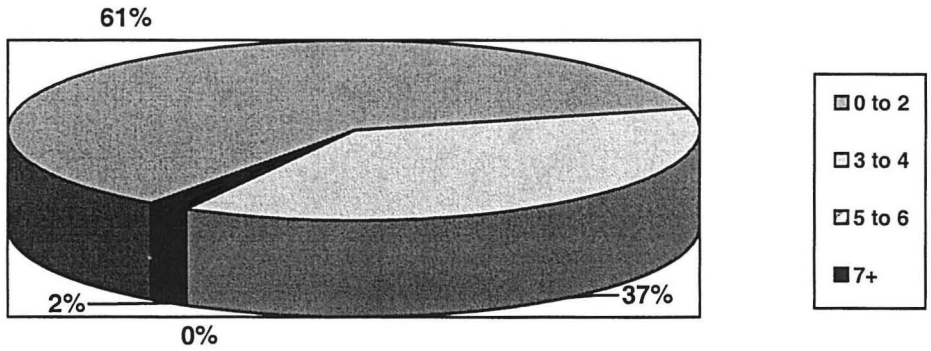

Figure 4. Number of Times People Eat on Campus Each Week

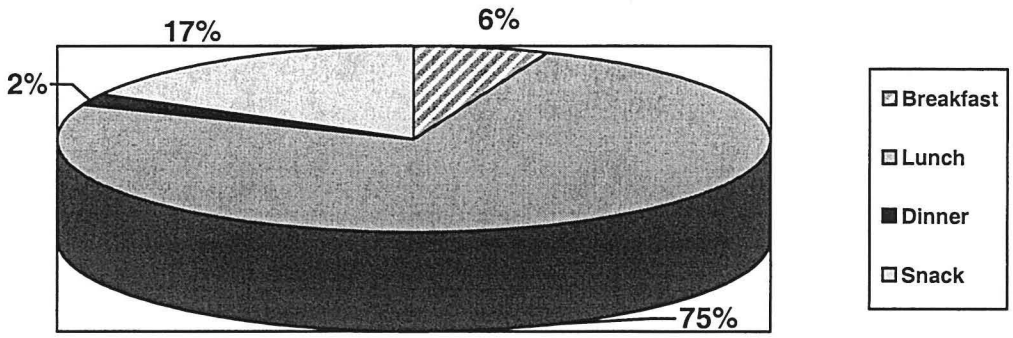

Figure 5. Meals Frequently Eaten on Campus

Thirty-nine (72%) of survey respondents reported that having information available on exercise and the amount of calories burned would be "somewhat helpful" to "very helpful" in assisting them in choosing healthy meals. However, where and how to most effectively distribute this material has yet to be determined. Additionally, 34 (63%) of those surveyed reported that having access to a pedometer would be "somewhat helpful" to "very helpful" in order to increase their knowledge of their daily activity. A campus wide program promoting the health benefits for employees could be looked into as a way to encourage healthy life choices.

New menu choices were cited as a way that faculty and staff on campus could find help for making good choices. Forty-seven (87%) of participants reported more fruits and vegetables would be "somewhat" to "very helpful" while 26 (48%) thought that low carbohydrate items would be "somewhat" to "very helpful" for them. Thirty-nine (72%) stated that more low fat menu items would be "somewhat" to "very helpful" and 41 (76%) thought higher fiber items would be "somewhat" to "very helpful" if implemented. Providing a variety of menu choices including items listed previously, may be the most beneficial way of meeting the majority of people's needs.

CHAPTER V

DISCUSSION AND CONCLUSION

Following review of results from this study, it cannot be concluded that people who use pedometers have greater knowledge of caloric intake and expenditure. Due to the low number of participants who used a pedometer it was not possible to run analytical statistics on these subjects. However, 73% of participants who use pedometers reported an increase in activity level. Participants also reported decreased stress levels, sleeping better, increased energy, weight loss, and making healthier eating choices since they began using a pedometer. These results suggest that pedometer use may be beneficial in weight loss or health programs. It is important to note that most of the pedometer users who participated in this survey are chronic pedometer users (6-12 months). Therefore, some of the effects reported may not be due to immediate changes, but rather long term. Further research is needed to determine the significance of the effects of pedometer use.

Information was gathered and analyzed concerning the influence of gender and obesity on people's knowledge of caloric intake and expenditure. Males and females scored similarly on both of these sections, suggesting that gender is not an influencing factor on knowledge of caloric intake and expenditure. Obesity was also not found to be an influencing factor on these areas. Participants with a BMI >30, which placed them in the obese category, scored similarly to those with a BMI of <30, who are not classified as obese. From this data, it does not appear that interventions need to be targeted

specifically to males or females, obese or non-obese individuals, but to the public as a whole.

This survey also included questions pertaining to information that may be helpful in assisting the UND campus to gain knowledge of caloric intake and expenditure. This would be beneficial in helping people lead a healthier lifestyle. Information on exercise and the amount of calories burned, access to a pedometer, as well as menu choices that include more fruits and vegetables, low carbohydrate, low fat and high fiber items were all reported by participants as changes that would be helpful in making healthier choices. This information can be used to implement programs on campus that promote healthy life choices and in further research regarding environmental changes that may help combat the obesity epidemic.

When considering the use of pedometers in an intervention program, one must note that current activity programs focus on a certain number of steps per day. However, of the participants in this study who use pedometers, only 2 of the 11 reported using it daily. This suggests that programs may need to consider focusing on an average number of steps based on the days the pedometer is worn. For example, if the pedometer is worn 2 days out of the week and a total of 20,000 steps is obtained the user could assume an average of 10,000 steps per day.

Limitations of the Study

While this study collected interesting data that may be built upon in future studies, there were a number of limitations. In doing a subjective survey, there will always be the possibility that respondents did not fill out the information truthfully or accurately. For example, the survey asked for the person's height and weight. As these are known to be

areas of great variability during self-report, there is no way of determining whether the BMI's calculated for our sample population are accurate. The response rate of the survey was also low. There may be several reasons for our low response rate including lack of time or interest. Also, due to the subjective nature of the survey, there is no way to ensure questions were answered based on knowledge or filled in for the sake of completing the survey. Faculty and staff at the University of North Dakota were the only people surveyed and validity of the survey was not tested. This population was chosen due to the fact that a number of them had received pedometers from Blue Cross/Blue Shield of North Dakota the previous year. However, in using random sampling, only 11 of our respondents had a pedometer. Additionally, many of these respondents had never used their pedometer yet answered the pedometer questions. Therefore, this survey may not be an accurate representation of the faculty and staff at UND or an accurate representation of people across the country. It would be helpful to do a larger scale survey on several campuses in several states.

Conclusions

Upon completion of this study, it is clear that little research has been completed concerning pedometer usage and the possible link to increasing one's knowledge of caloric intake and expenditure. This study demonstrates a need for further research on the impact that pedometers may have on assisting the fight against the obesity epidemic in this country. By providing people with a simple and inexpensive way to track their daily activity, those who own pedometers should be able to have a better understanding of their activity levels and how it relates to caloric consumption and expenditure.

APPENDIX A

University of North Dakota Exempt Certification Form
Research Involving the Use of Survey, Interview, Observational Procedures or Educational Tests

Complete this form if you are requesting permission to use survey, interview, or observational procedures, or educational tests.

All research with human participants conducted by faculty, staff, and students associated with the University of North Dakota, must be reviewed and approved as prescribed by the University's policies and procedures governing the use of human subjects. No activities are to be initiated without prior review and approval by the Institutional Review Board.

Please answer the following questions regarding your research.

1. Are prisoners included in the research? ☐ Yes ☒ No
If you answered "Yes" to the above question, this research does not qualify as exempt. Please fill out and submit a "Human Subjects Review Form". If you answered "No", continue to question 2a.

2a. Are minors included in the research? ☐ Yes ☒ No
If you answered "No" to the above question, please skip question 2b and continue to question 3. If you answered "Yes", continue to question 2b.

2b. Does the research include survey or interview procedures or the observation of public behavior with researcher interaction with the subjects? ☐ Yes ☒ No
If you answered "Yes" to the above question, this research does not qualify as exempt. Please fill out and submit a "Human Subjects Review Form". If you answered "No", continue to question 3.

3a. Will the data be recorded in a manner such that subjects cannot be identified, either directly or through identifiers linked to the subjects (subject name, social security number, birth date, coding, etc.) ? ☒ Yes ☐ No
If you answered "Yes" to the above question, please skip question 3b and continue with the rest of the form. If you answered "No", continue to question 3b.

3b. Will the disclosure of the subjects' responses outside of the research reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation?
☐ Yes ☐ No
If you answered "Yes" to the above question, this research does not qualify as exempt. Please fill out and submit a "Human Subjects Review Form". If you answered "No", provide the information requested below.

If the research involves the use of audio, video, digital or image recordings of subjects, this research does not qualify as exempt. Please fill out and submit a "Human Subjects Review Form".

Principal Investigator: Tara Hynek, Lynae Jost, Holly Freudenberg, Tera Bahl, Dave Relling, PT, PhD

Telephone: 701-777-2831 E-mail Address: hfreudenberg@medicine.nodak.edu

Complete Mailing Address: UND School of Medicine and Health Sciences P.O. Box 9037 Grand Forks, ND 58202

School/College: School of Medicine and Health Sciences Department: Physical Therapy

Student Adviser (if applicable): Dave Relling, PT, PhD

Telephone: 701-777-2831 E-mail Address: drelling@medicine.nodak.edu

Address or Box #: UND School of Medicine and Health Sciences P.O. Box 9037 Grand Forks, ND 58202

School/College: School of Medicine and Health Sciences Department: Physical Therapy

Project Title: A survey of the use of pedometers and knowledge of caloric intake.

Proposed Project Dates: Beginning Date: 07/26/04 Completion Date: 05/30/05
(Including data analysis)

Funding agencies supporting this research: None

(A copy of the funding proposal for each agency identified above MUST be attached to this proposal when submitted.)

☐ YES or ☒ NO Does the Principal Investigator or any researcher associated with this project have a financial interest in the results of this project? If yes, please submit, on a separate piece of paper, an additional explanation of the financial interest (other than receipt of a grant)

If your project has been or will be submitted to other IRB's, list those Boards below, along with the status of each proposal.

_____ Date submitted: _____ Status: ___ Approved ___ Pending

_____ Date submitted: _____ Status: ___ Approved ___ Pending

Type of Project: Check "Yes" or "No" for each of the following.

☒ YES or ☐ NO New Project

☐ YES or ☒ NO Continuation/Renewal

☐ YES or ☒ NO Is this a Protocol Change for previously approved project? If yes, submit a signed copy of this form with the changes bolded or highlighted.

☐ YES or ☒ NO Will research subjects be recruited at another organization (e.g., hospitals, schools, YMCA) or will assistance with the data collection be obtained from another organization?

☐ YES or ☒ NO Dissertation/Thesis

☒ YES or ☐ NO Student Research Project

If yes, list all institutions: _____

Letters from each organization must accompany this proposal. Each letter must illustrate that the organization understands their involvement in that study, and agrees to participate in the study. Letters must include the name and title of the individual signing the letter and, if possible, should be printed on letterhead.

☐ **YES or** ☒ **NO Is Altru Health Systems providing data? If "Yes", submit two copies of this proposal.**

Please provide additional information regarding your research on a separate sheet of paper.

4. In non-technical language, describe the purpose of the study and state the rationale for this research.

Obesity is an epidemic problem in the United States. Over 60% of the U.S. population is considered overweight. Environmental and genetic influences are thought to contribute to the incidence of obesity. While genetic factors are important, there is not a genetic treatment available at this time. Environmental interventions for obesity attempt to reduce caloric consumption and increase energy expenditure through diet and exercise, respectively. Understanding the balance of energy or caloric consumption and utilization are fundamental to an effective weight loss program. Pedometers are inexpensive, readily available devices which are used for promoting and monitoring increases in physical activity. However, the potential role of pedometers in facilitating the understanding of energy consumption and expenditure has not been determined. Therefore, the purpose of this study is to gain a better understanding of the role pedometer use may play in knowledge of caloric intake and expenditure in Faculty and Staff at the University of North Dakota. This study is the first step in determining possible environmental interventions to combat the obesity epidemic.

5. In non-technical language, describe the study procedures.

An electronic survey was developed to assess the role of pedometer use on knowledge of caloric intake and expenditure. Drafts of the survey questions and consent e-mail are attached. Microsoft Front Page software will be used to forma and code the electronic survey to allow data to be returned electronically and stored without any identifying information (providing for protection of confidentiality). A reminder e-mail will be forwarded to all subjects approximately four weeks after the initial e-mail.

SUBJECT RECRUITMENT: Upon IRB approval, a random sample of University of North Dakota faculty and staff will be identified from the 2003-2004 University of North Dakota directory. From this list, approximately 300 subjects will be sent an electronic consent form via e-mail with a link to the online survey.

PROTECTION OF CONFIDENTIALITY: All data will be coded and stored without identifying information. No identifying information will be on the survey documents or electronic files that are returned. All coding data will be stored on a secured server. Upon completion of the data analysis, data will be reported in aggregate form.

6. Where will the research be conducted?

The surveys will be completed online by the individuals, University of North Dakota staff and faculty members, where e-mail and internet access are available.

7. How will data be recorded and stored (that is will it be coded, anonymous, etc.)?

Electronic data will be stored on a secure server without any identifying information until the information can be converted to written documentation. Data file documentation will be stored in a locked filing cabinet in the Physical Therapy Department for three years post-completion of the study and then destroyed. Any identifying information for coding purposes will be stored ina locked cabinet in a location separate from the data storage.

Note: data and consent forms must be stored for a minimum of three years after data analysis is complete.

12/16/03

8. Describe the nature of the subject population and the estimated number of subjects.
A random sample of approximately 300 University of North Dakota staff and faculty will be selected for participation in this study. See recruitment methods above.
Necessary attachments:

Signed Student Consent to Release of Educational Record Form;
Consent form (not required for observational studies);
Surveys, interview questions, or educational tests;
Printed web screens (if survey is over the Internet); and
Advertisements.

NOTE: The UND IRB requires that all key personnel involved in the research complete human subject education before IRB approval to conduct research can be granted.

****

By signing this form, I certify that the above information is accurate and that this research will be conducted in accordance with the statements provided above; this research does not involve prisoners, but if a subject becomes a prisoner, I will notify the IRB.

(Principal Investigator) Date:

(Student Adviser) Date:

Consent Form Elements

A copy of the consent form must be attached to this proposal.

Please note: Regulations require that all consent forms, and all pages of the consent forms, be kept for a minimum of 3 years after the completion of the study, even if subject does not continue participation. The consent form must be written in language that can easily be read by the subject population and any use of jargon or technical language should be avoided. It is recommended that the consent form be written in the third person (please see the examples on the ORPD website). A two inch by two inch blank space must be left on the bottom of each page of the consent form for the IRB approval stamp. The consent form must include the following elements:

a) An introduction of the principal investigator

b) An explanation of the purposes of the research

c) The expected duration of subject participation

d) A brief summary of the project procedures

e) A description of the benefits to the subject/others anticipated from this study

f) A paragraph describing any reasonably foreseeable risks or discomforts to the subject

g) Disclosure of any alternative procedures/treatments that are advantageous to the subject

h) An explanation of compensation/medical treatment available if injury occurs.

i) A description of how confidentiality of subjects and data will be maintained. Indicate that the data and consent forms will be stored separately for at least three years following the completion of the study. Indicate where, in general, the data and consent documents will be stored and who will have access. The following statement must be included in all consent forms and informational letters: "Only the researcher, the adviser, [if applicable] and people who audit IRB procedures will have access to the data." Please make appropriate additions to the persons that may have access to your research data. Indicate how the data will be disposed of. Be sure to list any mandatory reporting requirements that may require breaking confidentiality.

j) The names, telephone numbers and addresses of two individuals to contact for information (generally the student and student adviser). This information should be included in the following statement: "If you have questions about the research, please call (insert Principal Investigator's name) at (insert phone number of Principal Investigator) or (insert Adviser's name) at (insert Adviser's phone number). If you have any other questions or concerns, please call the Office of Research and Program Development at 777-4279."

k) If applicable: an explanation of who to contact in the event of a research-related injury to the subject.

l) If applicable: an explanation of financial interest must be included.

m) Regarding participation in the study:

1) An indication that participation is voluntary and that no penalties or loss of benefits will result from refusal to participate.

2) An indication that the subject may discontinue participation at any time without penalty, with an explanation of how they can discontinue participation.

3) An explanation of circumstances which may result in the termination of a subject's participation in the study.

4) A description of any anticipated costs to the subject.

5) A statement indicating whether the subject will be informed of the findings of the study.

6) A statement indicating that the subject will receive a copy of the consent form.

Electronic Consent Form:

You have been invited to participate in a research project that will anonymously study eating patterns and pedometer use and the possible role of pedometer use in knowledge of caloric energy intake and expenditure. This project is being conducted by Tera Bahl, Holly Freudenberg, Tara Hynek and Lynae Jost, graduate students in the physical therapy department at the University of North Dakota, under the supervision of David Relling, PT, Ph.D. The use of human subjects in this project has been approved by the UND Institutional Review Board (IRB #) for the Protection of Human Subjects in Research. Please read the following statements. If you understand them and agree to participate, please click on the link at the bottom to indicate your consent and go to the first screen of the survey.

Participation in this project requires you to complete an 18 question survey taking approximately 10-15 minutes. The survey questions are designed to gather information about eating patterns and pedometer use and how they may influence individual understanding of the amount of walking needed to burn a specific quantity of calories in commonly available foods on campus. Completion of this survey will allow you to think critically about the foods you eat and the amount of exercise needed to burn off the calories associated with foods often available at the University of North Dakota. No identifying information such as name or e-mail address will be included with the survey information.

Your participation is purely voluntary and you are free to withdraw your consent and discontinue participation at any time. You should understand that your responses to the survey will be anonymous and will be kept confidential to the extent possible considering transmission over the Internet. This project is not expected to present any greater risk of your loss of personal privacy than you would encounter in everyday life with sending and/or receiving information over the Internet. While it is not possible to identify all risks in such research, all reasonable efforts have been undertaken to minimize any such potential risks. The responses you provide will not be encrypted but the survey results will be retained on a secure server. The results of this research may be published or reported to scientific bodies, however any such reports or publications will be reported in a group format. Thus, no individual identity will be determinable through demographic variables such as age or gender.

If at any time you have questions or concerns about any procedure in this project, you may e-mail the investigator at drelling@medicine.nodak.edu or speak with the investigator(s) by calling (701) 777-2831. If you have any other questions or concerns, please call the Office of Research and Program Development at (701) 777-4279. A copy of the finished research will be available for review at the UND School of Medicine and Health Science Medical Library following completion of the project.

Completion and return of the survey will be considered your consent to participate in the study. Please keep a copy of this consent form for your personal records. To access the survey, click on the following link or copy it to your web browser: http://med.nodak.edu/pt/health.asp

Thank you in advance for your time and cooperation.

Sincerely,

Tara Hynek Lynae Jost Holly Freudenberg

Tera Bahl Dave Relling, PT, Ph.D.

REPORT OF ACTION: EXEMPT/EXPEDITED REVIEW

University of North Dakota Institutional Review Board

Date: 7/15/2004 **Project Number:** IRB-200407-011

Principal Investigator: Hynek, Tara; Jost, Lynae; Freudenbert, Holly; Bahl, Tera; Relling, Dave

Department: Physical Therapy

Project Title: A Survey of the Use of Pedometers and Knowledge of Calorie Intake

The above referenced project was reviewed by a designated member for the University's Institutional Review Board on July 15, 2004 and the following action was taken:

☐ Project approved. **Expedited Review** Category No. _____
Next scheduled review must be before: _____

☐ **Copies of the attached consent form with the IRB approval stamp dated _____ must be used in obtaining consent for this study.**

☒ Project approved. **Exempt Review** Category No. 2
This approval is valid until July 15, 2005 as long as approved procedures are followed. No periodic review scheduled unless so stated in the Remarks Section.

☐ **Copies of the attached consent form with the IRB approval stamp dated _____ must be used in obtaining consent for this study.**

☐ Minor modifications required. The required corrections/additions must be submitted to ORPD for review and approval. **This study may NOT be started UNTIL final IRB approval has been received.**
(See Remarks Section for further information.)

☐ Project approval **deferred. This study may not be started until final IRB approval has been received.**
(See Remarks Section for further information.)

REMARKS: Any adverse occurrences in the course of the research project must be reported immediately to the IRB Chairperson or ORPD.

Any changes in protocol or Consent Forms must receive IRB approval prior to being implemented. You must submit a memo with a copy of the Consent Form and a revised Human Subjects Review Form, with the appropriate signatures, to the Office of Research and Program Development for review and approval.

PLEASE NOTE: Requested revisions for student proposals MUST include adviser's signature. All revisions MUST be highlighted.

☒ Education Requirements Completed. (Project cannot be started until IRB education requirements are met.)

waiver of signed consent per 45 CFR 46.117 c 2

cc: Dave Relling; Chair; Physical Therapy; Dean, School of Medicine

Signature of Designated IRB Member 7-15-04 Date
UND's Institutional Review Board

If the proposed project (clinical medical) is to be part of a research activity funded by a Federal Agency, a special assurance statement or a completed 310 Form may be required. Contact ORPD to obtain the required documents.

(Revised 10/2002)

APPENDIX B

UND DEPARTMENT OF PHYSICAL THERAPY
UNIVERSITY OF NORTH DAKOTA SCHOOL OF MEDICINE & HEALTH SCIENCES

Survey of University of North Dakota Faculty and Staff

Please complete the following questions. Your responses are important and your time spent completing this survey will be sincerely appreciated.

Demographic Information:

1. Gender: ☐ Male ☐ Female

2. Age: ☐ Under 20 ☐ 21-35 ☐ 36-49 ☐ 50 -65 ☐ Over 66

3. Employment Status: ☐ Staff ☐ Faculty

4. Physical Stature: (Please indicate your height in inches, weight in pounds.)
Height _____ Weight _____

Eating Patterns: Please answer the following questions regarding your most characteristic eating patterns.

5. Select the places you eat most often during work hours.

☐ Wilkerson Dining Center ☐ Terrace Dining Center ☐ Squires Dining Center

☐ Memorial Union Food Court ☐ Bring Lunch From Home ☐ Eat at home

☐ Other (please specify) _____

6. Number of meals you usually eat on campus per week: ☐ 0 - 2 ☐ 3 - 4 ☐ 5 - 6 ☐ 7 or more

7. Which of the following meals do you most frequently eat on campus?
☐ Breakfast ☐ Lunch ☐ Dinner ☐ Snack(s)

8. Please indicate your best estimation of the calories in each of the following food items?

Calorie Ranges	0 - 150	151 - 300	301-450	451-600	Over 601
Food Items					
Medium Apple	☐	☐	☐	☐	☐
Side salad with 2 tbsp. Ranch Dressing	☐	☐	☐	☐	☐
Large order of french fries	☐	☐	☐	☐	☐
Turkey Sub Sandwich from Subway (with mayonnaise or cheese)	☐	☐	☐	☐	☐
20oz Classic Coca-cola	☐	☐	☐	☐	☐
1 Piece of Supreme Pizza	☐	☐	☐	☐	☐
8 oz Glass of Skim Milk	☐	☐	☐	☐	☐
16 oz Latte with Whipped Cream	☐	☐	☐	☐	☐
1/4 lb. Hamburger with Mayonnaise, tomato and bun	☐	☐	☐	☐	☐
Large chocolate shake	☐	☐	☐	☐	☐
2 medium pancakes with 1/4 cup syrup	☐	☐	☐	☐	☐

9. Please indicate your best estimate of the calories you would burn if you walked the following distances:

Calorie Ranges	0 - 150	151 - 300	301 - 450	451 - 600	Over 600
Distances					
1/2 mile	☐	☐	☐	☐	☐
2 miles	☐	☐	☐	☐	☐

3 miles	☐	☐	☐	☐	☐
5 miles	☐	☐	☐	☐	☐

10. How beneficial would each of the following be to you ?

Menu Choices That Included:	Not Helpful	A Little Helpful	Somewhat Helpful	Very Helpful
Fruits and Vegetables	☐	☐	☐	☐
Low Carbohydrate Items	☐	☐	☐	☐
Low Fat Items	☐	☐	☐	☐
High Fiber Items	☐	☐	☐	☐
Resources:	Not Helpful	A Little Helpful	Somewhat Helpful	Very Helpful
Information about exercise & calories burned.	☐	☐	☐	☐
Access to a pedometer	☐	☐	☐	☐

11. Do you have a pedometer? ☐ Yes ☐ No

If you answered YES to this question, please continue on to question 12. If you answered NO to this question, thank you very much for completing this survey. Please go to the end and click the "Submit Survey" button to return the survey for analysis.

12. Does your pedometer provide any of the following? ☐ Number of Calories Burned ☐ Number of Miles Walked ☐ Number of Steps Taken

13. How often do you use your pedometer? (Please check one box.) ☐ Daily ☐ Weekly ☐ Monthly ☐ Never

14. How long have you been using your pedometer? (Please check one box.)

☐ Less than 1 month ☐ 1 - 3 months ☐ 3 - 6 months ☐ 6 -12 months ☐ 12 months or more

15. If you wear your pedometer all day, how many miles do you walk in an average day? (Please check one box.)

☐ Less than 2 miles ☐ 2 - 4 miles ☐ 4 - 5 miles ☐ 5 - 6 miles ☐ Over 6 miles

16. Since you began using your pedometer, which of the following has occurred? (Please check one box.)

☐ No increase in activity levels ☐ Small increase in activity levels ☐ Medium increase in activity levels

☐ Large increase in activity levels ☐ Decrease in activity levels

17. Since you began using your pedometer, have you noticed any of the following? (Please check all that apply.)

☐ More Energy ☐ Less Energy ☐ More Stress ☐ Less Stress

☐ Sleeping Better ☐ Sleeping Worse ☐ More Injuries ☐ Less Injuries

18. Since you began using your pedometer, have you noticed any of the following changes regarding your eating habits? (Please check all that apply.)

☐ Weight Loss ☐ Weight Gain ☐ Increased Appetite ☐ Decreased Appetite

☐ Making More Healthy Eating Choices ☐ Making Less Healthy Eating Choices

Submit Survey | Clear Form

Tera Bahl, Tara Hynek, Lynae Jost, Holly Freudenberg, and David Relling.

Revised: 08/04/04.

APPENDIX C

You have been invited to participate in a research project that will anonymously study eating patterns and pedometer use and the possible role of pedometer use in knowledge of caloric energy intake and expenditure. This project is being conducted by Tera Bahl, Holly Freudenberg, Tara Hynek and Lynae Jost, graduate students in the physical therapy department at the University of North Dakota, under the supervision of David Relling, PT, Ph.D. The use of human subjects in this project has been approved by the UND Institutional Review Board (IRB #200407-011) for the Protection of Human Subjects in Research. **Please read the following statements. If you understand them and agree to participate, please click on the link at the bottom to indicate your consent and go to the first screen of the survey.**

Participation in this project requires you to complete an 18 question survey taking approximately 10-15 minutes. The survey questions are designed to gather information about eating patterns and pedometer use and how they may influence individual understanding of the amount of walking needed to burn a specific quantity of calories in commonly available foods on campus. Completion of this survey will allow you to think critically about the foods you eat and the amount of exercise needed to burn off the calories associated with foods often available at the University of North Dakota. No identifying information such as name or e-mail address will be included with the survey information.

Your participation is purely voluntary and you are free to withdraw your consent and discontinue participation at any time. You should understand that your responses to the survey will be anonymous and will be kept confidential to the extent possible considering transmission over the Internet. This project is not expected to present any greater risk of your loss of personal privacy than you would encounter in everyday life with sending and/or receiving information over the Internet. While it is not possible to identify all risks in such research, all reasonable efforts have been undertaken to minimize any such potential risks. The responses you provide will not be encrypted but the survey results will be retained on a secure server. The results of this research may be published or reported to scientific bodies, however any such reports or publications will be reported in a group format. Thus, no individual identity will be determinable through demographic variables such as age or gender.

If at any time you have questions or concerns about any procedure in this project, you may e-mail the investigator at drelling@medicine.nodak.edu or speak with the investigator(s) by calling (701) 777-2831. If you have any other questions or concerns, please call the Office of Research and Program Development at (701) 777-4279. A copy of the finished research will be available for review at the UND School of Medicine and Health Science Medical Library following completion of the project.

Completion and return of the survey will be considered your consent to participate in the study. Please keep a copy of this consent form for your personal records. To access the survey, click on the following link or copy it to your web browser: http://med.nodak.edu/pt/health.asp

Thank you in advance for your time and cooperation.

Sincerely,

Tara Hynek Lynae Jost Holly Freudenberg

Tera Bahl Dave Relling, PT, Ph.D.

APPENDIX D

Subject: UND Physical Therapy Survey

Previously, you received an email concerning this survey from the University of North Dakota Physical Therapy Department. If you have already completed this survey thank you for your participation. If you have not yet had a chance to do so we would appreciate your participation as it will allow us to complete our research study. Thank you for your time.

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