The instances and occurrences that influence individuals with impaired glucose tolerance in their decision to exercise
by Peter Kenneth Shatwell

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Health and Human Development
Montana State University
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Abstract:
The purpose of this preliminary investigation was to identify the instances and occurrences (instances and occurrences that most easily come to mind) used by MSU employees with IGT during the decision balance process that determines engagement in physical activity. In this study, both qualitative and quantitative methods were used. The qualitative methods involved a series of 10 tape recorded interviews put through a content analysis that revealed trends and themes throughout the integrated theoretical model in three areas: memories of exercise in the past, ideas and thoughts associated with exercise in the present, and expectations of exercise in the future. Based on the content analysis, a survey was created using the statements generated from the interviews. In the survey, each area of the integrated model contained its own set of questions. The survey also contained 16 gold standard decision balance model questions to compare the integrated model with. The area, ideas and thoughts associated with exercise in the present, was the most robust component of the integrated model as it was a statistically significant predictor of exercise engagement at a p-value of .012 and predicted 19% of the variance in exercise behavior. However, memories of exercise in the past and expectations of exercise in the future were not significant predictors of exercise engagement. The gold standard decision balance model was also a significant predictor of exercise behavior predicted 18.2% of the variance. There were two conclusions that could be made from this preliminary study. First, instances and occurrences associated with exercise in the present, used by MSU employees with impaired glucose tolerance was a significant determinant of exercise engagement. Second, the association model predicted more of the variance in exercise engagement than the gold standard decision balance model.
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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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ABSTRACT

The purpose of this preliminary investigation was to identify the instances and occurrences (instances and occurrences that most easily come to mind) used by MSU employees with IGT during the decision balance process that determines engagement in physical activity. In this study, both qualitative and quantitative methods were used. The qualitative methods involved a series of 10 tape recorded interviews put through a content analysis that revealed trends and themes throughout the integrated theoretical model in three areas: memories of exercise in the past, ideas and thoughts associated with exercise in the present, and expectations of exercise in the future. Based on the content analysis, a survey was created using the statements generated from the interviews. In the survey, each area of the integrated model contained its own set of questions. The survey also contained 16 gold standard decision balance model questions to compare the integrated model with. The area, ideas and thoughts associated with exercise in the present, was the most robust component of the integrated model as it was a statistically significant predictor of exercise engagement at a p-value of .012 and predicted 19% of the variance in exercise behavior. However, memories of exercise in the past and expectations of exercise in the future were not significant predictors of exercise engagement. The gold standard decision balance model was also a significant predictor of exercise behavior predicted 18.2% of the variance. There were two conclusions that could be made from this preliminary study. First, instances and occurrences associated with exercise in the present, used by MSU employees with impaired glucose tolerance was a significant determinant of exercise engagement. Second, the association model predicted more of the variance in exercise engagement than the gold standard decision balance model.
CHAPTER 1

INTRODUCTION

It is estimated that 80% of all employers with 50 or more employees in the United States have worksite health promotion programs in place (Association for Worksite Health Promotion, 2000). Programs of this nature are initiated to increase the health of employee populations, to increase productivity, and to reduce the overall health insurance costs of a university, business, or corporation. To this end, worksite health promotion programs strive to facilitate a practice called “wellness,” defined as “an active process of becoming aware of and making choices toward a more successful existence” (National Wellness Institute [NWI], 1979, pp. 1).

Worksite wellness programs often provide a blood screening that produces information pertaining to disease risk. The Montana State University Employee Wellness Program (MSUEWP) is a worksite wellness program that has been screening its employees for select health risk factors over the past 15 years. Information from the blood screening is used to identify risk factors for several diseases such as cardiovascular disease, stroke, anemia, and diabetes.

Over the past five years, the program physician for the MSUEWP has identified an increasing incidence of high fasting blood glucose levels, which is a risk factor for impaired glucose tolerance (IGT). IGT or pre-diabetes is a condition in which an individual’s fasting plasma glucose levels are above normal (110 mg/dl-125 mg/dl) but not in a range indicative of diabetes (American Diabetes Association, 2002). Without
some form of intervention, these individuals are likely to acquire Type 2 diabetes. However, Tuomilehto, Lindstrom, Eriksson, Valle, Hamalainen, Ilanne-Parikka, et al. (2001) found that an increase in exercise was directly correlated with a decreased incidence of diabetes among those with IGT. Therefore, a need exists to increase physical activity among those who have IGT.

Health promotion practitioners are facing the difficult challenge of encouraging behavior change within the area of exercise among many at-risk populations, including those with IGT. Over the past 30 years several models have been used to influence exercise recruitment. The majority of these models have been utilized with varying levels of success; however, none have made a statistically significant impact on exercise recruitment rates of worksite populations (Dishman, Olenburg, O’Neal, & Shepard, 1998). One of the most prominent approaches to increasing exercise recruitment incorporates the decision balance model in which the pros and cons of a behavior change are weighed against one another. It is theorized that when the net gains (pros) of the outcome of the behavior change are greater than the net losses (cons) of the behavior change, an individual will engage in the activity (Janis & Mann, 1977). This framework has proved to be an effective mechanism for predicting exercise behaviors; however, the decision process is based on the assumption that health is of the greatest value to the individual. For example, a young smoker who wants to have friends engages in smoking because the immediate consequence is peer acceptance, a very valuable pro to a teenager. However, the adolescent fails to comprehend the very serious and adverse health
conditions associated with tobacco use. Since peer acceptance is of greater value than future health, the decision to smoke has more valuable pros than cons.

Kahneman and Tversky used the term “vivid information” to describe how tangible or conceivable something is (1984). The smoker’s most vivid information is of the peer acceptance he or she has just gained because it is immediately tangible and much easier to conceive of than the potential experience of lung cancer in the future. The bias caused by the vivid information can be identified and modified through the use of the “availability heuristic.” Kahneman and Tversky describe the availability heuristic as a concept used to explain decision-making, based on behavioral economic modeling to identify the information that an individual uses to make a decision. Through a population analysis, health practitioners can identify the instances and occurrences in which the availability heuristic leads to biased judgments within the decision balance model. Once those instances and occurrences are identified, fitness programming can be adapted to modify the factors that generate the bias thus increasing the probability that an individual will initiate exercise.

**Purpose Statement**

The purpose of this preliminary investigation was to identify the instances and occurrences that most easily come to mind used by Montana State University (MSU) employees with IGT during the decision balance process that determines engagement in physical activity.
Significance of the Problem

Diabetes is a growing epidemic in the United States. Currently 6.2% of the population or 17 million Americans have diabetes (American Diabetes Association [ADA], 2002). It is estimated that 11.1 million people have been diagnosed while another 5.9 million are unaware that they have the disease. Diabetes resulted in 210,000 deaths in 1999 making it the fifth deadliest disease in the United States. There are currently 2,200 newly diagnosed cases of diabetes per day (ADA, 2002).

Diabetes is not a curable condition. It is a group of chronic metabolic diseases due to defects in either insulin action, insulin secretion, or both (ADA, 2001). This disease results in a lifetime of costly medical treatment and management. Those with diabetes have an increased risk of many adverse health conditions including heart disease, stroke, high blood pressure, retinopathy, kidney damage, nervous system damage, peripheral vascular disease, and coronary heart disease. It is estimated that 73% of those with diabetes have high blood pressure. Retinopathy stemming from diabetes results in 12,000 to 24,000 new cases of blindness each year. Many of those with diabetes face severe kidney damage and, in fact, 114,478 had to engage in dialysis treatment or transplantation in 1999. Approximately 60-70% of those with diabetes have some form of nerve damage ranging from impaired sensation in their feet and hands to slowed digestion of food in the stomach. The inability to sense or feel pain resulted in 82,000 amputations of lower limbs from 1997-1999 (ADA, 2002).

Due to the significant amount of adverse health conditions and symptom management caused by diabetes it is estimated that the total annual cost in the U.S. was
$98 billion dollars in 1999. This disease accounts for 5.8% of the total U.S. health care cost (ADA, 2002). These figures demonstrate an alarming number of both monetary and personal costs.

Impaired glucose tolerance (IGT) or pre-diabetes is a condition in which an individual's fasting plasma glucose levels are above normal (110 mg/dl - 125 mg/dl) but not in a range indicative of diabetes (ADA, 2002). This condition not only increases the risk of diabetes onset, but also substantially increases the risk of cardiovascular disease and death (ADA, 2002).

Exercise has been shown to significantly decrease the risk of diabetes onset among those with IGT as well as other populations. Major health entities such as the American College of Sports Medicine (ACSM), the Centers for Disease Control and Prevention (CDC), and the Surgeon General have suggested that Americans should be engaging in 30 minutes of moderate intensity exercise on most or all days of the week (Pate, Pratt, Blair, Haskell, Macera, & Bouchard, et al., 1995). Despite these recommendations, 40-60% of Americans are sedentary. As the incidence of IGT continues to rise, it is important to develop exercise interventions targeted at those with IGT.

**Definition of Terms**

For the purpose of this study, these terms were operationally defined as:

1. **Employee Wellness Program**: Programs adopted by companies, businesses, or universities to address health risks and lifestyle behaviors that are costly.
The purpose of such programs is to assess disease risk and intervene through lifestyle modifications such as exercise, nutrition, and counseling.

2. Disease risk: A measure of how likely someone is of contracting a disease based on multiple health and lifestyle factors.

3. Regular physical activity: Engaging in at least 30 minutes of moderate intensity physical activity at least five days of the week. Moderate physical activity is at an intensity of 3-6 METs (metabolic rate), that is, walking briskly at 3-4 miles per hour (Pate et al., 1995).

4. Impaired glucose tolerance: A physiological state between normal glycemic action and the onset of diabetes. This is represented by a fasting glucose measurement between 110 mg/dl and 126 mg/dl.

5. Blood chemistry panel: A blood analysis that includes a comprehensive measurement of blood glucose levels. Blood panels can identify those who have IGT.

6. Decision balance model: A theoretical framework that assumes decision making is based on the relative weight associated with the pros and cons for engaging in a given behavior in four areas of consequence: gains and losses for self, gains and losses for significant others, self-approval or disapproval, and approval or disapproval from significant others (Janis & Mann, 1977).

7. Gains and losses for self: The costs and benefits of a decision with respect to
personal objectives (Janis & Mann, 1977). For example, when considering the
decision to exercise, an individual may compare the health benefits of exercise
with the time costs of going to the gym.

8. Gains and losses for significant others: The cost and benefits of a decision as
with respect to groups or individual with whom the decision maker is
associated or recognized (Janis & Mann, 1977). For example, when
considering the decision to exercise, an individual may compare the time used
to exercise with the time that he or she can spend with his or her children.

9. Self-approval or disapproval: Evaluation of how a decision will fit with
internal moral standards and self image (Janis & Mann, 1977). For example,
an individual may decide to exercise because it makes them feel good about
themselves.

10. Approval or disapproval by significant others: An evaluation of how a
decision will fit with the moral standards and ethics held by those with whom
the decision maker is associated or recognized (Janis & Mann, 1977). For
example, an individual may not exercise because his or her peer group
believes that if there is any free time from work it should be spent with
family.

11. Availability heuristic: Decision makers assess the likelihood of engaging in
an event by the ease with which particular examples of similar events can be
brought to mind through memory recall, association, and construction
(Kahneman & Tversky, 1984).
12. Memory recall: A mental process in which individuals retrieve the most relevant outcomes related to a current situation (Kahneman & Tversky, 1984). For example, an individual may make a decision not to exercise because he or she recalls that when he or she exercised in high school physical education class it was embarrassing.

13. Construction: A mental process where individuals create various outcomes a particular decision (Kahneman & Tversky, 1984). For example, an individual who is considering exercise may construct an instance where he or she begins to exercise and pull a muscle.

14. Association: A mental process where a decision maker assesses the strength of association between a choice and an occurrence (Kahneman & Tversky, 1984). For instance, for an individual, an association may exist between exercise and respect where increased exercise is associated with increased respect.

Assumptions

Assumptions in the study were: 1) all subjects (employees) completed the questionnaire honestly and correctly and 2) all subjects (employees) answered interview questions honestly and correctly.
CHAPTER 2

LITERATURE REVIEW

Employee Wellness Programs

Health care costs have continued to increase over the past 40 years. The medical expenditure of the United States has increased from $26.9 billion in 1960 to $1.149 trillion in 1998 (Centers for Medicaid and Medicare Services, 2000). Due to a gradual shift in responsibility for health care away from government sources to the private sector employers have been forced to take on a greater financial burden. Employers currently pay approximately 30% of the total U.S. health care expense (Pencack, 1991). The opportunity to be mobile and active at work has decreased due to the dependency on technology. This trend has lead to a multitude of diseases related to sedentary lifestyle to surface such as diabetes (Anspaugh, Dignan & Anspaugh, 2000). To combat the onset of these diseases EWPs have been implemented within corporations and businesses to keep people healthy and productive.

In the mid 1970s EWPs were introduced into worksites and viewed as a perk. Today over 80% of the worksites with 50 or more employees, and 98% of worksites with 750 employees or more have adopted wellness programs to reduce double-digit increases in health care cost (Riedel, Baase, Hymel, Lynch, McCabe, Mercer, et al., 2001). In 2002, Chapman reviewed 42 articles on the cost-effectiveness of worksite wellness and found that on average for every dollar invested in a EWP the return ranged from $2.15 to $5.64.
Researchers have recently indicated that the total productivity of an employee work force can be maximized by a properly implemented EWP. Worksites that helped employees avoid illness and disease had lower absenteeism, improved performance, greater creativity, increased motivation, avoided accidents, and reduced personal and company health care costs (Riedel, et al., 2001). To keep employees productive, health practitioners identify the causes of disease and illness and target them through interventions.

The lack of physical activity is a major cause of disease onset therefore exercise is should be a major component of a wellness program (Chapman, 2002). The need for more effective exercise interventions is increasing as preventable diseases such as cardiovascular disease and diabetes continue to increase.

**Impaired Glucose Tolerance and Diabetes**

The prevention of diabetes has become an increasing concern of the National Institute of Diabetes and Digestive and Kidney Diseases and the ADA. The CDC (2003) reported that the percentage of Americans with diagnosed diabetes rose from 7.3% to 7.9% between 2000 and 2001. There are currently 17 million cases of diabetes representing a 61% increase since 1991 (ADA, 2003). As a chronic metabolic disease, diabetes damages multiple organ systems within the body. Those with diabetes have heart disease rates two to four times greater than those without diabetes. Stroke risk is two to four times greater among diabetic populations. Diabetic retinopathy results in 12,000 to 24,000 new cases of blindness every year (NIDDK, 2002). Currently 43% of new cases
of treated renal disease are due to diabetes (ADA, 2002). In 1999, people undergoing
treatment for end-stage renal disease was 38,160 and 114,478 people had kidney
transplants or dialysis as a result of diabetes (ADA, 2002). Among those with diabetes,
60%-70% have nerve damage varying from impaired feeling in their feet and hands to
slower digestion of food in the stomach (ADA, 2002). Due to the loss of sensation in the
feet, cuts and scrapes go unnoticed and become infected. This resulted in 82,000
amputations of lower extremities from 1997-1999 (ADA, 2002). A study conducted by
the ADA (2002) estimated the total direct medical cost of diabetes to be $44 billion and
the indirect costs to be $54 billion, totaling $98 billion or 5.8% of the total U.S. health
care cost in 1997.

Pre-diabetic states have become the focus of increased research. One such
condition is impaired glucose tolerance (IGT), identified by a fasting glucose
measurement between 110 mg/dl and 125 mg/dl. Diabetes is identified by a fasting
glucose measurement greater than or equal to 126 mg/dl. Over the past decade
researchers have investigated the feasibility of preventing or delaying the onset of Type 2
diabetes through lifestyle modification including weight reduction, food intake, and
exercise (ADA, 2002). Tuomilhetto, et al. (2001) found that those with IGT who engage
in lifestyle modification reduce their risk of diabetes onset by 58%.

The Diabetes Prevention Program Research Group (DPPRG) also found that
lifestyle modification, including 150 minutes of physical activity per week, reduced the
incidence of diabetes onset by 58% among those with IGT. A significant body of
literature identifies exercise as a preventative behavior associated with diabetes onset.
Evidence supports that physical activity and exercise have been shown to increase the body’s sensitivity to insulin thereby improving glucose tolerance (Ivy, 1987; Koivisto, 1986). Bergenstal, Weaver, Leite, Monk, Upham, & Nelson, et al. (2000) found that those with normal weight who had improved their maximum oxygen uptake through exercise had significantly less progression from IGT to diabetes. Obesity, IGT, and diabetes onset are all strongly correlated. Mokdad, Bowman, Ford, Marks, & Koplan, (2001) have shown that as the prevalence of obesity increases so does diabetes prevalence. Obesity rates are at an all time high of 20% nationally and some states are demonstrating rates at close to a quarter of their population (Mokdad et al., 2001). A major modality in the reduction of weight is regular physical exercise (Tanji, 2000). The surgeon general recommends 30 minutes of physical activity a day on all or most days of the week. Currently 52% of the American public is not regularly exercising despite the consistent advice of the CDC, ACSM, and NIH. Research to influence the decision to engage in exercise among those with IGT who are sedentary is needed to change the current national rate of diabetes onset.

**Exercise Recruitment**

Exercise recruitment is a growing challenge to health promotion specialists. Several conceptual approaches have been applied to increase exercise engagement among the American public. Bauman (2002) studied determinants or causal factors that influence physical activity. They found that when the correct determinants were adjusted individuals were more likely to engage in exercise. A determinant positively associated
with physical activity was the use of a decision balance sheet. This sheet suggests that an individual weighs the consequences of engaging in a behavior (Janis & Mann, 1977) through four major categories.

The first category is gains and losses for self in which the decision maker identifies and weighs the expected outcomes of his or her choice (Janis & Mann, 1977). For example, when searching for a health club membership an individual may consider the membership fees, the services, and the programs offered by the club. The decision maker may not like the price of the membership fee but is impressed with the club's services and programs. He or she purchases the membership because the overall gain of the services and programs is greater than the loss of money that will be incurred.

The next category is gains and losses for others wherein the decision maker considers the cost and benefits that pertain to those with which he or she is associated or affiliated (Janis & Mann, 1977). If an individual is planning on exercising, he or she may be concerned with the effect that it will have on his or her children. The time spent exercising may require the children to remain in day care for an extra hour. The decision maker may decide that it is more of a loss for the children to spend the extra hour in daycare than it is a gain for him or her to exercise.

The third category is self-approval or disapproval. The individual considers how his or her decision will align with his or her own deeply rooted norms, self-image, and self-esteem (Janis & Mann, 1977). For example, an individual may contemplate the choice to exercise in his or her free time rather than work overtime. Individuals may have been raised by their parents to believe that exercise would be a selfish pursuit when they
could instead be making more money for their families; therefore, they would not exercise.

In the final category, social approval or disapproval, a decision maker compares the ideas and beliefs of other groups and people with the potential decisions (Janis & Mann, 1977). For example, an individual may contemplate joining a gym that exploits looking physically attractive by showing models doing workouts in their marketing campaigns (television ads, flyers, etc.). Their spouse feels that the commercials are part of the reason that so many people have issues with their own self-image and does not approve of joining such a club. The individual decides not to join the club because he or she knows that his or her spouse would not approve.

Figure 1 outlines the decision balance process based on these four categories.

Figure 1. Decision Balance Process

*Adapted from Janis and Mann’s Decision Balance Sheet, 1977*
Each of the four areas creates pros and cons to a decision. The pros are placed on one side of a decision balance scale and the cons on the other. When pros outweigh cons a person will decide to exercise. When cons outweigh pros a person will decide not to exercise.

The Need for Modifiers

Within the decision balance model (Figure 1) are causal pathways through which decisions are reached. These pathways are represented in Figure 1 by the arrows that lead from situation to gains and losses for self, gains and losses for others, self-approval and disapproval, and approval and disapproval of others. The pathways are complex and it is difficult to measure them using only the decision balance model. King, Stokols, Talen, Brassington, & Killingsworth (2002) recommended that theoretical models used in health promotion should integrate theory and concepts from other fields such as behavioral economics to improve their effectiveness in modifying exercise behavior. Behavioral economists Kahneman and Tversky (1984) merged concepts from psychology and economics to help understand how people make decisions. They discovered processes called heuristics. Heuristics are mental shortcuts or “rules of thumb” that allow people to make easy and timely decisions. Heuristics are based on the premise that people cannot accurately calculate the probability of the outcomes of their decisions so they estimate the outcomes based on rough approximations.

The heuristics modify the pathways used within the decision balance model by allowing practitioners to more specifically identify the information that individuals use to
make decisions. Kahneman and Tversky have developed a number of heuristics through their past 30 years of research. One specific type of heuristic is called the “availability heuristic.” In the availability heuristic, people bring potential outcomes associated with a decision to mind. The most vivid outcomes come to mind most easily and therefore influence the rough approximations of what the outcome of the decision will be (1984). Kahneman and Tversky call these outcomes “instances and occurrences.” Using the availability heuristic, the instances and occurrences are brought to mind using three mental processes: memory recall, construction, and association.

Memory recall occurs when an individual scans past experiences and recalls the most relevant outcomes related to the current situation. For example, an individual may make a decision not to exercise because he or she recalls embarrassing outcomes from high school physical education class. This is an example of Kahneman’s and Tversky’s (1984) outcomes instances and occurrences.

Using construction, individuals create various outcomes of a particular decision. For example, one who is considering exercise may construct an outcome where he or she begins to exercise and pull a muscle (Kahneman & Tversky, 1984).

The third process is association. In association, a decision maker assesses the strength of association between a choice and an outcome. For instance, for an individual, an association may exist between exercise and respect from friends, where increased exercise is associated with increased respect (Kahneman & Tversky, 1984).

Although heuristics can be useful and often correct, they can produce biased probabilities based on the instances and occurrences that are most easily referenced. If the
improper examples are brought to mind then a faulty outcome will be approximated and incorrect decisions will be made (Kahneman & Tversky, 1984). For example, if an individual with IGT cannot bring an instance or occurrence of diabetes onset to mind, he or she can easily underestimate the severity of becoming diabetic because there is no information to which he or she can refer.

**Integrated Conceptual Framework**

In Figure 2 Pat has just found he has IGT. The doctor advises him to exercise. He engages in the decision balance process to decide if he will exercise or not exercise. He quickly examines the gains and losses of exercising within the four domains. To increase the speed of his decision he uses the availability heuristic. In each of the four domains, he uses memory search, association, or construction to generate the pros and cons that will feed into the mental balance scale. He may use one, two, or all three of the mental processes in his decision-making. The heuristic channeling provides clear pros and cons to each of the domains that flow into the mental scale. When pros with greater causal significance are placed on the scale, it tilts in favor of the choice to exercise and when the cons with greater causal significance are placed on the scale, it tilts in favor of the decision not to exercise. Based on the side of the scale that has the greatest significant weight a decision is made (Janis & Mann, 1977).
The decision balance model is susceptible to the bias that occurs in heuristic processing because the paradigm is concerned with weighing pros and cons when making a choice. The bias is generated when the instances and occurrences that come to mind...
create pros and cons that are improperly weighted. The most vivid instances and occurrences produce pros and cons that fit onto an individual’s mental balance scale. The pros are placed on one side of the scale and the cons on the other.

Concerning exercise, it would be optimal if the decision maker’s examples of physical activity created pros with greater causal significance thereby leading the individual to engage in exercise. For example, when an individual with IGT is faced with the decision to exercise, he or she may remember how much enjoyment he or she had from running. An individual could also have a brother with diabetes and have very vivid images of the complications and management involved with the disease. The mental balance scale is more greatly weighted towards engaging in exercise due to the greater causal weight of the pros than the cons. In many instances, the decision scale does not work so optimally. If the causal significance of missing two days of work were greater than the two pros, the scale would have tipped in favor of opposing the decision to exercise.

Integrating the availability heuristic into the decision balance model allows researchers to more accurately pinpoint the instances and occurrences that are biased towards the decision to exercise. Based on this preliminary study, health practitioners can construct interventions to target and change the bias that impairs those with IGT from exercising.

In order for practitioners to improve the decision balance model and create more effective disease prevention, it is necessary that instances and occurrences that influence
the decision to exercise be identified. Once the instances and occurrences are pinpointed, they can be manipulated to increase the likelihood of engaging in exercise.

Conclusion

Employee wellness programs have moved from an employee perk to a modality for decreasing health costs and improving productivity. As jobs have become increasingly dependent on technology, the need for human mobility at work has been diminished resulting in costly diseases to rise in prevalence. To meet the increase of sedentary lifestyles, EWPs have focused intervention programs at increasing physical activity.

Models developed from various theories guide the most effective interventions. One such framework is the Decision Balance model that has shown a positive association with participation in physical activity. Researchers have suggested that these determinants should be integrated with theory from other fields of behavioral research such as behavioral economics. To this end, the availability heuristic can be added to the decision balance model to increase the precision and accuracy of the frameworks intervention guidance.

As health practitioners continue to improve the decision balance model there is a need to identify the instances and occurrences that influence those with IGT to exercise. Each instance and occurrence is a modifiable factor that can be addresses by a modality through health promotion channels. For example, if employees recall exercise as a large
use of time, the EWP director may create shorter classes or provide an onsite workout facility that is easier to reach than a local gym or club.
CHAPTER 3

METHODS

Purpose Statement

The purpose of this preliminary investigation was to identify the instances and occurrences (instances and occurrences that most easily come to mind) used by MSU employees with IGT during the decision balance process that determines engagement in physical activity.

Overview

The data collection took place in several stages as outlined in Figure 3. The first step was to obtain approval from the university human subjects committee. Ninety-eight MSU employees were identified by a fasting blood glucose reading between 110 mg/dl and 125 mg/dl in a blood draw sponsored by either the Employee Wellness Program at Montana State University-Bozeman or the Employee Wellness Program at Montana State University-Billings. Eighteen subjects from MSU-Bozeman were randomly selected to participate in an interview process. Interview questions were generated to identify the instances and occurrences that would influence an individual with IGT to exercise. Based on the responses to the interview questions, statements concerning the instances and occurrences for exercise were identified through content analysis and used to create a self-administered survey. The survey was piloted to ensure that the questions and statements were clear and understandable. The survey was distributed by mail to
employees, retirees, and spouses with IGT from MSU-Bozeman and MSU-Billings using the modified Dillman method (2001) to increase survey response rate. Once the surveys were collected, they were analyzed using SPSS to identify the instances and occurrences that determine engagement in exercise.

Figure 3. Methods Diagram.

Human Subjects Committee

The Montana State University Human Subjects Committee was contacted for research approval on February 11, 2003. The purpose of the study and the procedures involved in the research were detailed in the Human Subjects form (Appendix A). Topics reviewed by the committee included blood result querying, interviewing processes, and survey construction and distribution among both the MSU-Bozeman and University of Montana (UM) subjects. Unfortunately the UM Employees could not be contacted to participate in the study due to confidentiality procedures from the Health Insurance Portability and Accountability Act of 1996 (The Centers for Medicare and Medicaid Services, 2002). The employees had not given permission for the researchers to contact them regarding
their blood results and therefore had to be removed from the study. Due to the complications, an amendment was made to the Human Subjects exemption review form that excluded the University of Montana from the study (Appendix A). Instead, subjects from MSU-Billings were utilized for the study. At the time of the amendment, the Human Subjects Review Board found the study to be non-compliant with health insurance accountability and portability act (HIPAA) regulations; however, the exemption from review had been approved before the implementation of the act on April 16, 2003 (Centers for Medicaid and Medicare Services, 2003). The human subjects committee agreed to let the researchers continue the investigation based on the following conditions: 1) researchers must track the number of subjects who participate in the study and any unexpected or adverse affects, 2) report any adverse consequences to the committee, and 3) if there are serious adverse affects suspend the research until the situation has been reviewed by the human subjects committee (Appendix A).

**Interview Subjects**

Eighteen subjects were randomly selected for the interviews based on the following criteria: 1) 18 years-of-age or older, 2) subscribers to the university system health plan, and 3) had a fasting glucose reading between 110-125 mg/dl in their last EWP blood screening, classifying them with IGT. Subjects were contacted through a letter from both the director and medical director of the EWP asking subjects to participate in the interview sessions. At least three attempts were made to contact the
potential interviewees through written and telephone communications. All participants were required to sign a consent form prior to the interview process (Appendix B).

**Interview Instrumentation**

An interview is a face-to-face conversation guided by questions that collect information on an individual’s ideas, thoughts, and feelings about a particular area of inquiry. The interviews typically lasted about 20 to 25 minutes. The purpose of the interviews was to identify the instances and occurrences that would influence an individual with IGT during the decision balance process that determines engagement in physical activity.

The interview instrument consisted of three main sections: an introduction, a definition of exercise, and interview questions. The introduction identified the investigator performing the interview, explained the purpose for the interview, and informed the subjects of their rights as a voluntary participant in the study. Exercise was defined as shown in Figure 4. The definition was also placed on a note card that the interviewee could refer to at anytime during the interview.

**Figure 4. Definition of Exercise.**

<table>
<thead>
<tr>
<th>Exercise can be anything where planned physical activity occurs. Possible examples of exercise are:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Playing in the backyard as a child</td>
</tr>
<tr>
<td>• Physical education class</td>
</tr>
<tr>
<td>• Organized sports</td>
</tr>
<tr>
<td>• Working out in the gym</td>
</tr>
<tr>
<td>• Walking</td>
</tr>
<tr>
<td>• Running</td>
</tr>
<tr>
<td>• Skiing</td>
</tr>
<tr>
<td>• Lifting Weights</td>
</tr>
<tr>
<td>• Aerobics</td>
</tr>
<tr>
<td>• Bike Rides</td>
</tr>
</tbody>
</table>
Interview questions (Appendix C) were created with a conceptual matrix. The matrix was designed to ensure that both the decision balance model and the availability heuristic were integrated into a series of interview questions. The decision balance model was divided into the theoretical components originally designed by Janis and Mann: gains for self, losses for self, gains for others, losses for others, approval for self, self-disapproval, approval of others, and disapproval of others (1977). The availability heuristic was separated into three conceptual components, originally designed by Kahneman and Tversky: memory recall, association, and construction (1984). The three components were given a temporal designation. The memory recall component was based on memories of exercise in the past. The association component was based on the ideas and thoughts about exercise in the present. The construction component was based on the expectations of exercise in the future.

The matrix was built on a vertical and horizontal axis. The 8 decision balance components were placed on the horizontal axis and the 3 components of the availability heuristic were placed on the vertical axis as shown in Figure 5. The matrix consisted of 24 cells, each cell containing an integration of 1 component from the decision balance model and 1 component of the availability heuristic to create a question. For example, the cell integrating “gains for others” from the decision balance model and “construction” from the availability heuristic contained the question, “What benefits to others close to you do you expect from this exercise?” The components of the decision balance model, approval of self and self-disapproval, and approval of others and disapproval of others, were collapsed together as one component. In total, there were 18 interview questions.
divided into 3 temporal sections: past, present, and future. Each temporal area began with an introductory statement designed to place the subject in the appropriate temporal frame of reference. The introductory statements were “for the following questions I am going to ask you about your memories of exercise in the past;” “for the next set of questions I am going to ask you about the ideas and thoughts you associate with exercise in the present;” and “in the following set of questions I am going to ask you about what you expect to occur when or if you exercise in the future.”

**Interviewing Techniques**

The questions were open-ended to allow for discussion. A conversational interviewing technique was used where appropriate responses were followed by further probing questions to develop a consistent iteration between the interviewee and interviewer (Babbie, 2002). The interview followed in a temporal order starting with memory recall (past), association (present), and construction (future). Within each temporal area, questions were asked from the left of Figure 5 to the right until all of the questions were asked.

The interviews were recorded onto micro-audiocassettes utilizing a transcription machine with a built-in microphone. The recordings were transcribed verbatim into the word-processing program, Microsoft Word®. The transcriptions were then downloaded into NVivo® (revision 1.2.142) qualitative software for analysis.
Interview Data Analysis

The analysis procedure used in this investigation was similar to the process used by Montaño and Kasprzyk (2001) who also researched theory using multiple themes. Specifically, the investigators used open-ended interviews to recognize the outcomes to particular behaviors among distinct populations. Once they gathered the data, content analysis was used to identify the most relevant information to the behavior and their theory of interest.

In this study, the interview questions were developed to elicit specific instances and occurrences that influence the decision to exercise among a population of pre-diabetics based on the crossing of the decision balance model with the availability heuristic. Each question in the interview session was designed to elicit a specific response about engaging in exercise in the past, present and future. Each temporal series of
questions had to be delineated from the next temporal component to ensure that the interviewee was thinking in the proper frame of reference. In each part of the interview it was crucial that the interviewer exhausted the potential responses of the subject.

Once the interviews were completed, content analysis was used to define the instances and occurrences used by individuals with IGT during the decision balance process to exercise. Using NVivo®, the subjects comments were sorted into categories based on the framework shown in Figure 5. Each box within the matrix represented statements that would be used to generate the self-administered survey (Appendix D). Due to the exploratory nature of the study, every categorized comment was included in the survey.

Survey Instrumentation

Survey Subject Selection

Eighty-eight subjects were selected to receive a survey by mail based on the following criteria: 1) 18 years-of-age or older, 2) subscribers to the health plan at either MSU-Bozeman or MSU-Billings, and 3) had a fasting glucose reading between 110-125 mg/dl in their last EWP blood screening classify them with impaired glucose tolerance.

Survey Construction

In total, the survey was comprised of 112 items. The booklet-style survey consisted of three 11 inch × 17 inch pieces of paper stapled down the center and folded in half to create an 11-page survey with a blank back cover. The survey consisted of 6 sections: exercise activity, memories of exercise in the past, ideas and thoughts associated
with exercise in the present, expectations of exercise in the future, decision balance, and demographics.

The first 3 questions asked the subject about the frequency, duration, and intensity of his or her current exercise. Intensity was assessed through the Centers for Disease Control’s (CDC) talk test (2002) in order to determine MET Hours. The 3 questions used in this process were: 1) how many days per week do you exercise? 2) on the days that you exercise, how many minutes do you spend exercising total? and 3) please check the box that best describes how you usually feel during exercise:

1. This is nice and slow. I feel like I could sing.

2. I am working at a level above normal daily life but can still carry on a conversation.

3. I am breathing hard and working up a sweat.

In order to create the MET Hours variable days per week was multiplied by minutes per week in order to establish how many average minutes per week the individual was exercising for. Minutes was then converted to hours and multiplied by METs (Aaron & Kriska, 1997). The talk test allowed the researchers to assess the approximate the Metabolic Equivalent of their exercise (CDC, 2002). The first response represented an intensity level of 2 METs, the second response represented an intensity level of 4.5 METs, and the third response represented an intensity level of 6.5 METs.

The second, third, and fourth sections contained statements regarding memories of exercise in the past, thoughts and ideas associated with exercise in the present, and expectations of exercise in the future. Scales were used in order to recognize a pattern of
agreement with the given statements by assigning responses a certain level of intensity (Babbie, 2002). The statements were rated on a 5-point Likert scale system to measure the magnitude of agreement with the instances and occurrences. Specifically, subjects were asked to select a response of strongly agree, agree, not applicable, disagree, or strongly disagree for each of the statements.

The fifth section of questions measured Janis and Mann’s (1977) decision balance model using a series of gold standard questions created by Rakowski and Rossi to measure the decision balance process for exercise (1992). These questions provided a comparison for the integrated conceptual framework generated through the interview process. The statements were rated on a scale system to measure the importance of the statements to the subjects. Subjects were asked to indicate if they found the statements to be very important, important, not applicable, not important, or not important at all.

The sixth section of the survey contained questions addressing demographic information, diabetes risk, and current exercise. In addition to MET Hours, a second question based on the Surgeon General’s recommendation for physical activity (2001) was also used to assess physical activity. Specifically, the subject was asked, “I currently exercise for at least 30 minutes a day, 5-7 days a week in a sustained rhythmic movement at a level of effort equivalent to that of walking briskly, dancing, swimming, or bicycling on level terrain.”

The demographic variables utilized in this questionnaire were perceived diabetes risk, age, gender, job classification, level of education, marital status, number of children, employment situation, occupation, and household income. Perceived diabetes risk was
used as another descriptor of the pre-diabetic population to assess each individual’s perceived risk for diabetes onset: high risk, medium risk, low risk, or no risk. A question on job classification was asked to identify the differences among the various groups of health plan users among this worksite population. Job classification was determined through 6 classifications: spouse employed by MSU, spouse retired from MSU, classified, faculty, staff, and retired. Since the study was based on the information that people use to make decisions about exercise, it was important to look at the educational levels in order to identify any differences in knowledge that might exist. Level of education was determined through 6 classifications ranging from eighth-grade education to college degree or higher. Marital status was determined through 6 classifications: married, widowed, never been married, separated, divorced, and member of an unmarried couple. Current occupation and employment situation was asked as another measure of income. This allowed the researcher to estimate an individual’s income. Employment situation was determined through 6 classifications: employed full-time, employed but on leave, employed part-time, not employed, staying at home, and retired.

Survey Pilot

Consultation regarding the construction of the survey came from several sources. The questionnaire was given to health and research professionals, specifically Dr. Tim Dunnagan, associate professor of Health Promotion/Exercise and Wellness at MSU-Bozeman, Dr. George Haynes, Associate Professor of Health and Human Development at MSU-Bozeman, and Kirk Keller, EWP Director for MSU-Bozeman. These professionals provided crucial insight into complete and appropriate survey development. The survey
was also piloted on individuals who did not have direct knowledge of the study in order to substantiate the clarity and time required to take the survey.

Survey Distribution

The survey was distributed using a modified Dillman method (2000) for mail surveys. Letters were sent through campus mail or United States Postal Service depending on the return address associated with the subjects' last EWP blood screening. Initial contact was made with the subjects through a letter sent from the appropriate campus director and medical director. The letter explained why the subject was chosen for the study, the importance of the study, when the survey would arrive, and who should be contacted if he or she had any questions or concerns (Appendix E). Approximately 3 days later, the survey was sent out with an accompanying cover letter. The cover letter from the directors of the respective EWPs at either Billings or Bozeman was sent with the survey. The letter reiterated how crucial the study was to helping those with IGT to exercise. The first page of the survey outlined: 1) how the individual was selected for the study, 2) how the data would be used, 3) that participation in the study was voluntary, 4) who would have access to the answers, 5) what procedures to follow when the survey was complete, and 6) who to contact when individuals had questions (Appendix E).

Participants were urged to complete the surveys at their first possible convenience. One week later the survey was followed by a letter thanking the individuals for their participation and reminding them to return their completed survey if they had not done so already (Appendix E). Finally one week after the letter, subjects who had not yet returned
their surveys were contacted by telephone and asked to please complete and return the survey.

Statistical Analysis

The statistical analysis was conducted using of the Statistical Package for the Social Sciences Version (SPSS) 11.5 software application. Data were recoded and frequency distributions were used to identify missing data, obvious outliers and skewed variables.

Missing Variables

Of the 102 variables collected in the survey there were generally 1-4 missing values within each variable. There were 7 and 10 missing cases for occupation and income respectively. All missing cases were imputed based on the mode within each variable. None of the imputed variables contained responses such as “strongly agree” or “strongly disagree” and were therefore agree or disagree on the variable. This imputation procedure allowed all of the observation to be used in the analysis.

Dependent Variable

A continuous variable called MET Hours was developed using the 3 questions on exercise frequency, duration, and intensity. Normality tests were used to determine the linearity, and homoscedascity of MET Hours.
Scale Development

The individual Lickert scale questions could not be used in the regression analysis because they were ordinal variables. Ordinal variables do not create accurate residual values that are needed to estimate the variance explained in a regression model (Lomax, 2001). Therefore, scales were developed based on the items associated with the availability heuristic including memories of exercise in the past, ideas and thoughts associated with exercise in the present, and expectations of exercise in the future. The scales were constructed using the SPSS Reliability process. Each scale was entered into the reliability analysis in order to confirm that the scale had an acceptable internal consistency or Cronbach Alpha coefficient of greater than .700 as suggested by Nunnally (1978). The larger the Cronbach Alpha correlation, the greater the average correlation between all of the items measuring MET Hours. If the scales did not reach an Alpha of .700 items were removed one by one until the coefficient reached the appropriate level.

For the integrated model, the memory recall scale contained 31 items, and the association and construction scales each contained 24 items. The items in each scale were added together to create summative scores that would be used as continuous variables for memory recall, construction, and association. The new continuous variables were tested for normality using the explore command in SPSS.

The scales met content validity requirements because they were based upon the statements collected in the interviews. These statements provided a representative set of memories of past exercise, thoughts and ideas associated with exercise in the present, and expectations of future exercise from individuals who had IGT at MSU. Therefore, the
scales were created with appropriate items relevant to the population of interest (Devillis, 1991).

In order to compare the strength of the integrated model to a gold standard, the decision balance model, pros, cons, and a composite scale were used based on the work of Rakowski and Rossi (1992). Items from these scales were not removed because they have been shown as a gold standard measure.

**Linear Regression**

The dependent variable of interest was MET Hours, a measure of current exercise engagement. For the integrated model scales, five point Lickert scale items with responses ranging from “strongly agree” to “strongly disagree” were applied to measure the type of information used to make the decision to exercise. The scores for each scale were coded so that higher scores indicated a greater use of a particular type of information. For instance, a higher score on memory recall meant increased use of memory information when making the decision to engage in exercise. The independent variables were the summative scores from the integrated decision model: memory recall, association, and construction. In addition, the three summative scores from the decision balance model pros, cons, and composite scales were used as a measure to compare the predictive power of the integrated model.

Using the regression procedure in SPSS 11.5 (SPSS, 2002), simple regression analysis was used to determine if the independent variables of interest were significant predictors of MET Hours. The empirical models are as follows:

*Memory recall simple regression*
MET Hrs = \( B_0 + B_1 \text{sum of memory recall} + e \)

*Association simple regression*

MET Hrs = \( B_0 + B_1 \text{sum of association} + e \)

*Construction simple regression*

MET Hrs = \( B_0 + B_1 \text{sum of construction} + e \)

\( e \) = error term

Also simple regressions were run for the gold standard decision balance model components to determine which were predictive of MET Hours. The empirical models are as follows:

**Pros simple regressions**

MET Hrs = \( B_0 + B_1 \text{sum of pros} + e \)

**Cons simple regressions**

MET Hrs = \( B_0 + B_1 \text{sum of cons} + e \)

**Composite simple regressions**

MET Hrs = \( B_0 + B_1 \text{sum of composite} + e \)

\( e \) = Error Term

The control variables: perceived diabetes risk, age, gender, children in household, education, marital status, job classification, and household income were regressed against MET /Hours to determine which covariates were predictors of MET Hours. Both education and household income were found to be significant predictors of MET Hours. Consequently, these variables were used in a multivariate linear regression analysis. These models allowed the investigator to determine if the integrated model components predicted exercise behavior while controlling for education and household income.

The significance values for all the regression were held at a confidence level of .05. The multivariate empirical models used in this investigation are specified as follows:

**Integrated model**

*Memory Recall multivariate analysis*

MET Hrs = \( B_0 + B_1 \text{sum of memory recall} + B_2 \text{level of education} + B_3 \text{household income} + e \)


Association multivariate analysis
MET Hrs = B_0 + B_1 \text{sum of association} + B_2 \text{level of education} + B_3 \text{household income} + e

Construction multivariate analysis
MET Hrs = B_0 + B_1 \text{sum of construction} + B_2 \text{level of education} + B_3 \text{household income} + e
\quad e = \text{Error term}

In addition, the components of the decision balance model were used in a multivariate linear regression while controlling for education and household income.

Decision Balance Model

Pros multivariate analysis
MET Hrs = B_0 + B_1 \text{sum of pros} + B_2 \text{level of education} + B_3 \text{household income} + e

Cons Multivariate Analysis
MET Hrs = B_0 + B_1 \text{sum of cons} + B_2 \text{level of education} + B_3 \text{household income} + e

Composite Multivariate Analysis
MET Hrs = B_0 + B_1 \text{sum of composite} + B_2 \text{level of education} + B_3 \text{household income} + e
\quad e = \text{Error term}

Hypothesized Relationships

It was hypothesized that: 1) individuals with IGT with higher use of memory recall during their decision balance process that determines exercise would be more likely to exercise than individuals with IGT with lower use of memory recall during their decision balance process that determines exercise; 2) individuals with IGT with higher use of association during their decision balance process that determines exercise would be more likely to exercise than individuals with IGT with lower use of memory recall during their decision balance process that determines exercise; 3) individuals with IGT with higher use of construction during their decision balance process that determines exercise would be more likely to exercise than individuals with IGT with lower use of
construction during their decision balance process that determines exercise; 4) the integrated decision model predicts more exercise behavior than the decision balance model.

Analysis Summary

Using qualitative and quantitative methods, the integrated model was explored to identify the available information (information that most easily come to mind) used by MSU employees with IGT during the decision balance process that determines engagement in physical activity. Qualitative methods guided the construction of survey questions about exercise engagement among a distinct population. Quantitative survey methods allowed the investigators to identify the components of the integrated model that were used during the decision to exercise and also allowed for a comparison with a gold standard measure.
CHAPTER 4

RESULTS

This chapter presents the qualitative and quantitative results of the study. First, a description of the interview findings is provided. Next, a description of the survey respondents, scaling process, and regressions findings are summarized. Finally, a comparison of the decision balance model and the integrated models are made.

Interview Participant Information

A total of 18 individuals with IGT covered by the university system health plan from MSU-Bozeman were asked to participate in the face-to-face interviews. Of the potential recruits, the researcher was 3 were unable to be contacted, 3 declined, and 2 did not currently live in the state of Montana. Therefore, 10 agreed to participate in the interviews.

Interview Results

A conceptual matrix was developed to ensure that both the availability heuristic and the decision balance model were integrated in order to create appropriate interview questions. The matrix was built on a vertical and horizontal axis. The 3 components of the availability heuristic: memory recall (past), association (present), and construction (future) were placed on the vertical axis and the 8 components of decision balance: gains for self, losses for self, gains for others, losses for others, self-approval, self-disapproval,
approval of others, and disapproval of others were placed on the horizontal axis. Statements were developed to address each of the 24 categories on the matrix. The responses to those questions were sorted back into their respective categories: memory recall, association, and construction.

Memory Recall

In total, 31 statements were obtained from the interviewees about their memories of exercise in the past. Table 1 presents sample statements and the statements generated for the survey within each area of memory recall. Within Table 1, the first column shows the eight areas of the decision balance model: gains for self, losses for self, gains for others, losses for others, self-approval, self-disapproval, approval of others, and disapproval of others. The second column displays a typical statement from an interviewee regarding his or her memories of exercise in each area. For example, the area “gains for self” contained the statement “I kept my body weight down; I know I was burning off calories.” In the third column, an example of a generated survey statement is displayed. Based on the statement “I kept my weight down; I know I was burning off calories” the generated survey statement was “I remember that exercising helped me keep my weight down.” Finally, the fourth column displays the total number of statements regarding memories of exercise in each of the eight areas. For example, in the area of “losses for others” there were a total of 7 statements made by interviewees. At the bottom of the column, a total number of statements for memory recall is provided. Although the total number of statements from the interviewees was 111, only 31 statements regarding memories of exercise were used in the survey. In many cases
statements regarding the same theme were made and, therefore, only one survey statement was needed to assess that particular memory of exercise. For instance, in the area of losses for self multiple statements about memories of injury from exercise were made such as “I did a pretty good, MCL problem, I think they said a class two MCL, and so I haven’t skied since;” or “I broke my ankle several times;” and “I did have a really bad fracture within my upper humerus and broke it in five places skiing.” Therefore, the following survey statement about memories of injury was made, “I remember suffering an injury from exercise.” All of the statements for memories of exercise can be found in Appendix F.

Association

In total, 24 statements were obtained from the interviewees about their ideas and thoughts associated with exercise in the present. Table 2 presents sample interview statements and statements generated for the survey from within each area of association. Within Table 2, the first column shows the 8 areas of the decision balance model: gains for self, losses for self, gains for others, losses for others, self-approval, self-disapproval,
Table 1. Sample Interview Statements And Survey Statements Generated From Memory Recall.

<table>
<thead>
<tr>
<th>Area</th>
<th>Example of Interview Statement</th>
<th>Generated Survey Statement</th>
<th>Total Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gains For Self</td>
<td>&quot;I kept body weight down, I know I was burning off calories.&quot;</td>
<td>I remember that exercising helped me keep my weight down.</td>
<td>31</td>
</tr>
<tr>
<td>Losses For Self</td>
<td>&quot;In the very recent past I twisted my ankle badly.&quot;</td>
<td>I remember suffering an injury from exercise.</td>
<td>28</td>
</tr>
<tr>
<td>Gains For Others</td>
<td>&quot;My life likes to see me trim rather than overweight.&quot;</td>
<td>I remember my significant other liked to see me fit from exercise.</td>
<td>8</td>
</tr>
<tr>
<td>Losses For Others</td>
<td>&quot;When I've gone backpacking with people, if I am the one that is the slow person in the group, that is a cost for the group.&quot;</td>
<td>I remember that if I wasn't in good physical condition it limited my ability to recreate with others.</td>
<td>7</td>
</tr>
<tr>
<td>Self Approval</td>
<td>&quot;Well I guess I approve of the fact that I finally got my rear in gear and started doing that.&quot;</td>
<td>I remember that exercise required self discipline.</td>
<td></td>
</tr>
<tr>
<td>Self Disapproval</td>
<td>&quot;I feel guilty about not exercising.&quot;</td>
<td>I remember feeling guilty when I didn't exercise.</td>
<td>6</td>
</tr>
<tr>
<td>Approval of others</td>
<td>&quot;I think my husband was real pleased when I started walking&quot;</td>
<td>I remember that my significant other approved of exercise.</td>
<td>18</td>
</tr>
<tr>
<td>Disapproval of others</td>
<td>&quot;I know that my mother was against organized activity for children so I didn't really participate in anything like that.&quot;</td>
<td>I remember that my parents did not approve of exercise.</td>
<td>5</td>
</tr>
</tbody>
</table>

TOTAL STATEMENTS 111

approval of others, and disapproval of others. The second column displays a typical statement from an interviewee regarding his or her own thoughts and ideas associated
with exercise in the present in each area. For example, the area “gains for self” contained the statement “I think it lowers my cholesterol.” In the third column, an example of a generated survey statement is displayed. Based on the statement “I think it lowers my cholesterol” the generated survey statement was “I associate exercise with good physical health (low blood pressure and cholesterol, controlled pain).” Finally, the fourth column displays the total number of statements regarding memories of exercise in each of the 8 areas. For example, in the area of “losses for others” there were a total of 8 statements made by the interviewees. At the bottom of the column, a total number of statements for memory recall are provided. Although the total number of statements from the interviewees was 58, only 24 statements regarding memories of exercise were used in the survey. In many cases, statements regarding the same theme were made and, therefore, only one survey statement was needed to assess that particular thought or idea associated with exercise in the present. For instance, in the area of losses for self, multiple statements about thoughts of monetary costs of exercise were made such as “well it costs 42 dollars a month now;” and “financial is one, you know, pay to have access to a club of facilities, exercise facilities, and time.” Therefore, the following survey statement about thoughts of monetary cost associated with exercise was, “I associate exercise with excessive monetary costs to myself.” All of the statements for memories of exercise can be found in Appendix G.
Table 2. Sample Statements and Statements Generated from Association.

<table>
<thead>
<tr>
<th>Area</th>
<th>Example of Interview Statement</th>
<th>Generated Survey Statement</th>
<th>Total Statements by area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gains For Self</td>
<td>&quot;I think it lowers my cholesterol.&quot;</td>
<td>I associate exercise with good physical health (low blood pressure and cholesterol, controlled pain).</td>
<td>17</td>
</tr>
<tr>
<td>Losses For Self</td>
<td>&quot;Financial is one, in other words if, you know, pay to have access to a club of any sort, or facilities, exercise facilities and time.&quot;</td>
<td>I associate exercise with excessive monetary costs to myself.</td>
<td>8</td>
</tr>
<tr>
<td>Gains For Others</td>
<td>&quot;I'm not grumpy. Yeah sometimes I get grumpy and if I think inwardly too much without that energy release I can get really grumpy and naggy and that upsets my daughter and my dog.&quot;</td>
<td>I associate exercise with a better attitude toward others.</td>
<td>7</td>
</tr>
<tr>
<td>Losses For Others</td>
<td>&quot;Lack of time spent on relationships with family and friends.&quot;</td>
<td>I associate exercise with too much time away from other people in my life.</td>
<td>6</td>
</tr>
<tr>
<td>Self Approval</td>
<td>&quot;Uh, self approval. If I am exercising, I'm feeling good about myself and what I am doing.&quot;</td>
<td>I associate exercise with feeling good about myself.</td>
<td>11</td>
</tr>
<tr>
<td>Self Disapproval</td>
<td>&quot;When I do it is approval. I feel guilty if I don't.&quot;</td>
<td>I associate not exercising with guilt.</td>
<td>6</td>
</tr>
<tr>
<td>Approval of others</td>
<td>&quot;Because I am not doing any I suspect that those close to me would wish I were so perhaps I would be in better shape.&quot;</td>
<td>I associate exercise with others concern for my health.</td>
<td></td>
</tr>
<tr>
<td>Disapproval of others</td>
<td>&quot;No more of disapproval. Yeah because those people don't know I exercise. You know their still making judgements based on my size.&quot;</td>
<td>I associate how others view me as a sign that I don't exercise.</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL STATEMENTS</strong></td>
<td></td>
<td></td>
<td><strong>58</strong></td>
</tr>
</tbody>
</table>
In total, 24 statements were obtained from the interviewees about their expectations of exercise in the future. Table 3 presents sample interview statements and statements generated for the survey within each area of construction. Within Table 3, the first column shows the 8 areas of the decision balance model: gains for self, losses for self, gains for others, losses for others, self-approval, self-disapproval, approval of others, and disapproval of others. The second column displays a typical statement from an interviewee regarding his or her own expectations of exercise in the future in each area. For example, the area “gains for self” contained the statement “I would feel more in control of myself, which I always do, when I exercise.” In the third column, an example of a generated survey statement is displayed. Based on the statement provided “I would feel more in control of myself, which I always do, when I exercise” the generated survey statement was “I expect exercise will help me be in control of my body.” Finally, the fourth column displays the total number of statements regarding memories of exercise in each of the 8 areas. For example in the area of “losses for others,” there were a total of 3 statements made by the interviewees. At the bottom of the column, a total number of statements for memory recall are provided. Although the total number of statements from the interviewees was 73, only 24 statements regarding construction were used in the survey. In many cases statements regarding the same theme were made and, therefore, only one survey statement was needed to assess that particular expectation of exercise in the future. For instance, in the area of losses for self, multiple statements about the physical difficulty of exercise were made such as “but doing stuff is hard,” and

<table>
<thead>
<tr>
<th>Area</th>
<th>Example Interview Statement</th>
<th>Generated Survey Statement</th>
<th>Total Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gains for self</td>
<td>“I would feel more in control of myself, which I always do, when I exercise.”</td>
<td>“I expect exercise will help me be in control of my body.”</td>
<td>1</td>
</tr>
<tr>
<td>Losses for self</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Gains for others</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Losses for others</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Self-approval</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Self-disapproval</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Approval of others</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Disapproval of others</td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>


“physically hard.” Therefore, the following survey statements about thoughts of monetary cost associated with exercise was, “I expect my future exercise will be difficult.” All of the statements for memories of exercise can be found in Appendix H.

Table 3. Sample Statements And Questions Generated From Construction.

<table>
<thead>
<tr>
<th>Area</th>
<th>Example of Interview Statement</th>
<th>Generated Survey Statement</th>
<th>Total Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gains For Self</td>
<td>&quot;I would feel more in control of myself which I always do when I exercise.&quot;</td>
<td>I expect exercise will help me be in control of my body.</td>
<td>28</td>
</tr>
<tr>
<td>Losses For Self</td>
<td>&quot;Physically hard&quot;</td>
<td>I expect my future exercise to be difficult.</td>
<td>12</td>
</tr>
<tr>
<td>Gains For Others</td>
<td>&quot;Being a role model to my daughter.&quot;</td>
<td>My exercise will make me a role model for others.</td>
<td>12</td>
</tr>
<tr>
<td>Losses For Others</td>
<td>&quot;Time away from relationships.&quot;</td>
<td>Future exercise won't allow me to spend the time I want to with those close to me.</td>
<td>3</td>
</tr>
<tr>
<td>Self Approval</td>
<td>&quot;I think I would feel better about myself if I were exercising&quot;</td>
<td>I expect to feel better about myself when I exercise in the future.</td>
<td>7</td>
</tr>
<tr>
<td>Self Disapproval</td>
<td>&quot;Well you know it would be great if I had the energy and self discipline to do it.&quot;</td>
<td>My future exercise will require self discipline.</td>
<td>2</td>
</tr>
<tr>
<td>Approval of others</td>
<td>&quot;I would say that everybody would approve. Again because of results.&quot;</td>
<td>I expect that my friends will approve of exercise.</td>
<td>8</td>
</tr>
<tr>
<td>Disapproval of others</td>
<td>&quot;Not anymore. My mom is no longer with us.&quot;</td>
<td>I expect that my parents will disapprove of my exercise.</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL STATEMENTS 73

Qualitative Summary

Gains for self-statements were most frequently mentioned throughout memories of exercise, association, and construction and disapproval of others contained the fewest number of statements. There were several themes found throughout the qualitative
analysis in memory recall, association and construction. Some of the most common memories of exercise were related to the medical benefits of exercise, enjoyment of exercise, the dislike of exercise, losses of time, losses of money, improved self-esteem, injury, embarrassment, weight control, exercising with a spouse, pleasing others, encouragement of others, approval of spouse and family, and family support. In association, the most common thoughts and ideas related to exercise in the present were increased self-esteem, improved mood, less time spent with others, guilty feelings about not exercising, and physical appearance to others. The most common statements concerning expectations of exercise in the future were related to weight loss, health benefits such as improved blood pressure or lowered cholesterol, and improved mood.

Survey Respondent Information

A total of 88 surveys were distributed through the United States Postal Service and campus mail to individuals with IGT covered by the university insurance plan at both the Bozeman and Billings campuses. Of the 88 individuals who received the survey, 60 (68%) completed and returned the survey.

Exercise Behavior Measured in Average MET Hours per Week

Table 4 illustrates the frequency distribution of MET hours among the respondents. Only 16.7% were reaching the optimal MET Hours (at least 14.63 MET hours per week) for reducing their risk of Type 2 diabetes onset while over 28.3% did not currently exercise.
Table 4. Respondents Average MET Hours per Week.

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>% Of Survey Sample (N=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MET*HRS PER WEEK</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>28.3</td>
</tr>
<tr>
<td>1-7</td>
<td>30.0</td>
</tr>
<tr>
<td>7.1-14.62</td>
<td>30.0</td>
</tr>
<tr>
<td>14.63-21.1</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Population Characteristics

Percent distributions of respondents' demographic and socioeconomic characteristics are presented in Table 5. The mean age of the respondents was 60 years with a standard deviation of 11.2 years. Approximately 48 (48.3%) of the respondents were male and 51.7% were female. Those who perceived their risk for Type 2 diabetes as lower than high risk was 75%. One quarter (25.0%) of the respondents felt they were at high risk, 35.0% felt they were at medium risk for Type 2 diabetes, 25.0% felt they were at low risk for Type 2 diabetes, and 15.0% felt they were not at risk for Type 2 diabetes. Percentage of respondents who were married was 70% and 81.7% did not have children living in their households. Approximately 68.3% of the respondents had a college degree. Respondents who were faculty numbered 20.0%, 10.0% were staff, 20.0% were classified, 31.7% were retired, and 18.3% were a spouse of someone who worked for or was retired from the university system. A majority (95.0%) of the respondents' household income was over $20,000, while over half (63.4%) made over $50,000 a year.
Table 5. Demographic and Socioeconomic Characteristics of Survey Respondents.

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>% Of Survey Sample (N=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE (mean 60 yrs)</td>
<td></td>
</tr>
<tr>
<td>(SD 11.2)</td>
<td></td>
</tr>
<tr>
<td>30-60 yrs</td>
<td>50.0</td>
</tr>
<tr>
<td>61-83 yrs</td>
<td>50.0</td>
</tr>
<tr>
<td>GENDER</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.3</td>
</tr>
<tr>
<td>Female</td>
<td>51.7</td>
</tr>
<tr>
<td>MARITAL STATUS</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>70.0</td>
</tr>
<tr>
<td>Not Married</td>
<td>30.0</td>
</tr>
<tr>
<td>EDUCATION</td>
<td></td>
</tr>
<tr>
<td>No College Degree</td>
<td>31.7</td>
</tr>
<tr>
<td>College Degree</td>
<td>68.3</td>
</tr>
<tr>
<td>CHILDREN</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>81.7</td>
</tr>
<tr>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>8.3</td>
</tr>
<tr>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>EMPLOYMENT STATUS</td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>20.3</td>
</tr>
<tr>
<td>Staff</td>
<td>10.2</td>
</tr>
<tr>
<td>Classified</td>
<td>20.3</td>
</tr>
<tr>
<td>Retired</td>
<td>30.5</td>
</tr>
<tr>
<td>Spouse</td>
<td>18.7</td>
</tr>
<tr>
<td>HOUSEHOLD INCOME</td>
<td></td>
</tr>
<tr>
<td>$10,000-$19,000</td>
<td>6.0</td>
</tr>
<tr>
<td>$20,000-$29,999</td>
<td>14.0</td>
</tr>
<tr>
<td>$30,000-$39,999</td>
<td>12.0</td>
</tr>
<tr>
<td>$40,000-$49,999</td>
<td>12.0</td>
</tr>
<tr>
<td>$50,000-$74,999</td>
<td>24.0</td>
</tr>
<tr>
<td>$75,000-$100,000</td>
<td>20.0</td>
</tr>
<tr>
<td>&gt;$100,000</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Integrated Decision Model and Decision Balance Model Scales

Table 6 illustrates the Cronbach Alpha scores of the scales that were generated to measure the various components of the Integrated Decision Model and Decision Balance Model scales. None of the scales had to be reduced to increase the Cronbach Alpha Coefficient. In short, all of the scales had alpha values greater than .7 demonstrating a suitable reliability. Memory recall had the lowest alpha value at .79 with 31 items,
association had an alpha of .86 with 24 items, and construction had an alpha value of .85 with 24 items. The decision balance pros had the highest alpha at .92 with 10 items, decision balance cons had an alpha of .83 with 6 items, and decision balance composite had an alpha of .80 with 16 items. The new variables were normally distributed. The skewness and kurtosis of the variables was within acceptable limits.

Table 6. Reliability Measure for Integrated Decision Model Scale and Decision Balance Scales.

<table>
<thead>
<tr>
<th>SCALE</th>
<th>Cronbach Alpha</th>
<th># of items in the scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY RECALL</td>
<td>0.79</td>
<td>31</td>
</tr>
<tr>
<td>ASSOCIATION</td>
<td>0.86</td>
<td>24</td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>0.85</td>
<td>24</td>
</tr>
<tr>
<td>DECISION BALANCE PROS</td>
<td>0.92</td>
<td>10</td>
</tr>
<tr>
<td>DECISION BALANCE CONS</td>
<td>0.83</td>
<td>6</td>
</tr>
<tr>
<td>DECISION BALANCE COMPOSITE</td>
<td>0.80</td>
<td>16</td>
</tr>
</tbody>
</table>

Linear Regression Results

For each scale all of the items (statements) were added together to create a summated score for each respondent. Simple linear regression models were performed on MET Hours using the memory recall, association, and construction scales as the independent variables of interest from the integrated decision model. Also, MET Hours was regressed against the 3 decision balance model scales.

For the integrated model scales, five-point Lickert scale items with responses ranging from “strongly disagree” to “strongly agree” were used to measure the type of
information that was used to make the decision to exercise. The scores for each scale were coded so that higher scores indicated a greater use of a particular type of information. For instance, a higher score on memory recall meant a greater agreement with the statements regarding memories of exercise when making the decision to engage in exercise.

The decision balance model scales also used a five-point Lickert scale with responses ranging from "not important at all" to "very important." Summated scores for each scale were coded so that higher scores indicated that a decision balance model component was considered to be important. Cons were reverse-coded to make the entire scale move in a positive direction. For instance, a higher score on decision balance pros meant that an individual considered the pros of exercise to be important when making the decision to engage in physical activity and would engage in exercise. In decision balance, a higher cons score meant that an individual found the cons to exercise to be important and would be less likely to exercise.

Simple Regressions

Results of the simple regressions for the integrated model components are presented in Table 7. The association component was found to have a positive relationship with MET Hours. That is to say, as association information increased, MET Hours increased. No significant relationship was found between the integrated model components of memory recall and construction to MET Hours. Association predicted 6.2% of the variance in exercise engagement.
Table 7. Simple Regressions of the Integrated Model Composites. Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>B</th>
<th>Std. Error</th>
<th>p-value</th>
<th>Adjusted R Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY RECALL</td>
<td>0.003</td>
<td>0.073</td>
<td>0.968</td>
<td>-0.017</td>
</tr>
<tr>
<td>ASSOCIATION</td>
<td>0.177</td>
<td>0.080</td>
<td>0.031</td>
<td>0.062</td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>0.087</td>
<td>0.084</td>
<td>0.308</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: N = 60

Results of the simple regressions for the decision balance model components are presented in Table 8. The decision balance composite component was found to have a positive relationship with MET Hours. That is, as decision balance pros and composite statements were found to be more important MET Hours went up. The decision balance composite component was found to have positive relationship with MET Hours. No relationship was found between the decision balance pros and cons constructs and MET Hours.

Table 8. Simple Regressions of the Decision Balance Composites. Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>B</th>
<th>Std. Error</th>
<th>p-value</th>
<th>Adjusted R Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECISION BALANCE CONS</td>
<td>-0.312</td>
<td>0.167</td>
<td>0.067</td>
<td>0.057</td>
</tr>
<tr>
<td>DECISION BALANCE PROS</td>
<td>0.190</td>
<td>0.121</td>
<td>0.121</td>
<td>0.024</td>
</tr>
<tr>
<td>DECISION BALANCE COMPOSITE</td>
<td>0.263</td>
<td>0.101</td>
<td>0.012</td>
<td>0.089</td>
</tr>
</tbody>
</table>

Note: N = 60

Next, the control variables were entered into a series of simple regressions to see which variables were significant predictors of MET Hours. Table 9 presents the results of
the regressions for each variable. Education level was a significant control variable at a p-value of .045 and household income was a significant covariate at a p-value of .024. Age, gender, marital status, children, and employment status were found to be non-significant in the simple regression models.

Table 9. Simple Regression Control Variables.
Dependent variable = MET Hours

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>B</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>-0.020</td>
<td>0.073</td>
<td>0.785</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.015</td>
<td>1.627</td>
<td>0.993</td>
</tr>
<tr>
<td>PERCEIVED DIABETES RISK</td>
<td>0.701</td>
<td>0.804</td>
<td>0.387</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>1.138</td>
<td>0.555</td>
<td>0.045</td>
</tr>
<tr>
<td>MARITAL STATUS</td>
<td>0.546</td>
<td>0.637</td>
<td>0.395</td>
</tr>
<tr>
<td>CHILDREN</td>
<td>1.489</td>
<td>1.041</td>
<td>0.158</td>
</tr>
<tr>
<td>EMPLOYMENT STATUS</td>
<td>0.789</td>
<td>0.461</td>
<td>0.092</td>
</tr>
<tr>
<td>HOUSEHOLD INCOME</td>
<td>1.046</td>
<td>0.448</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Note: N=60

Multivariate Analysis

The two control variables, education and household income that were identified as significant predictors of MET Hours in the simple regressions and were, therefore, incorporated into multivariate models (Tables 10-12). The integrated model components memory recall, association, and construction were regressed against MET Hours. Also, the decision balance pros (Table 13), decision balance cons (Table 14), and decision
balance composite (Table 15) components were regressed against MET Hours in order to compare the integrated model to a gold standard decision balance model.

**Memory Recall Model**

When memory recall and the two control variables were added to the regression model, 9.2% of the variance in MET Hours was explained at a significance level of p=.03. Income (p=.043) was the only significant predictor of MET Hours (Table 10). That is, exercise engagement behavior was more likely in individuals who make $50,000 or more per year. However, memory recall was not a significant predictor of MET Hours.

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.619</td>
<td>7.604</td>
<td>0.732</td>
</tr>
<tr>
<td>Income over $50,000</td>
<td>3.697</td>
<td>1.785</td>
<td>0.043</td>
</tr>
<tr>
<td>College Degree</td>
<td>1.846</td>
<td>1.850</td>
<td>0.323</td>
</tr>
<tr>
<td>Memory Recall Composite</td>
<td>0.002</td>
<td>0.069</td>
<td>0.973</td>
</tr>
</tbody>
</table>

Notes: $R^2 = .138$; adjusted $R^2 = .092$; *p < .1

**Association Model**

When association and the two control variables were added to the regression model 19.0% of the variance in exercise engagement was explained at a significance level of .001 (Table 11). The independent variables that were statistically significant predictors of exercise were association (p=.012) and income (p=.027). That is, as the use of positive instances and occurrences associated with exercise in the present increases so
does MET Hours and exercise engagement behavior was more likely in individuals who make $50,000 or more per year.

Table 11. Multiple Linear Regression of Association Controlling for Income and Education.
Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-13.735</td>
<td>6.535</td>
<td>0.040</td>
</tr>
<tr>
<td>Income over $50,000</td>
<td>3.821</td>
<td>1.686</td>
<td>0.027</td>
</tr>
<tr>
<td>College Degree</td>
<td>2.052</td>
<td>1.747</td>
<td>0.245</td>
</tr>
<tr>
<td>Association Composite</td>
<td>0.193</td>
<td>0.074</td>
<td>0.012</td>
</tr>
</tbody>
</table>

Notes: R² = .231; adjusted R² = .190; *p ≤ .1

Construction Model

When construction and the two control variables were added to the regression model 10.6% of the variance in exercise engagement was explained at a significance level of .017 (Table 12). The independent variable that was a statistically significant predictor of exercise was income (p=.046). That is, exercise engagement behavior was more likely in individuals who made $50,000 or more per year. However, construction was not shown to be a significant predictor of exercise behavior.

Table 12. Multiple Linear Regression of Construction Controlling for Income and Education.
Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-3.812</td>
<td>7.259</td>
<td>.602</td>
</tr>
<tr>
<td>Income over $50,000</td>
<td>3.610</td>
<td>1.772</td>
<td>.046</td>
</tr>
<tr>
<td>College Degree</td>
<td>1.860</td>
<td>1.834</td>
<td>.315</td>
</tr>
<tr>
<td>Construction</td>
<td>.0750</td>
<td>.0800</td>
<td>.351</td>
</tr>
</tbody>
</table>

Notes: R² = .151; adjusted R² = .106; *p ≤ .1
Decision Balance Cons Model

When decision balance cons and the two control variables were added to the regression model, 12.3% of the variance in exercise engagement was explained at a significance level of .050. The independent variable that was a statistically significant predictor of exercise was income (p=.042), shown in Table 14. That is, exercise engagement behavior was more likely in individuals who make $50,000 or more per year. However, decision balance cons was not a significant predictor of exercise.

Table 13. Multiple Linear Regression Decision Balance Cons Model. Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>Model</th>
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<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
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<td>.035</td>
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<tr>
<td>Income over $50,000</td>
<td>3.527</td>
<td>1.757</td>
<td>.050</td>
</tr>
<tr>
<td>College Degree</td>
<td>1.465</td>
<td>1.836</td>
<td>.428</td>
</tr>
<tr>
<td>Decision Balance Cons</td>
<td>-.230</td>
<td>.163</td>
<td>.164</td>
</tr>
</tbody>
</table>

Note: $R^2 = .167; \text{adjusted } R^2 = .123; *p < .1$

Decision Balance Pros Model

When the decision balance pros and the two control variables were added to the regression model, 14.1% of the variance in exercise engagement was explained at a significance level of .009. Table 14 shows the independent variable that was a statistically significant predictor of exercise was income (p=.040). That is, exercise engagement behavior was more likely in individuals who made $50,000 or more per year. However, decision balance pros were not a significant predictor of exercise behavior.
Table 14. Multiple Linear Regression Decision Balance Pros Model. Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-5.192</td>
<td>4.723</td>
<td>.276</td>
</tr>
<tr>
<td>Income over $50,000</td>
<td>3.653</td>
<td>1.735</td>
<td>.040</td>
</tr>
<tr>
<td>College Degree</td>
<td>2.053</td>
<td>1.801</td>
<td>.259</td>
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<tr>
<td>Decision Balance Pros</td>
<td>.204</td>
<td>.114</td>
<td>.079</td>
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</tbody>
</table>

Note: $R^2 = .185$; adjusted $R^2 = .141$; *p<.1

Decision Balance Composite Model

When the decision balance composite model and the two control variables were added to the regression model, 18.2% of the variance in exercise engagement was explained at a significance level of .001. The independent variables that were statistically significant predictors of exercise were income (p=.046), and the decision balance composite (p=.016), revealed in Table 15. That is, exercise engagement behavior was more likely in individuals who made $50,000 or more per year and among individuals who feel the components of the decision balance model are important when considering exercise engagement. The con statements were recoded to move in the same direction as the pro statements within the composite variable.

Table 15. Multiple Linear Regression Decision Balance Composite Model. Dependent Variable = MET Hours

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
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<td>5.799</td>
<td>.061</td>
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<tr>
<td>Income over $50,000</td>
<td>3.465</td>
<td>1.696</td>
<td>.046</td>
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<tr>
<td>College Degree</td>
<td>1.698</td>
<td>1.755</td>
<td>.337</td>
</tr>
<tr>
<td>Decision Balance Composite</td>
<td>.239</td>
<td>.096</td>
<td>.016</td>
</tr>
</tbody>
</table>

Note: $R^2 = .223$; adjusted $R^2 = .182$; *p < .1
Quantitative Analysis Summary

The most robust component of the integrated model was association as it was statistically significant throughout the simple regression at a p-value of .031, and multivariate regression at a p-value of .012. Memory recall and construction were not as statistically robust. Memory recall and construction were not significant in any of the regressions.

Income was the most robust control variable and was statistically significant in both the simple regression at a p-value of .024 and multivariate regressions when combined with memory recall (.043), association (.027), and construction (.046). Education was statistically significant in the simple regression only at a p-value of .045.

The composite of the decision balance model was the most robust component in both the simple regression with a p-value of .012 and multivariate regression at a p-value of .016. The pros and cons components were not significant in any of the regressions.

The association model explained 19.0% of the variance with association and income as significant variables. In comparison, the gold standard decision balance model, explained 18.2% of the variance with both decision balance composite and income as significant variables.
CHAPTER 5

DISCUSSION

Introduction

The purpose of this preliminary investigation was to identify the instances and occurrences (instances and occurrences that most easily come to mind) used by MSU employees with IGT during the decision balance process that determines engagement in physical activity. To this end, a model was designed that integrated the 8 decision balance model components of gains for self, gains for others, losses for self, losses for others, self-approval, self-disapproval, approval of others, disapproval of others with the 3 components of the availability heuristic: memory recall, association, and construction.

Due to the exploratory nature of this study, both qualitative and quantitative methods were used. The qualitative methods involved a series of 10 interviews where each was recorded on tape and put through a content analysis that revealed trends and themes related to the integrated model. Based on the content analysis a survey was created using the statements generated from the interviews. Each area of the integrated model contained its own set of questions. The memory recall section contained 31 questions about individuals memories of exercise in the past, the association section contained 24 questions about the thoughts and ideas individuals associated with exercise in the present, and the construction section contained 24 questions about individuals' expectations of exercise in the future. The survey also contained 16 gold standard
decision balance questions generated by Rakowski and Rossi (1992). The discussion of
the outcomes of this study will review the interview findings, each integrated model
component and its relationship to exercise engagement, each decision balance model and
its relationship to exercise engagement, a comparison of the integrated model to the
decision balance model, and finally conclusions and implications of this research.

Interview Findings

The interviews revealed several trends and themes through the various statements
that individuals made. The categories most frequently commented on by the interviewees
related to gains and losses for self. Individuals were generally concerned with how
exercise affected aspects of their own lives. Some of the most prominent themes were
based upon individualistic concerns such as losing weight, maintaining one’s own health,
having fun, the cost of exercise in both money and time, feeling guilty about not
exercising, injury, and disliking exercise. Generally, individuals could speak most about
their own instances and occurrences with exercise. This may be due to the idea that it is
easier for them to contemplate their own outcomes to decisions than to contemplate them
for others.

The second most frequent comments related to gains and losses for others.
Statements made about others close to them concerned a spouse exercising as well and
losing weight for a spouse or significant other. Self-approval and self-disapproval had
very few comments in comparison to the other categories. The majority of the statements
were concerned with the self-discipline of exercise, and the guilt associated with not
exercising. Finally approval of others and disapproval of others had comments mainly regarding family support, spousal support, and pleasing others.

It is important to note that the frequency of the comments did not necessarily indicate that one category was more important than another in addressing exercise behavior. For instance, the most frequently expressed comments concerned memories of exercise, however, association proved to be the most robust and significant predictor of exercise engagement and had considerably fewer comments. Therefore, every category within the integrated model was used to make the survey. Each theme expressed in the interviews was used to create a statement in the survey regardless of the number of comments expressed by the subjects. This process allowed the researchers to explore the integrated model's potential to explain exercise behavior.

**Statistical Findings**

**Integrated Model**

In the simple regressions, association was the only significant predictor of exercise and explained 6.2% of the variance in MET Hours. Association was positively correlated with exercise. Of the control variables, tested education and household income were found to be significant predictors of exercise and were included in the multivariate regressions. Association and income continued to be robust through the multivariate regressions and explained 19% of the variance in MET Hours.

Association was the only component of the integrated model that was a significant predictor of MET Hours. Specifically, as the use of the association heuristic increased so
did MET Hours suggesting that those who used instances and occurrences associated with exercise in the present were more likely to engage in physical activity. It may be easier for individuals to bring to mind association information when considering exercise because in a temporal sense it is the most tangible source of ideas and thoughts regarding exercise. For example, an individual who exercises has a rule of thumb that he or she associates exercise with fun and that information is available immediately when he or she makes the decision to exercise. Conversely, memory recall may not even be relevant to the decision because the instance and occurrences may have occurred so far in the past that they are no longer applicable to the current decision.

It is also possible that construction requires additional mental processing to be a rule of thumb or easily accessed source for information because the decision to exercise is more complex than to simply decide to exercise or not exercise in the future. For instance, an individual who is deciding to exercise a month from now may have too many other conditions involved in the decision. Factors such as housework or job duties may have to complete in his or her free time, his or her spouse’s schedule, or commitments to other things he or she enjoys such as vacation or hobbies. There are simply too many considerations to make the decision a rule of thumb.

The three decision balance components were entered into the simple regressions. Only the decision balance composite component was found to be a significant predictor of exercise in the multivariate analysis and explained 18.2% of the variance in MET Hours. When compared to the gold standard decision balance model, the integrated
model explained 5.8% more of the variance in MET Hours. Both the decision balance composite model and the integrated model were positively correlated with MET Hours.

Conclusions

There were two conclusions that could be made in this preliminary study. First, instances and occurrences associated with exercise in the present, used by MSU employees with impaired glucose tolerance was a significant determinant of exercise engagement. Second, the integrated model predicted more of the variance in MET Hours than the gold standard decision balance model.

The hypothesis testing from this study confirmed that individuals with higher use of association are more likely to exercise than individuals with a lower use of association, and that the integrated decision model is a greater predictor of exercise behavior than the decision balance model. The results of the hypothesis testing also disproved the hypothesis that individuals with a higher use of construction during their decision to exercise are more likely to exercise than those with a lower use of construction and individuals with a higher use of memory recall during their decision to exercise are more likely to exercise than those with a lower use of memory recall.

Implications

In this preliminary investigation, instances and occurrences associated with exercise are used by MSU employees in the decision balance process that determines engagement in physical activity. Association is a heuristic process where a decision
maker assesses the strength of association between a choice and an outcome (Kahneman & Tversky, 1984). A potential intervention strategy for practitioners would be to involve an assessment of the associations that an individual makes with the decision to exercise and try to modify those associations. For instance, an employee with IGT who associates exercise with difficulty and discomfort may need a one-on-one counseling session on exercises that are enjoyable. The health practitioner’s job would be to help dispel ideas and thoughts associated with exercise that make people avoid physical activity and reinforce the thoughts and ideas associated with exercise that support the decision to engage in physical activity. Interventions using the decision balance model should more closely investigate why and how pros and cons are associated with exercise because those pros and cons could be inaccurate associations with exercise. For example, a con to exercise may be that an individual associates exercise with running and sweating profusely when, in fact, all that is required to lower IGT risk is a 30-minute walk at a brisk pace. The health practitioner can play an educational role in dispelling that con. Health practitioners should engage in one-on-one counseling with individuals who have IGT in their population. Case management is a key component to addressing the associations with exercise that are incorrect. Once an individual has been identified with IGT, he or she should be contacted by a case manager who will schedule a meeting with the individual. In that meeting, the practitioner should find out what the individual’s thoughts and ideas are about exercise. When those ideas and thoughts are somewhat skewed or distorted, the practitioner can give examples or suggestions on how to make
exercise seem palatable to the individual. The key to this process is not the suggestion of the ideas; it is listening to the participants in the programs.

The case management process could also take on an electronic form in a web based interactive survey based upon the 31 questions used in this study. The survey would ask the individuals about their ideas and thoughts they associate with exercise. Based upon the responses a computer database could produce recommendations that help to dispel inaccurate notions about exercise. This may be an alternative to the case management process when dealing with large populations where it is difficult to meet with each individual at high risk for IGT.

**Recommendations for Future Research**

Future research should be conducted to establish more specific associations that are made with exercise. A larger sample size is necessary to investigate individual items in order to construct an assessment tool that is less than 31 items. The items should also be refined to make them more inclusive and clear to individuals who have IGT. Following the identification and refinement of those items research should then be conducted on how to help dispel associations with exercise in the most effective way. For instance, the best strategies to approach individuals about their inaccurate information should be identified.

The ability of association to improve the decision balance process warrants further research with Prochaska’s transtheoretical model (1979). The transtheoretical model consists of five stages of behavior change: precontemplation, contemplation,
preparation, action, and maintenance. Precontemplation is the primary stage of change where an individual is not considering behavior change at all. When an individual considers changing his or her behavior within the next 12 months he or she is in contemplation stage. Preparation refers to a stage when an individual plans to engage in a behavior change within the next 30 days. Action is the stage when an individual engages in the behavior change. Finally, maintenance is a stage when an individual has successfully changed his or her behavior for six months or more (Prochaska, Redding & Evers, 1997). Prochaska et al. found that the decision balance model is an effective construct in moving individuals through various stages of change (1997). To move an individual from precontemplation to contemplation the pros of a decision must increase. To move from contemplation to action the cons of a decision must decrease. Association should be studied to identify how effectively this construct could be used to move people through the stages of change by modifying the number of pros in contemplators and the number of cons in precontemplation, preparation, and action stages. For instance, does the association integrated with decision balance move individuals with IGT who are making a behavior change toward exercise easier or faster?

Finally, the model should be tested on other employee populations that are at risk for conditions and diseases, other than IGT, who should engage in exercise to reduce their risk. The associations used by individuals in other at-risk populations may be different from those shown in the IGT population at MSU.
Limitations

Limitations of the study are: 1) the data analyzed were self-reported data on instances, occurrences, and examples of pre diabetes and exercise; 2) results are able to be generalized only to the population of MSU employees with IGT that participated in this study; 3) subject's mode of exercise was not used in the calculation of MET Hours; 4) the translation of interview comments to survey statements may not reflect the absolute meaning of individual's memories of exercise in the past, ideas and thoughts associated with exercise in the present, and expectations of exercise in the future; 5) the influence of an individual's exposure to different forms of media in the formulation of his or her memories of exercise in the past, ideas and thoughts associated with exercise in the present, and expectations of exercise in the future was not measured.
REFERENCES


SPSS. (2002). SPSS 11.5 For Windows: SPSS, Inc.


APPENDICES
APPENDIX A

HUMAN SUBJECTS FORMS
MEMORANDUM

TO: Pete Shatwell
FROM: Stephen Guggenheim, M.D., Administrator, Human Subjects Committee
DATE: February 21, 2003
SUBJECT: The instances and occurrences that influence individuals with impaired glucose tolerance in their decision to exercise

The above research, described in your submission of February 21, 2003 is exempt from the requirement of review by the human subjects committee in accordance with the Code of Federal Regulations, Part 46, section 101. The specific paragraph which applies to your research is

___ (b)(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices.

X (b)(2) Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior.

___ (b)(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these specimens are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified.

___ Other

Although review by the Human Subjects Committee is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.
AMENDMENT TO THE HUMAN SUBJECTS EXEMPTION FROM REVIEW MEMORANDUM.

MEMORANDUM

TO: Pete Shatwell
FROM: Stephen Guggenheim, M.D.
Administrator, Human Subjects Committee
DATE: May 7, 2003
SUBJECT: The Instances and Occurrences that Influence Individuals with Impaired Glucose Tolerance in their Decision to Exercise [PS050703]

Thank you for submitting the revisions and clarifications requested by the Human Subjects Committee. This proposal is now approved for a period of one-year.

Please keep track of the number of subjects who participate in the study and of any unexpected or adverse consequences of the research. If there are any adverse consequences, please report them to the committee as soon as possible. If there are serious adverse consequences, please suspend the research until the situation has been reviewed by the human subjects committee.

Any changes in the human subjects aspects of the research should be approved by the committee before they are implemented.

It is the investigator's responsibility to inform subjects about the risks and benefits of the research. Although the subject's signing of the consent form, documents this process, you, as the investigator should be sure that the subject understands it. Please remember that subjects should receive a copy of the consent form and that you should keep a signed copy for your records.

In one year, you will be sent a questionnaire asking for information about the progress of the research. The information that you provide will be used to determine whether the committee will give continuing approval for another year. If the research is still in progress in 3 years, a complete new application will be required.
APPENDIX B

INTERVIEW CONSENT FORM
INTERVIEW CONSENT FORM

Consent Form for Participation in Human Research at Montana State University

Why am I being asked to participate in this Project on Impaired Glucose Tolerance and Exercise?

- Any individual that has been found to have Impaired Glucose Tolerance (IGT) has an increased risk of Type 2 Diabetes onset. One of the most effective ways for those with IGT to avoid Diabetes is to engage in exercise. The Montana State University Employee Wellness Program and University of Montana Faculty/Staff Wellness Program is creating an intervention to help those with IGT engage in exercise. Employees identified with IGT from their last Wellness blood screen were randomly invited to participate in this study.

What will I be asked to do?

- You will be asked questions regarding your decisions to exercise. The interviews will be conducted in the Employee Wellness Office with a trained wellness professional behind closed doors to ensure the confidentiality of your responses. The interviews will be recorded on audio cassette for transcription into a computer.

How long will the interviews take?

- The interviews will take approximately one hour.

Who will see the results of my interview?

- Your decision to be involved is completely voluntary and any information you give us will be held in the strictest confidence by the primary investigators. A control number, not your name, will be used to identify your interview for the purpose of the research. Your name will not be linked in any way to the data or the research results.

- This project has been reviewed by the Human Subjects Committee in order to insure individuals like yourself are given enough information to decide whether or not they want to take part.

What are the Risks and Benefits of participating?

- As a result of participating in this study you will be benefiting yourself and other employees that have IGT at Montana State University and The University of Montana. You may find that answering some of the questions could cause minor emotional stress.

INTERVIEW CONSENT FORM

Who is paying for this project?

- This project is being paid for by the Montana State University Employee Wellness Program.

Why do you have me signing this form?

- This type of form is used anytime people gather information for a research project. It is done to make sure that you understand any risks of participating in the interview and to give you people to contact in case you have any questions about the project.
If I have questions who can I contact?

- If you have any questions about the interview or this consent form please ask the wellness professional who gave you this form. If you have additional questions, the Chairman of the Human Subjects Committee, Mark Quinn, (406) 994-4707 can answer additional questions about the rights of human subjects.

Authorization: I have read the above and understand the discomforts, inconveniences, and risk of this study. I, ___________________ (your name), agree to participate in this research. I understand that taking part is voluntary and that I may refuse to participate and that I may quit this process at any time without penalty of any kind. I have received a copy of the consent form for my own records.

Signed: ______________________________________

Witness: ______________________________________

Study Representative: ____________________________

Date: _______________________________________

February 19, 2003 version
APPENDIX C

INTERVIEW QUESTIONS
Interview Questions

For the following questions I am going to ask you about your memories of exercise in the past.

1. What are your most memorable benefits from exercise?
   What are your most memorable costs from exercise?

2. Can you recall of a time when others close to you experienced benefits or gains from your exercise?
   Can you recall of a time when others close to you experienced costs or losses from your exercise?

3. Can you recall a time when you approved or disapproved of your own exercise?

4. Can you recall a time when others close to you approved or disapproved of your exercise?

For the next set of questions I am going to ask you about the ideas and thoughts you associate with exercise in the present.

5. Do you currently exercise?

6. What benefits to yourself do you associate with exercise?
   What costs to yourself do you associate with exercise?

7. What benefits to others close to you do you associate with your own exercise?
   What costs to others close to you do you associate with your own exercise?

8. Do you associate self approval or self disapproval with exercise?

9. Do you associate the approval or disapproval of others close to you with exercise?
INTERVIEW QUESTIONS

We are almost finished. In the following set of questions I am going to ask you about what you expect to occur when or if you exercise in the future.

10. It is a week from today and you have just started to engage in some form of exercise.

   What benefits could you expect from this exercise?
   What costs could you expect from this exercise?

11. What benefits to others close to you do you expect from your exercise?

   What benefits to others close to you do you expect from your exercise?

12. Do you approve or disapprove of this exercise?

13. Of those close to you is there anyone who would approve or disapprove of this exercise?
APPENDIX D

SELF-ADMINISTERED SURVEY
Impaired Glucose Tolerance and Exercise

Who should complete this survey?

So that the results of this survey will accurately represent all of the employees and spouses on both the MSU-Bozeman and MSU-Billings campuses with impaired glucose tolerance the individual whom this survey was addressed to should take this survey on their own.

How will the data from this survey be used?

The data that you provide will be used in combination with data from other survey respondents to develop Programs that help individuals with impaired glucose tolerance exercise.

Is my participation voluntary?

Yes this survey is voluntary. In addition, you may skip any question that you do not want to answer. However, you can help us very much by taking 15 minutes to share your experiences, feelings, and expectations of exercise and impaired glucose tolerance.

Who will have access to my answers?

Only the study team assigned by the MSU Employee Wellness Program will ever have access to the individual answers. We want you to know that we will summarize all the responses; no individual responses will be released. Your survey is assigned with an identification number to ensure a high response to this survey, however the numbers will be stripped prior to analysis to secure your confidentiality.

What do I do when I complete the survey?

Please return it in the envelope provided as soon as possible. Some envelopes will be suited for campus mail and others will be postage paid for your convenience. If you have any questions please contact Pete Shatwell at 994-6333.

Please go to the next page
SELF-ADMINISTERED SURVEY

Instructions

What is this survey about?

We are interested in your current exercise habits, memories of exercise in the past, the ideas and thoughts you associate with exercise in the present, and what you expect to occur when or if you exercise in the future.

What do I do?

Please check (x) the one box next to the most appropriate response for each question.

The first series of questions asks you about your current exercise habits.

Start Here

1. How many days per week do you currently exercise?
   - None, Skip to Question #4
   - 1-2 days per week
   - 3-4 days per week
   - 5-7 days per week

2. On the days that you exercise, how many minutes do you spend exercising total?
   - 10-15 minutes
   - 15-20 minutes
   - 20-25 minutes
   - 25-30 minutes
   - More than 30 minutes

3. Please check the box that best describes how you usually feel during exercise:
   - This is nice and slow. I feel like I could sing
   - I am working at a level above normal daily life but can still carry on a conversation.
   - I am breathing hard and working up a sweat.

The following questions are designed to measure how easily certain memories of exercise come to mind. Please indicate if you strongly agree, agree, disagree, or strongly disagree with each of the following statements.

4. I remember that I enjoyed exercise in the past.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree

5. I remember that being outside was a benefit of exercise.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree

6. I remember that I had more physical and mental energy in my daily life when I exercised.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree

7. I felt that I had more control of my own body when I exercised in the past.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree

8. I remember that exercising helped me keep my weight down.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree

9. I remember how good I felt about myself when I exercised.
   - Strongly agree
   - Agree
   - Not Applicable
   - Disagree
   - Strongly disagree
SELF-ADMINISTERED SURVEY

10. In the past I used exercise to manage my health, for instance to lower my cholesterol, control my blood pressure, manage pain, or maintain flexibility.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

11. I remember suffering an injury from exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

12. I recall times when I really disliked exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

13. I recall times when exercise cost me too much money.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

14. I have memories when exercise cost me too much time.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

15. I recall times when exercise was boring.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

16. I recall times when exercise was too hard for me to do.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

17. I recall times when exercise was embarrassing.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

18. I remember that my partner liked to see me fit from exercise.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

19. I remember that if I exercised my partner would exercise also.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

20. I remember that if I exercised my children would exercise also.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

21. I remember that when I exercised with my partner it was an enjoyable time spent together.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

22. I remember that if I wasn't in good physical condition it limited my ability to recreate with others.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree
SELF-ADMINISTERED SURVEY

23. I remember that exercise used time I could have been spending with others close to me.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

24. I remember when my exercise created inconveniences for others close to me.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

25. I remember when I didn’t exercise and it worried others close to me.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

26. I remember when I exercised and it cost others close to me too much money.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

27. I remember that exercising required self-discipline.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

28. I remember feeling guilty when I didn’t exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

29. I remember exercising to please others close to me.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

30. I remember exercising more in the past than I do now.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

31. I remember exercising because others close to me were encouraging.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

32. I remember that my peers and friends approved of exercise in general.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

33. I remember that my family approved of exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

34. I remember that my partner approved of exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree
SELF-ADMINISTERED SURVEY

35. I remember that my parents did not approve of exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

36. I remember that people judged me as someone who does not exercise based on my looks.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

The following questions are designed to measure the thoughts and ideas you associate with exercise presently. Please indicate if you strongly agree, agree, disagree, or strongly disagree with each of the following statements:

37. I associate exercise with a positive outlook.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

38. I associate exercise with control over my body.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

39. I associate exercise with fun and enjoyment.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

40. I associate exercise with weight loss.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

41. I associate exercise with feeling good about myself.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

42. I associate exercise with good physical health (low blood pressure and cholesterol, controlled pain)
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

43. I associate exercise with injury.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

44. I associate exercise with displeasure.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

45. I associate exercise with excessive monetary costs to myself.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

46. I associate exercise with excessive loss of time.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree
SELF-ADMINISTERED SURVEY

47. My exercise sets a positive example for my children.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

48. My exercise sets a positive example for my partner.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

49. I associate exercise with a better attitude toward others.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

50. I associate exercise with my families concern for my health
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

51. I associate exercise with too much time away from other people in my life.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

52. I associate exercise with inconvenience to my family members.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

53. I associate not exercising with guilt.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

54. I associate not exercising with others concern for my health.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

55. I associate exercise with pleasing others.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

56. I associate exercise with less diabetes risk.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

57. I associate exercise with a better attitude toward others.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

58. I associate exercise with the approval of my spouse.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree
SELF-ADMINISTERED SURVEY

59. I associate the disapproval of others with not exercising.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

60. I associate others' disapproval of my exercise with how I look.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

The following questions are designed to measure what you expect to occur if or when you exercise in the future. This future exercise would consist of at least 30 minutes of sustained rhythmic movement at a level of effort equivalent to that of walking briskly, dancing, swimming, or bicycling on level terrain. Please indicate if you strongly agree, agree, disagree, or strongly disagree with each of the following statements.

61. I expect to exercise outside.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

62. I expect that if the weather is nice I will exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

63. I expect exercise will help me be in control of my body.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

64. I expect that I will feel better mentally when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

65. I expect my future exercise to be fun and enjoyable.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

66. I expect to lose weight when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

67. I expect to feel better about myself when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

68. I expect my physical health to improve when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

69. I expect to get injured when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree
SELF-ADMINISTERED SURVEY

70. I expect my future exercise will cost too much money.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

71. I expect my future exercise will cost me too much time.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

72. I expect my future exercise will be very difficult.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

73. I expect my partner will exercise if I exercise.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

74. I expect my children will exercise if I exercise.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

75. My exercise will make me a role model for others.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

76. I will be in a better mood when I exercise in the future.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

77. I won’t be able to spend the time I want to with those close to me in the future.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

78. Others close to me will have to give up some of their time to help me exercise.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

79. My future exercise will inconvenience others close to me.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

80. My future exercise will require self-discipline.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree

81. My future exercise will please others.
    □ Strongly agree
    □ Agree
    □ Not Applicable
    □ Disagree
    □ Strongly disagree
SELF-ADMINISTERED SURVEY

82. I expect my that my family will be encouraging when I exercise in the future.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

83. I expect that my friends will approve of my exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

84. I expect that my partner will approve of my exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

85. I expect that my parents will disapprove of my exercise.
   □ Strongly agree
   □ Agree
   □ Not Applicable
   □ Disagree
   □ Strongly disagree

The following questions are designed to measure your considerations when you are deciding to exercise.
Please indicate if the following statements are extremely important, important, not applicable, not important, or not at all important in your decision to exercise.

86. I would feel more energy for my family and friends if I exercised regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

87. Regular exercise would help me relieve tension.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

88. I would feel more confident if I exercised regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

89. I would sleep more soundly if I exercised regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

90. I would feel good about myself if I kept my commitment to exercise regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

91. I would like my body better if I exercised regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important

92. It would be easier for me to perform routine physical tasks if I exercised regularly.
   □ Extremely important
   □ Important
   □ Not applicable
   □ Not important
   □ Not at all important
SELF-ADMINISTERED SURVEY

93. I would feel less stressed if I exercised regularly.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

94. I would feel more comfortable with my body if I exercised regularly.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

95. Regular exercise would help me have a more positive outlook on life.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

96. I think I would be too tired to do my daily work after exercising.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

97. I would find it difficult to find an exercise activity that I enjoyed that is not affected by bad weather.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

98. I feel uncomfortable when I exercise because I get out of breath and my heart beats very fast.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

99. Regular exercise would take too much of my time.
   - [ ] Extremely important
   - [ ] Important
   - [ ] Not applicable
   - [ ] Not important
   - [ ] Not at all important

100. I would have less time with my family and friends if I exercised regularly.
     - [ ] Extremely important
     - [ ] Important
     - [ ] Not applicable
     - [ ] Not important
     - [ ] Not at all important

101. At the end of the day I am too exhausted to exercise.
     - [ ] Extremely important
     - [ ] Important
     - [ ] Not applicable
     - [ ] Not important
     - [ ] Not at all important

You’re nearly finished

102. I currently exercise for at least 30 minutes a day, 5-7 days a week in a sustained rhythmic movement at a level of effort equivalent to that of walking briskly, dancing, swimming, or bicycling on level terrain.
     - [ ] Yes
     - [ ] No

103. Which of the following best describes your risk for type 2 diabetes?
     - [ ] High risk
     - [ ] Medium risk
     - [ ] Low risk
     - [ ] I am not at risk for type 2 diabetes

104. How old were you on your last birthday?

105. What is your gender?
     - [ ] Male
     - [ ] Female
SELF-ADMINISTERED SURVEY

106. What is the highest degree or level of school you have completed?

☐ Grades 1-8 (Elementary)
☐ Grades 9-12 (Some high school but no diploma)
☐ Grades 12 or GED (High school graduate)
☐ College 1 year to 4 years (Some college or technical school, but no degree)
☐ College 1 year to 4 years (Associate Degree)
☐ College 4 years or more (College graduate, BA, MA, JD, MD, EdD, PhD)

107. Are you:

☐ Married
☐ Divorced
☐ Widowed
☐ Separated
☐ Never been married
☐ A member of an unmarried couple

108. How many children do you currently have in your household?

109. Which of the following describes your current job classification with MSU?

☐ My spouse is employed by MSU
☐ My spouse is retired from MSU
☐ Faculty
☐ Staff
☐ Classified
☐ Retired

110. What is your current occupation?

111. Which of the following describes your employment situation right now?

☐ Employed, full time
☐ Employed, but on leave
☐ Employed, part time
☐ Not employed, but looking for work
☐ Staying at home, homemaker
☐ Retired

112. Which of the following best describes your total household income from all sources in the year 2002 before taxes and other deductions?

☐ Less than $10,000
☐ $10,000 to $19,999
☐ $20,000 to $29,999
☐ $30,000 to $39,999
☐ $40,000 to $49,999
☐ $50,000 to $74,999
☐ $75,000 to $100,000
☐ $100,000 or more

Thank you for taking your valuable time to complete this survey.
APPENDIX E

SURVEY LETTERS
INITIAL CONTACT LETTER

Dear,

A few days from now you will receive in the mail a request to fill out a survey for an important project being conducted by your Employee Wellness Program.

In your last blood chemistry screening conducted through the Employee Wellness Program you had a higher than normal blood glucose reading. This reading represents a condition called impaired glucose tolerance that places you at a higher risk for type 2 diabetes onset. One way that you can help to prevent or delay diabetes is through regular exercise. We want to design a program targeting Impaired Glucose Tolerance that makes it easier for individuals to begin exercising. Your completion of this survey is vital to this process.

I assure you that your responses will be completely confidential. There is an identification number attached to the survey to help us determine who has returned the questionnaire. Those numbers will be destroyed once we begin data entry and analysis to ensure confidentiality.

Thank you for your time and consideration. It’s with the gracious assistance of individuals like you that make the Employee Wellness Program better for the employees here at Montana State University.

Sincerely,
SURVEY COVER LETTER

Dear,

We are writing to ask for your help in an important study designed to reduce the incidence of diabetes onset at Montana State University. The research is being conducted by your Employee Wellness Program.

In your last blood chemistry screening conducted through the Employee Wellness Program you had a higher than normal blood glucose reading. This reading represents a condition called Impaired Glucose Tolerance that places you at a higher risk for type 2 diabetes onset. One way that you can help to prevent or delay diabetes is through regular exercise. We want to design a program targeting Impaired Glucose Tolerance that makes it easier for individuals to begin exercising.

In order for us to design an effective program we need your help. By completing the enclosed survey you can provide us the information we need to develop a program that is specific to the employees at Montana State University.

Your answers are completely confidential and will only be released to the researchers conducting the study. There is an identification number attached to the survey to help us determine who has returned the questionnaire. Those numbers will be destroyed once we begin data entry and analysis to ensure confidentiality.

You are part of a small group of individuals who have a unique insight into glucose tolerance and exercise so it is vital that you complete this survey.

Thank you for your time and consideration. It is with the gracious assistance of individuals like you that make the Employee Wellness Program better for the employees and their families here at Montana State University.

Sincerely,
SURVEY FOLLOW UP LETTER

Dear,

Last week a survey seeking your unique insight into impaired glucose tolerance and exercise was mailed to you. You were selected for this study due to your elevated glucose reading on your last blood draw conducted through the MSU Employee Wellness Program.

If you have already completed and returned the survey to us, please accept our sincere thanks. If not, please do so today. We are especially grateful for your help because it is only by asking individuals like you to share your experiences and thoughts that we can understand how to help those with impaired glucose tolerance to exercise.

If you did not receive a questionnaire, or if it was misplaced, please contact Pete Shatwell by phone at (406) 994-6333 or e-mail him at pks@montana.edu and he will send you another one in the mail today.

Sincerely,
APPENDIX F

MEMORY RECALL COMMENTS
MEMORY RECALL GAINS FOR SELF COMMENTS

- Those were really beneficial for me in terms of self esteem.
- It was a good way to compete without being terribly aggressive.
- It was fun.
- I really enjoyed it.
- I realize that kind of exercise is my um satisfaction or the kind of exercise that I would do because it wasn’t uh sitting at a desk.
- I kept body weight down, uh I knew I was burning off calories.
- I know that that is a benefit to me no matter how I want to spin it, it’s a real benefit to me.
- Recreation is a gain.
- Well, I know you feel better. Your body functions better if a person exercises.
- one of my primary reasons for exercising is uh, for heart and to keep my blood pressure under control.
- I enjoy being outside, walking, hiking.
- I just felt that more exercise made me feel better and I just got off all of the medication for that.
- I have been able to keep my blood pressure under control with medication and exercise.
- Of course there wasn’t a wide variety of exercise like there is today. We really have a lot of choices now.
- Well I’ve always enjoyed exercise.
- I have always really enjoyed sports and being athletic.
- I just feel like I have more energy and can do more, and you know happier I suppose.
- the benefit of that is great that I get this half an hour that I can slow down, think about what’s going to happen in the coming day or what happened in that day as I’m walking home. So it really is nice to have that half hour break that you’re getting time to yourself basically on a walk.
- actually the first sport that I actually really enjoyed was um, was skiing because when I took that up at thirty five it was great fun.
- And probably within three years I really began to enjoy it more and I did it more often.
- When you get better at something you enjoy it more.
- I like doing it. It’s pleasant.
- Skiing kind of accomplishes good things because you can ski and not sweat. Its cold and you don’t sweat. I love skiing. It thinks its great.
- I would say feeling good.
- Physically feeling good after the exercise
- whenever you’re exercising you feel better. I felt better.
- I am not sure I can define this really well but I will try. You have a better sense of your body. I think you just feel like perhaps your more in control of your body. I think you walk with a bounce in your step; um that’s how I felt. I think you fell more energetic both physically and mentally. I think that is how I would describe it.
- I think just the sort of endorphin feeling from running mostly.
- burgh that said one time in an interview in a newspaper quote they said ‘why do you keep doing it’ and he said ‘because I feel so good when I stop.’
- anybody who has run distances at all knows that is a darn good feeling.
- I used to do it at noon and it was a great break up between morning and afternoon business activities. And I think the idea that I could control the blood pressure through running and at least at first we tried salt control as well.
I broke my ankle several times. And had to have an operation so after I was eighteen and I couldn’t compete any more, actually couldn’t skate at all for several years. I think that was a big loss for me, personally as well as um, physically. I mean socially as well as physically. And my self esteem hit the skids and of course I began to put on weight and you know so, I think it was a loss in ways others than just the physical.

And then I did a lot of couples or pairs skating and that was fun and just the um, it was a way to gain approval I think and I didn’t, just the competitive nature in me when I couldn’t compete and succeed anymore, and I think I started sliding downhill.

Just the I don’t enjoy doing it.

because its boring and if you know your stressing physically to do it. I don’t find it fun.

In the past I had taken a few of those exercise classes programs through MSU and there were some times when it just seemed too much, too stressful, too hard I should say.

I uh, probably would have been home watching television, or working in the yard, doing something that was more pleasurable for me and uh I suspect.

way back when in the dark ages with the sports programs in high school and I just didn’t care for any of that.

Oh I just didn’t. I don’t know. You know when you go to a small school you know the cliques and the rules like well you know you had to wear the regular uniform and then they’d have the half court basketball. We’re talking a long time ago, and uh just the different rules and regulations. If you didn’t take a shower you get a D that day. I just didn’t uh, that just kinda turned me off.

It was harder to find time to really do lots of exercise when your doing a lot of studying.

Well actually it was at a time when I was going to school at Stanford and I had, it took a lot more time out of my day to actually.

That was a cost that I had. You know it took me so long to do that that it was, and it was at a time when I had just been in a situation where I didn’t exercise at all because I was overseas, and it was just not a good situation for exercise. So I was really out of shape and I had to get in shape fast. And it was, it did take, that was a cost. The time thing was a cost. And still today when I think about what time I would spend on to exercise, it always how much time do I have in the day to do the things that I want to do.

being of an older generation um there wasn’t that many opportunities and if you weren’t of an upper income then you wouldn’t do what we call luxurious sports like skiing or waterskiing or something like that because I didn’t live in an area that was right there in my backyard.

Um, my memories of exercise at school are absolutely desperate. I hated it because I was not very good at it.

I am totally uncoordinated, and you know, if the teachers wanted to have an example of someone who was absolutely you know a klutz they picked on me so I knew that.

Ok, and we had to wear these dumb looking uniforms which just were just awful.

My history as a young person right through high school was just dismal as far as exercise.

I suffered a lot.

I joined a health club and thought I gave myself a heart attack within the first week.

I tried aerobics but the aerobics drives me nuts because I’m dyslexic in addition to being old and right, left it just was real confusing.

After having three children running presents other problems.

But I still continue to try and ski but I did have a really bad fracture within my upper humerus and broke it in five places skiing and it just jammed this right over the top of it so I have a plate and a couple of screws in there.

Oh embarrassment mostly. You know never being picked for any kind of team. You have to pick them, those people, they don’t do good but you have to pick them. It was very embarrassing.

I didn’t like the sweat.

She let us do anything we wanted as long as it didn’t cost a whole lot of money.

Costs would be membership fees at athletic clubs.

So I did have a bad injury but that is the only one I can recall.

In the very recent past I twisted my knee badly skiing.

I did a pretty good MCL problem. I think they said it was a class two MCL, and so I haven’t skied since
MEMORY RECALL GAINS FOR OTHERS COMMENTS

- My wife likes to see me trim rather than overweight.
- Well maybe in a round about way this helps my husband too because he has had bypass surgery.
- And I feel that by going to exercise with him, that it keeps him going so it, and then he keeps me going to it. So it's kind of a two point reciprocal type thing.
- Some days you don't feel like going but then the other one will kick you, jumpstart you so I guess that would be it.
- Well I have always approved of it. I think it is a good thing. I don't like to exercise. I don't really think I ever have but it's just something I've set my mind to doing for many years, so I do it. Because I know the benefits and maybe it came from way back when in the dark ages with the sports programs in high school and I just didn't care for any of that.
- Oh yeah, I mean I drug my children to every ski resort in Europe because I decided that this was going to be my sport so I mean my children got to learn how to ski really well.
- I did some exercise when I was pregnant. I did some exercise you know, just to keep in shape and breathing exercises and stuff like that so they all came out pretty good.
- began running programs because they started to run with me a little bit. I think that one of them in particular has sort of continued a running program on her own.

MEMORY RECALL LOSSES FOR OTHERS COMMENTS

- In terms of my kids they have suffered all of their lives because I can't do stuff with them. You know I can't play with them. Um, physically I can't even go on a hike with them or whatever. So yeah um. And um I got married about two and one half years ago and the first thing he wanted to do after we got married was to take my kayaks out and I can't fit in his kayak. That's a big loss because those are thing I can't do with him.
- Uh no it seemed more losses in terms of my folks time. They hated running me around. They hated taking me to competitions and things like that.
- Well I think my husband feels like if he, if I'm not exercising, when I'm not in shape he's worried about that. It makes him worry that I may you know keel over with a heart attack or develop diabetes or whatever.
- When I've gone backpacking with people, if I am the one that is the slow person in the group that is a cost for the group. I am the one that is walking slower than everybody else so I, you know, you can see, you can feel that this is a little bit of a problem.
- just when I broke my arm my daughter had to drive me around.
- when I exercised in the past I was perhaps to friends and family a better person to be around. In other words you know, I hate to explain it in the negative but not moody, or anything like that but had a pretty fresh perspective on life. Some would say relationships with other people you were perhaps better able to be positive in those relationships and cope with challenges etc. Just because of how you felt physically and mentally.
- Yeah, my wife had to uh shovel more snow this winter after I had my MCL problem.
MEMORY RECALL SELF APPROVAL COMMENTS

- I guess I approve of the fact that finally got my rear in gear and started doing that.
- Well I always that I was doing the right thing If I was exercising cause you know your supposed to exer
cise.
- I probably wouldn't do it if I didn't approve of it.
- Well I have always approved of it. I think it is a good thing. I don't like to exercise. I don't really think I
ever have but it's just something I've set my mind to doing for many years, so I do it. Because I know the
benefits and maybe it came from way back when in the dark ages with the sports programs in high school
and I just didn't care for any of that.
- Well yeah, I always feel like the more I am exercising the better I feel and you know I am putting in the
time so I guess it's always. I've never had a negative feeling towards getting more exercise. The better
shape I can be in the better it's gonna be for me
- Well I approve of exercise, I really do approve of it now. I take it more seriously now because I live down
from the Ridge and I can walk there in the nice weather which is kind of a neat thing to do
- My mother told me I was foolish because old people didn't do that and that once I got to be thirty you
should stop doing everything. And I thought no I don't think so.
- Like most other things in my life I draw a lot of personal satisfaction from accomplishment so. You know
completing a three mile run is an accomplishment and I score the little accomplishments as well as the big
ones.

MEMORY RECALL SELF DISAPPROVAL COMMENTS

- I always disapprove of my own exercise.
- I feel guilty about not exercising.
- if you do exercise and then don’t do it you feel bad.
- I approve. I had better since I have been doing it for quite a while.
- but I’ve never been a person to do exercise to the point where it injures me.
- I know I can see that I know people who do that so intensely into things that they tend toward the bulimia
side of things. Now there are situations like that. I guess I’ve never, it’s never been part of my makeup to
overdo it.
- so running I don’t approve of. I think running is a form of dementia.
MEMORY RECALL APPROVAL OF OTHERS COMMENTS

- I think my husband was real pleased when I started walking.
- Um I remember the wellness director running into me at church and saying hey I have seen you walking you know every morning and I was like you did.
- Apparently he came down nineteenth about the time I was headed up nineteenth and it felt good to have him notice and obviously he was encouraging.
- That’s what I was doing at the time so that was fine.
- My friends view people that are chubby or a little bit on the heavy side as not being as healthy as people that are heading in the other direction and I would strive to be in uh, quote the other direction.
- Well, I guess everybody approves of exercise.
- My kids I guess they might think it’s good for me.
- Everybody in my family approves of it and they all partake in it.
- Uh, it probably is. I guess like I said with my kids being involved in it and my son is a runner and uh, so I think he really gets excited when I do things like that, and my daughter in law since she works in the fitness area.
- He’s concerned for my health and so his perspective is that he’d like to see me do more exercise.
- Oh yeah, totally my husband who has the whole feeling of the more you go out and take walks or get outside the better. It’s better to exercise than not exercise.
- Can you think of any specific times that you remember when he may have said something to you that indicated that approval or?
- Interviewee: Oh yeah, like last night, you know like all of the time. You gotta walk to work. Don’t let me give you a ride. You know that type of thing.
- But you know uh, it was in the middle of doing my dissertation and my former husband sent us all on ski holiday and he was the only one who knew how to ski.
- I said if I wanted to ski I would ski and for him to back up and leave me alone.
- And so I think my family appreciates that my running is a real benefit towards long term health goals.
- Yeah, I think so. The linking of a running program with a health problem was something that really uh you know sunk in.
- It was kinda hard to run through the snow. But I went all the way down there and she was there to pick me up. She never complained about it. I thinks its just an example of the small contribution she can make to my health.

MEMORY RECALL DISAPPROVAL OF OTHERS COMMENTS

- Um so yeah I think uh always all my life disapproval of not exercising, I mean that comes from your closest people in the family to people who walk by you on the street and judge you as a person who doesn’t exercise.
- I know that my mother was against uh organized activity for children so I didn’t really participate in anything like that.
- Nobody wants me on an organized sports team because I am klutzy.
- Mymother told me I was foolish because old people didn’t do that and that once I got to be thirty you should stop doing everything.
- Oh my mom, I mean when I was really probably going to damage my self for life because um, not only did I exercise but I traveled to do it and that in itself is inherently dangerous. Uh, she was a very old fash-
ASSOCIATION GAINS FOR SELF COMMENTS

- Uh, my joints are much more flexible when I exercise. Uh, I breathe easier. I just feel better all over but especially my joints. Um, their much better when I exercise.
- So it would seem like to be on the exercise bike would be good to get blood flowing a little more. And um with the achilles tendon it really uh, the physical therapist um has said I should do that to keep them working for a longer period of time. I am slowly degenerating but I am sure stretching them is a good idea.
- it makes me feel good that I am contributing to something that I know I should be doing
- some increased fitness.
- Recreation
- Transportation
- It helps my body, my pain from arthritis and that.
- It makes me feel better.
- I feel more relaxed, just physically I feel better. I sleep better.
- The other thing about a lot exercise is fun.
- You know going skiing is fun, going for bike rides is kind of fun
- Well, maintaining your strength and your agility and your um I don’t know, keeping your weight down so that your able to go farther distances when you recreate, you know so that your able to pay the way you want to play.
- I think it lowers my cholesterol.
- And it keeps me from gaining weight which I don’t want to do.
- I have a tendency to wallow. You know you get into winter and you wallow around in negative thoughts. If I go and exercise it kind of helps dispel that.
- Uh a little time but I feel that time is well spent.
- I would say weight control, feeling better physically and mentally.
- I think it helps keep me in balance. You know the job that I have is pretty mentally demanding job. Teaching and research and so it definitely helps provide a counterbalance to these types of pressures.

ASSOCIATION LOSSES FOR SELF COMMENTS

- some evenings I am really really tired so its hard to get on the exercise bike and do the five minutes. I mean my legs are really hard to manage but um that’s about it.
- Just fitting it in, doing it.
- Just an injury to my knee skiing
- Well it costs forty two dollars a month now.
- Now this dog is one hundred and fifty five pounds. He’s taller that I am and he’s got a lot of energy, and I try and walk him every once in awhile. And I regret it because it is a contest.
- Financial is one, in other words if you know pay to have access to a club of any sort, or facilities, exercise facilities and time.
- I guess I have begun to wonder whether maybe if running is going to pound on my joints.
- You know the running and skiing and hiking that I do, I just really, I can’t think of any real negative that comes from it other than the time it takes to do it. And again I appreciate that it takes time if your going to have an exercise program and you have to say that time is important in your life.
ASSOCIATION GAINS FOR OTHERS COMMENTS

- I think the gains are just you know that I am healthier and I am less painful and probably nicer to other people.
- I mean other than I’m less disabled than I might be.
- I know that my friends, my family, extended and direct family are concerned about my health, and if I am contributing to maintaining my health by exercise, I am sure it makes them feel good about what I am doing.
- I don’t think my exercise affects anyone else.
- Well I think by feeling better it is a load off of everybody’s mind. And I am trying to take care of myself. Plus I am not as grumpy when I can get out and move around and exercise and my outlook on life is better.
- I think the benefit is more important, if I am more willing to say go out on hikes every weekend that’s a huge benefit to my relationship with my husband because we can spend all that time together doing something we enjoy and it improved both our mental and physical health.
- I’m not grumpy. Yeah because sometimes I get grumpy and if I think inwardly too much without that energy release I can get really grumpy and naggy and that upsets my daughter and the dog.

ASSOCIATION LOSSES FOR OTHERS COMMENTS

- Just money.
- I would assume that if I were someone who spent three hours a night at the gym that it would impinge on my ability to spend time with my husband.
- I guess its anytime you spend time doing something just with yourself, your not able to spend time with other people in your life, that’s a cost but I don’t think that’s a big issue for me.
- Not available for somebody at that particular point in time.
- Lack of time spent on relationships with family and friends.
- it’s a problem for my wife to have get up early in the morning and drive down to Pete’s hill and bring me
ASSOCIATION SELF APPROVAL COMMENTS

- Well I think self approval in the sense that I exercise.
- self disapproval because in the past I would never do it enough and I am sure since this is related to the glucose tolerance or whatever that issue is. Um, I know it is edging. It had been edging up because I know I wasn’t able to walk around or that kind of stuff anymore.
- Uh, self approval. If I am exercising I’m feeling good about myself and what I am doing
- I would probably have to say approval.
- Oh self approval.
- But I have positive feelings about doing walking and cross country
- I guess, one of my feelings about exercise is that I wish I could do more but at the same time I have other things that I would really like to do.
- But on the day to day level you know most of the days your going to work you have to have some kind of exercise just to keep your body going.
- I mean I do see that I approve of myself more when I exercise. I guess I need to say that. I feel like, I feel that exercise is a good thing so I would approve of myself exercising.
- But I don’t feel like I am totally devastated that I don’t exercise a lot either. I don’t feel like it is the only thing that holds up my own self-esteem.
- Well I would say self approval.

ASSOCIATION SELF DISAPPROVAL COMMENTS

- Well self approval if I get it done and if I don’t do it, “you should have been doing it.”
- If I am not involved in some kind of an activity, at the end of the day I feel guilty that I have just been sitting around doing nothing. Even actually sitting in front of a computer and say uh, I’m gathering some information, whatever on the computer, but just sitting there, I feel guilty about that.
- I suppose it would be approval.
- And so it’s almost this kind of guilt feeling that it would be great if I could spend more time exercising but...
- When I do it is approval. I feel guilty if I don’t. I am wasting my money is what I am doing if I don’t.
- Uh, a fair amount. I am a professor here and I may get invited to give seminars and go to workshops and things like that. In the old days I used to take my running gear with me and actually use it. Now I sometimes take my running gear with me and I never use it.

ASSOCIATION APPROVAL OF OTHERS COMMENTS

- No. There is no sense of, that they feel its their business to approve or disapprove.
- Oh its approval definitely.
- I know that it means a lot to my husband that I exercise and it makes him feel really good.
- I wish I could find someone to do it with. That’s the problem because most of my peers 60 and over are no longer downhillers. Those who are really good and don’t want to ski with me. And the younger people go too fast.
- Because I am not doing any I suspect that those close to me would wish I were so perhaps I would be in better shape. But basically I think that those close to me would just um like that I were in better shape and that’s a result of the exercise, of any exercise I were to do. So I think they would like the final result.
- Approval
ASSOCIATION DISAPPROVAL OF OTHERS COMMENTS

- No more of the disapproval. Yeah because those people don't know I exercise. You know, their still making the judgments based on my size.
- When you look at a person, and look at say their physical image and usually people that are exercising present a better image than those that are not exercising.
- I hate to use the word looking slimmer. I would say better muscle tone, better color, better complexion. They just kind of extrude a healthy persona.
APPENDIX H

CONSTRUCTION COMMENTS
CONSTRUCTION GAINS FOR SELF COMMENTS

- I guess the first thing is it's fun
- socially, you know I am the youngest person in my class so these old folks are um mostly all retired and um their lovely people. And its really, its nice to um converse with them. I mean we don't talk a lot but um, yeah their friendly and if you miss they always want to know if you've been sick or if you took a trip or whatever so that's kind of nice. Knowing that my joints are going to feel better when I get finished is uh really good. Knowing that my heart will get a workout you know, hopefully I am using it enough to keep it healthy. And that to the extent that I cooperate with the exercise and don't overeat. You know that I'm not gaining anything. I haven't lost anything but I certainly haven't gained anything since I started.
- Well I know it would help my overall well being. You know your body is meant to be used.
- It would be all those things that exercise is supposed to do. Improve your bones, improve your blood flow, your heart, all that stuff.
- I would expect just that I would stay healthy and flexible longer.
- One of the ways that I would expect to find a drop in weight, I would be looking forward to losing some weight. Stepping on the scale after lets say two or three days, and maintaining a sensible diet, and doing this exercise, whatever it may be, I would expect to see some reflection of that in a weight loss.
- Mmm, I expect to feel better.
- Well I don't think the pain is bad when I exercise.
- Well for one thing I plan on starting my walking program in full gear again so I can be outside enjoying the weather, nature, um. I think walking, I have spinal stenosis, and I think it helps my back. That's one of the big reasons that I like to walk.
- I enjoy walking alone too. It's kind of my time.
- I realize that in order to have more time in my life for the long term I need to be healthy and I should be exercising.
- I would have fewer instances of having back pain.
- I may be able to lose some weight.
- I probably should be ten pounds lighter than I am now, or twenty even, especially for the diabetic thing.
- I would probably have more energy and be more able to lose weight etcetera, etcetera.
- I would feel less depressed perhaps.
- I have another wedding to go to so I would like to be fit for that. So that would be good. Trimming is always a good idea.
- So I think looking better and maybe I will lower my blood glucose.
- I know it has an effect on doing the cholesterol thing.
- I would expect to lose weight.
- feel better physically, more energetic perhaps, in better control of my body.
- I am no spring chicken so, so because of my age hopefully it would help with um some onset of arthritis, sorts of symptoms in my body.
- I would feel of more in control of myself which I always do when I exercise. I feel like I am more in control of my mind and body.
- I would perhaps feel like accomplishing more even in my time away from work, that sort of thing.
- two hours at night when you get home to do something that you might be more efficient.
- I mean you would be more efficient, be able to complete work faster, be more focused, in order to do this whether it is writing letters to friends and family, or doing organizational work that you might belong to.
- I am hoping for that runners high.
- his nice warm sunshine its just getting out into nature again is gonna be a real benefit.
CONSTRUCTION LOSSES FOR SELF COMMENTS

- well I understand with Multiple Sclerosis you can actually overdo it.
- But doing stuff is hard.
- Physically hard.
- Actually one of the things that I would like to do is uh take a Yoga class. They have this new Berkams Yoga where your in a real heated room and I have heard great things about, I have some friends that are doing it but just getting there from work I would have to give up my walk to get there because I couldn’t make it there by six o’clock because I am usually kind of late, I stay late, there’s just no way.
- And I’m thinking that maybe in the summer I could do it because maybe I could ride my bike and so I could get around town faster, And actually that’s one of the things that happens for me in the summer is I’m conflicted because I like the fact that I can get to work faster, and riding your bike is a little bit of exercise but its only ten minutes or fifteen minutes so all of the sudden I kind of end up not getting a long bit of exercise, as long as of exercise as I do in the fall or the spring.
- it would just take a little bit more time
- The forty two dollars that it costs.
- I might be achy or something.
- When I ski I feel it the next day because I don’t do it enough.
- Well just generally achiness in the legs mostly. And if I fall then I will aggravate my shoulder.
- So cost is frankly to me, an issue. And I would not like to pay for example one hundred and twenty dollars to have access to fitness facilities on campus, for example, which is for me probably the most convenient thing to use and I am a staff employee.
- I might have to get up a shade earlier.

CONSTRUCTION GAINS FOR OTHERS COMMENTS

- My husband definitely likes for me to exercise because I move easier.
- I think my daughter probably appreciates it and you know the fact that I feel better my attitude is better I don’t grouch at her. And I think that even my employers benefit from it because I’m healthier.
- Ah, usually when people are exercising in our particular peer group, meaning people that are in their sixties, or seventies and they see someone exercising or walking the mall, or doing whatever, even out bicycling. They look at them as someone that maybe they could model their own activities after and uh I am not looking to the point at looking up to them but this something that maybe they could be doing as well as the person, myself doing that exercise.
- Well hopefully I will be doing the same thing, especially my husband. He usually starts to walk with me when the weather gets nice.
- I would be a happier, healthier, more balanced, adjusted person. Easier to live with.
- I think your mood is altered by exercise and that when your in a nasty mood your not as easy to live with. And if you’re all nice and cheery and happy, you’re nicer to live with unless you’re living with a depressive which I am not.
- Other than being less grumpy I can’t think of any.
- Being a role model so my daughter.
- You would think then that relationships with other people would be more positive.
- think they will be happy that I’m back on my plan. I think they all know that I like to keep my health in a state of balance and that it’s a little bit out of balance now.
- So I think the exercise for me and for my family has just been so positive that we know, even looking historically we can say that it is part of the sport to injure your knee if your going to be telemarking, so um, the past exercise gives us good feelings about what we have already done but I think it also gives us optimism that we can get over negatives like knee injuries and move forward to get back on track again and continue to enjoy it.
- It is just such a fulfilling part of our lives that I think that it helps us on an individual level, but it also helps all of us.
CONSTRUCTION LOSSES FOR OTHERS COMMENTS

- Other than time and separation.
- Time away from relationships.
- My wife may have to come pick me up some more. You know I hope like everybody hopes there is not some acute problem that comes up like you twist an ankle, or have a heart attack or something like that you know, you know that would create a hardship for a family member.

CONSTRUCTION SELF APPROVAL COMMENTS

- Assuming that the exercise is palatable, that I can manage it okay.
- It makes me feel good, uh and it makes me feel that I am doing something to benefit not only my immediate environment, but I am doing something to benefit me personally in a healthy way.
- Oh yes I approve.
- I think I would feel better about myself if I were exercising. If that is an answer you are looking I think I would feel better about myself if I were exercising.
- I should be doing it so I guess I would say that I would approve.
- Approve, definitely. My biggest fear is that something that is out of my control, like aging is going to make me cut it back. It certainly helps that we have these wonderful examples of people in our community that are fighting off those feelings.
- I know that if I do get up and do it that I will be happy with myself when I've done it, and its not because I made myself overcome some reluctance to do it, its that I know I will feel good, then I do fell good.

CONSTRUCTION SELF DISAPPROVAL COMMENTS

- Well you know it would be great if I had the energy and self disciplines to do it.

CONSTRUCTION APPROVAL OF OTHERS COMMENTS

- My husband approves I guess.
- No. It would be fine. It's like whatever I want to do is fine.
- Well since we haven't named a particular exercise I would almost have to say that that question is hard for me to answer. I wouldn't go so far as to say irrelevant but uh, you have to make an assumption, perhaps to say, we assume the exercise is going to be bike riding, x amount 4 or 5 miles a day perhaps riding the bike around a subdivision or something. I can't think of anyone in my immediate circle of friends or family that would disapprove of that. I can always just go hey, look what I did and uh I am glad you have time to do it because a lot of people don't have time to do that.
- My wife I'm sure.
- No, everybody approves.
- My husband, or my mom, my whole family. I actually have a sister who recently uh lost a lot of weight and everybody's all go Martha. She's not actually involved in exercise. I think she is just dieting.
- I would say that everybody would approve. Again because of results.
- oh well I mean of course they would approve of it.

CONSTRUCTION DISAPPROVAL OF OTHERS COMMENTS

- Not anymore my mom is no longer with us so she disapproved.