

Fitness and Diet Behavioral Change Intervention Program

Lisa Kristine Samuel

Ph.D. Candidate, Health Psychology

Walden University, School of Psychology and Behavioral Sciences

Dr. Rachel Piferi

Health Psychology

PSYC-8745-01

May 20, 2007

Abstract

This paper discusses designing a fitness and diet behavioral change intervention program by addressing biological metrics such as cholesterol levels, blood pressure measurement, and body weight as represented by the body mass index measurement as health determinant factors. The goal is to shift these numbers in a positive direction for a long-term behavioral change using the theory of planned behavior as the overall umbrella to develop reasonable health change behaviors, such as increasing exercise and food consumption awareness, while incorporating the positive incentive theory of eating to make sure the changes are long-term.

Fitness and Diet Behavioral Change Intervention Program

The purpose of this research paper is to design a fitness and diet behavioral change intervention program that can be applied by anyone who is trying to improve his or her overall health. This program will look at biological metrics such as cholesterol levels, blood pressure measurement, and body weight as represented by the body mass index measurement as health determinant factors. The goal is to shift these numbers in a positive direction for a long-term behavioral change using the theory of planned behavior as the overall umbrella to develop reasonable health change behaviors, such as increasing exercise and food consumption awareness, while incorporating the positive incentive theory of eating to make sure the changes are long-term.

Americans are struggling with their weight and currently the American Obesity Association states that 64.5 percent of Americans are considered obese and that obesity a chronic illness that increases the possibility of developing high blood pressure, type 2 diabetes, and heart disease (2005). Body mass index, or BMI, is a standard measurement that is calculated using a person's height and weight to derive a body fat percentage to determine obesity (Hairon, 2006). The National Institute of Health (2007) states that a BMI of 30.0 or above is considered obese. The Center for Disease Control (CDC) used the body mass index statistics in the United States and concluded that obesity has risen from 15% to 32.9% in the 24 years (2006). With the rise in obesity comes an increase of risk for the development of many chronic health conditions such as hypertension, coronary artery disease, stroke, type 2 diabetes, and some cancers (Baum & Posluszny, D. 1999).

In addition to the contributing factors of eating excessively or improperly and having a sedentary lifestyle the Center for Disease Control further defines obesity as being impacted by the environment that is lived in, personal behavior, and culture and socioeconomic status (2006). Americans live in a culture that is driven by immediate satisfaction and this culture contributes to obesity rates because it impacts how Americans eat (Segelken, 2005). Even though Americans do not eat properly, exercise appropriately, and are overweight this culture still supports a concept entitled the “thin ideal” which is that success, beauty, and personal worth is associated with a person’s body image, so people are constantly starting and stopping diets (Klaczynski, Goold, & Mudry, 2004). With all this information there are other factors that determine if a person can make a significant fitness and dietary behavioral change.

Health psychologists can help with the obesity epidemic by contributing, in conjunction with medical physicians, to the development of behavioral health modification programs as health psychologists are actively involved in research surrounding human behaviors that can contribute to health problems (Baum & Posluszny, D. 1999). When assessing a person’s overall health their existing eating behavior and exercise plans should be taken into consideration as well as understanding how they feel about food and exercise from a psychological perspective. This can help the health psychologist get a baseline understanding of what the likelihood of success with regarding a change in eating and exercise behavior program may have (Carrier, 1994).

Theory of Planned Behavior

The effectiveness of a weight loss plan is determined by the ability of the person on the program to achieve the set goals and maintain those goals for the long term. Very

often weight that was lost is regained and this may be because the program did not take the time to investigate the theory of planned behavior as they apply to exercise and eating. The theory of planned behavior was first proposed by Ajzen and Fishbein (1980) to predict behavior with the knowledge and understanding that each person is unique and therefore, has unique attitudes, subjective norms, and intentions.

Everyone has feelings about their own ability to successfully manage their weight by maintaining an exercise program; some people have high self-efficacy about becoming physically fit and others believe they are just not cut out to be successful and truly are not ready, from a motivational perspective, to engage in a weight-related behavior modification program (Fontaine, 1997). Before a person starts a behavioral change an assessment of his or her attitudes, subjective norms, and intentions should be taken so that an individualized program can be tailored to those needs to increase the success rate of the program. To be specific, an attitude, which is one of the factors in the theory of planned behavior, is a personal feeling about certain behavior that has been built upon throughout that person's lifetime based upon experiences, observations, and information they have acquired about the behavior (Higgins & Marcum, 2005). An additional component of the theory of planned behavior is that everyone has a unique set of subjective norms, which are beliefs about what other people in their social circle such as spouses, neighbors, or peers, would have regarding any given behavior such as dieting or achieving a thin ideal (Ajzen & Holmes, 1974). Finally, according to the theory of planned behavior, intentions are how a person combines his or her attitudes and subjective norms and thereby views how he or she plans to tackle a problem (Ziefelmann, Luszczynska, Lippke, & Schwarzer, 2007).

The theory of planned behavior demonstrates that a person can then take that intention and act upon it which thereby results in a specific behavior or outcome (Ajzen & Fishbein, 1980). For example, this would suggest that a person's eating and nutritional behavior is a result of their intention to stay on a weight reduction program and that intention is driven by how a person's subjective norms and attitudes that affect intention (Ajzen & Fishbein, 1980). If a person has a personal attitude that internally he or she is not competent at exercising and their subjective norms suggest it is normal to be sedentary then it is unlikely that they will have the intention of successfully making a dietary lifestyle change and their behavior will reflect their intentions; they most likely will not exercise. These factors must be taken into consideration when a behavioral change program is designed.

Psychological Eating Behaviors

A person's behavior towards eating and exercise is usually more the result of internal belief systems rather than the influence of an environmental factor (Ajzen & Holmes, 1974). Therefore, before a person takes on a behavioral modification program he or she should be educated on psychological concepts of eating behavior such as the positive-incentive theory, and they should understand how this theory interacts with the theory of planned behavior as well as biological responses to eating and expending energy.

Biologically there were two theories developed to explain and understand the concept of weight gain, loss, and maintenance and they are the glucostatic and lipostatic theories. These theories both suggest that the human body has a natural weight and glucose range, also referred to as a set-point, which adults have and even if it varies away

from the set point, perhaps because of diet or exercise, it will eventually return to the set-point (Carrier, 1994). These theories state that eating a meal or gaining and losing weight are all done with the effort of returning to a homeostatic body state (Pittas, Hariharan, Stark, Hajduk, Greenberg, & Roberts, 2005). The glucostatic theory is based upon the idea that the body regulates itself for the short term by the blood glucose level and that as the level of blood glucose is depleted a person psychologically and physically will begin to prepare for his or her next meal and upon consuming the meal, the body returns to its set-point (Panksepp, Tonge, & Oatley, 1972). The lipostatic theory is based upon a similar idea regarding regulation except this theory is based upon fat storage and long-term regulation. This theory suggests that eating and metabolism are acting upon if there is a deviation from the body's weight set-point (Baile, Della-Fere, & Martin, 2000). The lipostatic theory assumes that the relative stability of an adult's body weight is because leptin manages the stability of the body regardless of short-term behavioral differences in food consumption or exercise behaviors (Baile, Della-Fere, & Martin, 2000). This theory states that the body has its own place of stability with regard to total weight and amount of fat, and that the body will eventually return to that state regardless of environmental influences (Baile, Della-Fere, & Martin, 2000). If humans all have a natural tendency to return to our set point then the obesity epidemic as well as other eating disorders such as bulimia and anorexia, would not likely exist in such extreme fashion.

There are a variety of factors, rather than just a glucostatic or lipostatic set-point, that regulate body weight, eating patterns, and diet maintenance. The positive-incentive theory suggests that in addition to biological reasons humans eat because food is found to be pleasurable, the eating process is enjoyable, and there are social reasons that

encourage or discourage the frequency and the amount of consumption (Pinel & Lehman, 1998). Research was performed that demonstrated that the desire to eat may be driven in the same manner in which humans are motivated sexually (Singer & Toates, 1987).

These ideas in addition to the biological factors developed new theories about hunger.

Factors associated with hunger include the understanding of how eating behavior is managed. People make cognitive decisions about their eating patterns that are not associated with their current level of homeostasis. For example, the eating experience itself can be associated with grazing behaviors, binge eating, or gorging at one meal setting (Oxford University Press, 2007). A person may cognitively be aware that they should not overeat but some experience a momentary pleasure from the food and possibly lose control and continue to overeat, and they may experience guilt and shame after the binge eating comes to completion (Oxford University Press, 2007). Or, a person may experience different social pressures to lose weight or obtain a body image that is unrealistically thin and he or she cognitively makes a decision to obsessively diet or restrict their next meal. The positive-incentive theories explain that food is desired because of anticipated pleasure that comes with eating in addition to biological and hunger factors. The idea of eating out and celebrating a special occasion with a special meal is not a new concept; however, sociologists note that these occasions are built upon mannered rituals, the bringing together of family and friends, and notably, structured meals (Chaney, 2002).

With this knowledge an initial assessment about their attitude towards dieting and eating with the honest realization that if they are taking on a weight reduction program that they will be sacrificing some of the pleasure factors that are associated with eating

freely should be performed upfront (Carrier, 1994). A potential dieter should also take a personal inventory of what their subjective norms are with the understanding that they will face social pressure to deviate from their diet plan (Chaney, 2002). Then, if they feel they have the right intentions for taking on a fitness and diet behavioral change program they should be more successful as long as there is an understanding that if they restart their previous nutritional behavior they are likely to regain the weight (Ahern & Hetherington, 2006).

Proposal for Fitness and Diet Behavioral Change Method

This fitness and diet behavioral change intervention has been designed using the theory of planned behavior to create an individual diet and exercise plan while incorporating the positive incentive theory in making food choices and eating socially. The goal was to first provide education to the participant regarding how food choices are consumed, then a questionnaire was developed under the guidelines of the theory of planned behavior so that the participants intentions will be addressed, and a behavior modification program consisting of changed eating and exercise patterns was implemented with measurable metrics and a data collection method in place.

Participants

In this fitness and diet behavior change there is one participant. The participant is an American male, age 45, married, of Indian Asian ethnicity. He is a non-smoking, mild drinker who does not take any prescription medications but does have a history of moderate gastrointestinal irritations in which prescription acid-reflux medications were prescribed temporarily and were used successfully. The participant no longer drinks coffee, tea, or soda in excess because of the recovery from acid-reflux.

Measures

Weight, resting heart rate, workout frequency, blood pressure, waist measurement, body mass index, and overall cholesterol levels are the measurements that were chosen for this study based upon the current research further detailed below and the availability of these tests to be performed by a non-medical practitioner in the subject's home. The measurements were taken first thing in the morning after fasting throughout the night.

Men are aware of their weight and size and many of them are concerned about being overweight or less muscular than they desire and they, like many women, feel intense body dissatisfaction and are obsessed with their weight (Smolak & Levine, 2001). A person's physical weight can be a baseline for determining if a person's health is going off track; therefore, a weight measurement using a standard scale was taken on a weekly basis (Ford, Grieve, & Wann, 2006).

A resting heart rate is a measurement that can be taken by placing two fingers on the interior part of a person's wrist, finding the pulse which is located beneath the thumb on the wrist, and counting the beats for 30 seconds (American Heart Association, 2007). Then this number is multiplied by two which becomes the resting heart rate number. A person's heart rate at rest should be between 60 and 80 beats per minute as it is a representation of the amount of oxygen the body is requiring at any given time and regular exercise has been shown to lower the resting heart rate as the body can more efficiently pull oxygen from the bloodstream (American Heart Association, 2007). The resting heart rate was measured weekly.

Blood pressure was also measured on a weekly basis using a manual stethoscope and a blood pressure cuff. Blood pressure is an important measure as it can be a leading indicator for potential heart disease, hypertension, hypertrophy, or stress related illnesses (Frazer, Larkin, & Goodie, 2002). Health psychology research explains that how a person reacts to and manages stress will have an influence on risks for certain stress related diseases and as a person ages research shows that he or she may be able to more effectively manage their reaction to stressors (Uchino, Berg, Smith, Pearce, & Skinner, 2006). However, with the increase in age and ability to manage stress also comes a decrease in the overall functionality of the cardiovascular system so there is a stronger relationship between a person aging and having both higher resting blood pressure and higher stress induced blood pressure (Uchino, Berg, Smith, Pearce, & Skinner, 2006). The National Heart Lung and Blood Institute's diseases and conditions index (2007) has determined that a person with normal blood pressure has a systolic pressure of less than 120 and a diastolic pressure of less than 80, a person with prehypertension has a systolic pressure of 120-139 and a diastolic pressure of 80-89, a person with stage 1 high blood pressure has a systolic pressure of 140-159 and a diastolic pressure of 90-99, and a person with stage 2 high blood pressure has a systolic pressure of 160 or higher and a diastolic pressure of 100 or higher (National Heart Lung and Blood Institute, 2007). For this study the goal is to have a normal blood pressure measurement.

A workout program consisting of 30 minutes of cardiovascular exercise, such as a brisk walk on a treadmill, and 30 minutes of moderate weight lifting is also a measurement for this study. The participant should work out three times a week for approximately one hour of cardiovascular focus and approximately one half of an hour

focused on muscular building exercises, so this plan is currently below exercise standards (Bryant & Peterson, 1999). This plan is also modified based upon recommendations by the American Heart Association for implementing exercise programs for males over the age of 40 and this program should contribute to a reduction in resting heart rate and overall blood pressure measurements (Fletcher et al., 1996).

The circumference of the waist is also an included measurement. A large waist measurement, in proportion to a person's overall height, is an indicator that they have a higher body mass index and are either overweight or at risk for obesity (Lean, Hans, & Morrison, 1995). Most body fat around the waist can be attributed to an organ called the omentum which acts as a fat storehouse and is located outside of the stomach and the intestines in the body cavity (Alagumuthu, Das, Pattanayak, & Rasananda, 2006). The omentum can act in a lymphatic function, removing toxins and wastes while promoting the growth of healthy blood vessels, yet it also captures the wasteful fats and grows larger, resulting in an unhealthy waist circumference (Alagumuthu, Das, Pattanayak, & Rasananda, 2006).

Body Mass Index is an important metric as this is the measure that the Center for Disease Control uses, instead of total weight, to determine if a person is considered overweight, at risk for obesity, or obese (2006). The body mass index is a statistical relationship between a person's height and weight and it is applicable for both men and women, regardless of age. The National Institute of Health and the Center for Disease Control state that a person is considered underweight if the body mass index is less than 18.5, a person is of normal weight if the body mass index is 18.5-24.9, a person is considered overweight if there is a body mass index of 25-29.9, and a person is obese if

the number exceeds 30 (2006). The goal for this program was to maintain a normal body mass.

The last measurement for this study is cholesterol. Cholesterol is a lipid that is produced in the liver and although the human body produces enough by itself, it can also be found in a variety of food that people consume daily such as meat, dairy, seafood, and poultry (Mayo Clinic, 2007). Cholesterol is a leading indicator for risks of myocardium infarction, stroke, and cardiovascular disease (Uchino, Berg, Smith, Pearce, & Skinner, 2006). The Mayo Clinic (2007) recommends that a person should have a cholesterol level that is less 200 milligrams (mg); a level that is between 200-239 mg is considered to be borderline high and levels that exceed 240 mg are considered to be high cholesterol levels. Cholesterol levels were tested three times throughout the study using a CardioChek Brand Analyzer Portable Whole Blood Test System purchased from Wal-Mart. After fasting, a droplet of blood was obtained using a safety lancet, placed into a plastic blood collector, and applied to a cholesterol test strip produced by Polymer Technology. The strip was then placed in the CardioChek system and analyzed for a result. For the purpose of this study the cholesterol levels were measured as a whole number and not divided between low density lipids and high density lipids.

Procedure

Using the theory of planned behavior the goal of this fitness and diet behavioral change intervention is to create a favorable attitude towards the behavior of exercising and eating healthy so the first step in this plan is to educate the participant about the fundamentals of diet and exercise (Ajzen, 2006). Even though the subject in this study is a well educated individual it is helpful to readdress some basic nutrition and exercise

concepts with an educational review (Fletcher et al., 1996). The importance of exercise for overall health and the role it plays in preventing disease and illness by releasing chronic stress was discussed as well as reviewing the psychological benefits exercise has on increased self-esteem and increased motivation (Akande, Van Wyk, & Osagie, 2000). Biological components of exercise, such as the benefit of gas exchange when the respiratory system is working harder, the benefit of increased flexibility for the muscular and skeletal systems, and the role exercise has in burning stored lipids was addressed (Akande, Van Wyk, & Osagie, 2000).

The second part of the procedure was to interview the participant using a theory of planned behavior questionnaire with a model developed by Ajzen (2006), the founder of the theory. Using a likert scale the participant was asked questions and opinions about his intention towards the behavior of changing his lifestyle. The statements to be rated included statements such as “I intend to change my eating behavior according to the plan and exercise at least three times a week for the next three months”. The next section of statements to be rated using a likert scale were regarding the participants attitude and belief about the behavior and included statements such as “for me, changing my eating behavior and exercising three times a week is” either harmful or beneficial, pleasant or unpleasant, good or bad, worthless or valuable, or enjoyable or unenjoyable. The last section of statements to be rated using a likert scale surrounded uncovering the participant’s subjective norms by using statements such as “most people who are important to me think that I should/ should not change my eating behavior and exercise three times a week”, “the people in my life whose opinions I value the most have/ do not have good eating behaviors and exercise regimes”, and “the people in my life whose

opinions I value would/ would not approve of my change in eating behavior and exercising three times a week". The questions were all developed using the theory of planned behavior as recommended by Ajzen (2006).

The results from the assessment showed that the participant has a positive attitude toward the behavior, he feels supported by his subjective norms regarding the behavior change, and believes he has a strong perceived behavioral control over achieving the desired results (Ajzen & Fishbein, 2004). A hypothesis can be made that the participant's intentions are to succeed and therefore a prediction of a behavioral change can be made.

However, based upon the theory of planned behavior and reasoned action likert scale based assessment it was uncovered that there was some resistance towards having a diet that would be so restricted that it might be hard to maintain it long term. This concern is result of the positive-incentive theory of eating in which food is not just a way to achieve health and nutrition; food is eaten because it is pleasurable and the participant does not want to lose that satisfaction (Pinel & Lehman, 1998). The subject's eating self-efficacy was discussed and confirmed and a dietary menu that is creative, tasteful, and pleasurable from an eating perspective was developed so that binge eating would be avoided and the behavioral change will be long term (Goodrick, 1999).

With the information gained from the theory of planned behavior assessment the subject has demonstrated a behavioral intention to move forward with the diet and exercise program with the personalized goals of reducing overall body weight, bringing the blood pressure level to a measurement of 120/80, keeping a resting heart rate that is between 60-80 beats per minute, reducing the circumference of the waist by four inches, reducing body mass index and maintaining it at the normal percentages of between 18.5-

24.9, bringing the total cholesterol level to 200 mg or less, and to have one half hour of cardiovascular exercise and one half hour of moderate weight lifting occur at a minimum of three times a week. These goals will be achieved by reinforcing the participant's positive attitude about exercising and dieting, helping the subject feel in control of his behavior, and supporting the positive subjective norms about eating nutritiously (Higgins, & Marcum, 2005).

The specific details of the program, created with the understanding of the attitudes, subjective norms, and intentions of the participant included creating a food diary for the subject so that a daily awareness of consumption and portion size is monitored using self-reporting techniques, a diet that excludes excessive dairy products, fried foods, food with saturated fats, and simple carbohydrates such as bread and flour products was implemented, and portion control using the recommendation of the National Institute of Health (2007) was included. Additionally, a low-cost membership was purchased from a local gym that had flexible hours of operation to encourage the participant to exercise as recommended.

Results

Five weeks of data were collected on the measurements starting on April 8, 2007 and ending on May 6th, 2007 by inputting the information into an Excel spreadsheet once a week. The data from this behavioral modification plan is too preliminary to draw a conclusion; however, the current data is encouraging. From a behavioral standpoint the participant remained positive, followed the dietary behavioral changes and participated in exercise while feeling empowered and having self-efficacy about the program.

Table 1

Fitness and Diet Behavioral Change Metrics: Participant 1

Date	4/8/2007	4/15/2007	4/22/2007	4/29/2007	5/6/2007
Weight	147	142	139	135	132
BP Systolic	130	128	124	120	116
BP Diastolic	84	84	84	80	76
Cholesterol	218	-	198	-	187
Resting HR	114	110	98	90	84
Waist	34	33	33	32.5	32
Workout	0	3	2	3	3
BMI	23	22.2	21.8	21.1	20.7

At the beginning of the fitness and diet behavioral change intervention program the participant weighed 147 pounds. He gradually lost a total of 15 pounds by dropping to 142 pounds in week two, 139 pounds in week three, 135 pounds in week four, and resting at 132 pounds in week 5. The first week there was not active participation in the exercise component of the plan; however, in week two there was three days of activity, week three there was two days of activity, and in week four and five there were also three days of activity at the gym for the recommended amount of time.

The measured resting heart rate was relatively high in weeks one and two as the rate was 114 and 110; the rates feel closer to the normal range as they dropped to 98, 90, and 84 respectively (American Heart Association, 2007). The blood pressure results were very encouraging. The first week the baseline pressure was a systolic pressure of 130 over a diastolic pressure of 84 which, although not incredibly high, is not near the target range of 120/80. The blood pressure readings slowly dropped as the pressure was 128/84 in week two, 124/84 in week three, 120/80 in week four, and exceeded the goal

and fell within normal range at 116/76 in week five (National Heart Lung and Blood Institute, 2007).

The participant's waist measurement decreased from 34 inches to 32 inches during the five week period. Although the participant was never out of the normal range for the body mass index, there was a significant reduction. In week one the body mass index was 23%, it dropped to 22.2 in week two, 21.8 in week three, 21.1 in week four, and was 20.7 in week five.

The cholesterol measurements were successful in the short term as at the beginning of the study the participant had a total cholesterol level of 218 which is considered to be borderline high and puts the participant at risk for a variety of cardiac related disorders (Uchino, Berg, Smith, Pearce, & Skinner, 2006). The cholesterol level was tested again during week three and it measured 198 and upon the final testing in week five it measured 187.

Discussion

Although the data is preliminary and encouraging, conclusions can only be finalized by collecting sufficient data overtime. However, long term data collection should show that health behavioral change models using the theory of planned behavior is more effective than exercise and dieting programs that do not incorporate behavioral or psychological factors into the plan (Baranowski, Cullen, Thompson, & Baranowski, 2003).

Research suggests that the older a person is the less likely he or she would be able to make a behavior change when it relates to their health (Ferrini, Edelstein, & Barrett-Conner, 1994). Therefore, the next steps are to continue to encourage the participant's

intention and behavior in a positive manner regarding diet and exercise maintenance while and having direct observation on progress as well as having self-reported information maintained in the data collection sheet.

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