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# Stability of exercise identity and healthy-eater identity over six months among rural hospital employees

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**Stability of exercise identity and healthy-eater identity over six months  
among rural hospital employees**

by

**Heather Nicole Dillman**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
DOCTOR OF PHILOSOPHY

Major: Kinesiology (Behavioral Basis of Physical Activity)

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2012

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## ABSTRACT

Due to the health crises in the United States, there is a need to better understand health behavior patterns and how they are developed and maintained. Therefore, there is a need to better understand exercise patterns and healthy eating behaviors and how they are developed and maintained. Many scholars have suggested that an individual's concept of self is composed of numerous identities. As role identities motivate behavior consistent with the identity, role-identity salience may predict future exercise or healthy eating behavior. Therefore, the purpose of this study was to examine exercise identity, healthy-eater identity and frequency of exercise and healthy-eating behaviors, as well as the stability and frequency of these behaviors during six months of a worksite health promotion program. This study was also exploratory in nature, as the relationship between exercise identity and healthy-eater identity and the respective behaviors were examined, as well as the relationship between exercise identity, healthy-eater identity and affect.

Two waves of data collection, separated by 6 months, were performed with employees of a rural community hospital located in the Midwest who were enrolled in an employee health program. Attrition rate was 38% resulting in a final sample of 83 respondents. The average age was 42 years with a range of 24 to 69 years. Exercise identity was measured by the average of nine Likert-type items (Anderson & Cychosz, 1994) designed to measure the extent to which exercise was descriptive of the concept of self ( $\alpha=.95$ ). Healthy-eater identity was measured by modifying the nine items in the Exercise Identity Scale (Strachan & Brawley, 2009) ( $\alpha=.89$ ).

Difference scores were calculated for dependent variables of exercise behavior over the past 7 days, exercise identity, positive affect and negative affect by subtracting pre-test scores from post-test scores. A MANOVA was utilized to compare four exercise groups with each of the five dependent variable differences ( $F(5,72)=2.118, p=0.01$ ). Univariate tests indicated that 7 day exercise behavior was significantly related to exercise group ( $F(3,80)=6.121, p=0.001$ ), as well as positive affect ( $F(3,80)=3.340, p=0.02$ ) and negative affect ( $F(3,80)=3.155, p=0.03$ ). Exercise identity approached significance ( $F(3,80)=2.411, p=0.073$ ). Difference scores were also calculated for dependent variables of average servings of fruit and vegetables per day, healthy-eater identity, positive affect and negative affect. A MANOVA comparing each of the four eating behavior groups for each of the dependent variable differences was not statistically significant ( $F(3,73)=0.496, p=0.88$ ). These data suggest individuals with more salient exercise and healthy-eater identities held higher identity standards and were more likely to seek identity-behavior congruence by engaging in exercise and healthy eating behavior. Moreover, exercise identity and healthy-eater identity remained stable in the employees reporting more salient identities.

## CHAPTER 1. INTRODUCTION

Regular exercise has continually shown to have numerous health benefits. Among them are reductions in cardiovascular disease, hypertension, diabetes mellitus, colon and breast cancer, obesity, hypertension, and bone and joint diseases (Warburton, Nicol, & Bredin, 2006). Other studies have found that exercise may have social psychological benefits, including reduction in depressive symptoms and anxiety, improvements in self-esteem, reduced age-related mental deterioration and a more positive perception of the self by others (Schomer & Drake, 2001). Though many benefits of exercise have been documented, 66% of adults do not engage in the recommended amount of exercise and 55% of adults do not participate in more than 10 minutes of vigorous activity per week (CDC, 2009). Moreover, of those who begin an exercise program, 50% drop out in the first six months (Miller, Ogletree, & Welshimer, 2002).

Individuals who do not participate in a regular physical activity program may develop internal as well as external costs. Internal costs are those borne by the individual and may be taken into account in decisions about how much to exercise (e.g. increased risk of hypertension, cardiovascular disease, some cancers). External costs are costs that others pay as a result of an individual's decision to lead a relatively inactive life rather than exercise. External costs of a sedentary lifestyle include more hospital admissions and longer lengths of stay, more medical claims costs, and increased employee health care costs due to disabilities, as well as higher absenteeism, lower productivity and decreased employee attitudes (Allegrante, 1998). These external costs have led many employers to develop

worksite health promotion (WHP) programs. According to the National Association of Health and Fitness (NAHF) (2009), employers, as well as employees, may receive many benefits from effective WHP programs. Some of the benefits employers receive are reduced employee absenteeism, decreased rate of illness and injury, improved health care cost and management, as well as enhanced productivity. Employees may receive benefits including lower stress levels, increased self-esteem, increased well-being, and potential weight loss (Olson, & Chaney, 2009).

Although employers and employees may receive many effective benefits from WHP programs, participation rates remain low. It has been suggested that, on average, less than 50% of employees participate in WHP programs (Robroek, Van Lenthe, Van Empelen, & Burdorf, 2009; McLellan, MacKenzie, Tilton, Dietrich, et al., 2009). Olson and Chaney (2009) suggest there are various reasons employees do not participate in WHP programs, including costs due to time and money (perceived barriers), not seeing benefits (perceived benefits) and not feeling susceptible to a disease or illness (perceived susceptibility).

In view of the many benefits of physical activity and WHP programs, it is surprising that only a small portion of American adults participate in regular physical activity and WHP programs. This lack of participation in and adherence to regular programs of exercise has influenced many researchers to explore numerous theoretical models as a basis to explain early and continued participation in exercise behavior, as well as other health behaviors. These models include social cognitive theory, the health belief model, the stages of change model, self-efficacy, and the theory of reasoned action or planned behavior. However, much of this research has

had only limited success (Rhodes & Courneya, 2003; Annesi, 2004; Storer, Cychosz & Anderson, 1997; Jones, Harris, Waller & Coggins, 2005). An alternative approach should investigate the identity-behavior link.

One possible theoretical approach to measure the link between identity and behavior is identity theory. Identity theory suggests individuals hold many social positions in society, and attached to these positions are identities (Burke & Stets, 2009). For example, if a person holds the position of exerciser, they have a corresponding exercise identity. Further, each identity has a set of meanings and expectations attached to it that guide future behavior. As individuals act out certain behaviors, the identity attached to the behavior may be reinforced and validated, in turn, increasing the likelihood of engaging in future behavior. As an identity becomes more salient and important to one's concept of self, a person may be more motivated to behave in a way that is congruent with that identity (Stets & Burke, 2000). Therefore, a person with a more salient exercise identity or healthy-eater identity may be more likely to exercise or eat healthy in order to obtain identity-behavior congruence.

Identity theory also suggests that individuals with salient identities would be likely to recognize a discrepancy between identity and behavior (Burke, 1980). In addition, it would be expected that these individuals would experience lower positive affect and higher negative affect when they behave in a way that is incongruent with their identity (Cast & Burke, 2002; Stryker & Burke, 2000). In turn, they would be likely to change future behavior in order to realign behaviors and identities. However,

when individuals behave in an identity-congruent manner, they may experience more positive emotions (Cast & Burke, 2002; Stryker & Burke, 2000).

Hooker and Kaus (1994) suggest individuals may hold certain standards related to health behaviors. If a discrepancy is perceived between the standard and current behavior, one will engage in behaviors to narrow the discrepancy, or seek health-related possible self-behavior congruency. However, when possible self-behavior congruency is maintained, individuals may experience increased positive affect and decreased negative affect. In turn, positive affect may feed back to the health related possible self, influencing future behavior.

Previous research has suggested that individuals with salient exercise identities feel greater negative affect and lower positive affect as well as intend to regulate future behavior when faced with a behavioral challenge in which it was difficult for them to maintain identity-behavior congruence (Strachan & Brawley, 2008; Strachan, et al., 2011). Therefore, a person with more a more salient exercise identity and healthy-eater identity may experience greater negative and lower positive affect than a person with less salient identity, when they are unable to behave in a manner that is congruent with their identity. The increase in negative affect and decrease in positive affect may influence a person to adjust future behavior in order to achieve identity-behavior congruence. In turn, they may experience increased positive affect and decreased negative affect when identity-behavior congruence is maintained.

## **Purpose**

Though many people know the benefits of making healthy lifestyle choices, a large percentage of the adult population does not participate in a regular exercise program, nor regularly consume a healthy diet. As already mentioned, several theoretical models have been examined in an attempt to understand why participation and adherence to health behaviors is so low, but success has been limited. Another possibility to examine this relationship is identity theory, more specifically exercise and healthy-eater identity. Defining and measuring exercise identity in terms of the reciprocal relationship between exercise identity salience and exercise behavior may be useful in recognizing those individuals more likely to maintain and expand an exercise program. In addition, the relationship between exercise identity and behavior may be extended to other healthy behaviors, such as healthy-eater identity. Therefore, the purpose of this study was to examine exercise identity, healthy-eater identity and frequency of exercise and healthy-eating behaviors, as well as the stability and frequency of these behaviors over six months. This study was also exploratory in nature, as the relationship between exercise identity and healthy-eater identity and the respective behaviors were examined.

A secondary purpose of this study was to explore the relationship between exercise and healthy-eater identities and affect as it relates to consistency of one's health behaviors. It is expected that individuals who behave in an identity-behavior congruent manner over six-months will experience higher positive affect and lower negative affect with respect to the frequency of exercise or healthy eating behavior. However, individuals who behave in an identity-behavior incongruent manner will

experience higher negative and lower positive affect. Moreover, it is expected that participants who increase exercise or healthy eating behavior will report decreased negative affect and increased positive affect at follow-up, while those who decrease the amount of exercise or healthy eating behavior will report increased negative affect and decreased positive affect.

## **CHAPTER 2: REVIEW OF LITERATURE**

Theoretical discussion and research which argues that role identities are pivotal factors for behavioral regulation within larger social structures may provide a useful framework for the investigation of exercise adherence behavior (Cast & Burke, 2002; Stets & Burke, 2000; Stryker & Burke, 2000). Central to this line of thought is identity theory (Burke & Reitzes, 1991) which recognizes the importance of socio-structural influences on identity formation and behavior, and accounts for the self's internal dynamics that impact behavioral decisions. Consequently, it may prove useful to examine the importance of one's role identity as an exerciser and healthy-eater in the initiation of and adherence to an exercise program and healthy-eating behavior. Therefore, the examination of role identities may serve as a useful approach to better understand health behaviors including diet and exercise behavior.

### **Identity Theory**

Callero (1985) and Wininger and Pargman (2003) state that an individual's concept of self is comprised of numerous role identities. A specific role identity is defined as one dimension of the self, and is formed based on an individual's behavior, attitudes, and beliefs. When these identities are combined, they define who a person is. Identity theory suggests that the core of an identity is the categorization of the self and incorporation, into the self, the meanings and expectations associated with the role and its performance (Burke & Tully, 1977; Thoits, 1986). Meanings and expectations attached to an identity are thus the basis

of standards that guide behavior. As an individual enacts certain behaviors, the behaviors often become part of an identifiable role and are incorporated into the concept of self. In turn, the self-image and behaviors attached to it become important to the individual (Charng, Piliavin, & Callero, 1988).

As patterns of behavior become internalized as a central role identity and thus, become increasingly important to a person's sense of self, intentions to engage in the relevant role behaviors increase based on the salience of the role identity and the related behaviors (Charng, Piliavin, & Callero, 1988). Identity salience is defined as the relative importance or centrality of a given identity for defining oneself and the importance of the identity in one's self structure (Hoelter, 1983; Charng, Piliavin, & Callero, 1988). As an identity becomes more salient, the more representative of self it becomes. In turn, the individual begins to define him or herself in terms of salient identities (Callero, 1985; Stryker & Burke, 2000; Winerger & Pargman, 2003).

Callero (1985) stated that the most visible consequence of role identity salience is one's behavior. As role identities increase in salience and individuals begin to define who they are based on these roles, they begin to enact behaviors that are related to these identities (Stryker & Burke, 2000; Winerger & Pargman, 2003). As individuals act out these behaviors, they may, through social interaction, have these identities reinforced and validated. Concurrently, validation of the role identity increases the salience of the identity, thus increasing the likelihood of future behavior related to the identity. Once these behaviors have been initiated or mobilized by a person and are recognized and reinforced by others, they are likely to become important to one's concept of self, and in turn may become primary salient

beliefs. If the role identity becomes a valued aspect of one's self and a primary salient belief, it may also become important in directing future exercise behavior (Anderson and Cychosz, 1995; Anderson, Cychosz and Franke, 1998, 2001), and may be viewed as "an important predictor of behavior" (Stryker, 1968).

Another concept underlying identity theory is commitment (Stryker & Burke, 2000). There are two types of commitment: extensiveness (quantitative) and intensiveness (qualitative). Extensiveness refers to the number of individuals one is tied to due to a particular identity. A person may feel connected to many people based on an identity, or they may feel connected to few people. The second type of commitment is intensiveness or the strength of the commitment tied to various identities. A person can feel they have strong ties to an identity, or weak ties. Stryker and Burke (2000) suggest the more extensive and intensive the commitment, the greater the salience of an identity will be. Thus, identity theory's specification of Mead (1934) is "commitment shapes identity salience shapes role choice behavior."

When an individual is presented with a situation where more than one identity is activated, meanings associated with the situation are compared to meanings associated with identities. If an individual perceives the situation to be identity-incongruent, they may experience negative emotions. In turn, the negative emotions may motivate an individual to adjust the situation in order to seek identity verification, or identity-behavior congruence. However, if an individual perceives the situation to be identity-congruent, they may experience more positive emotions (Cast & Burke, 2002; Stryker & Burke, 2000).

As individuals hold multiple role identities, identity theory suggests these identities are organized into a hierarchy (Charng, Piliavin, & Callero, 1988). This implies that the identities most salient are located at the top of the hierarchy with less salient roles falling near the bottom (Callero, 1985). In any given situation people will seek out opportunities to enact a highly salient identity. The more salient identities located at the top of the hierarchy are more likely to be activated (Stets & Burke, 2000). For example, Callero (1985) studied role identity salience among blood donors. He hypothesized that salience of the blood donor role identity would be positively associated with self-definition as a blood donor. Secondly, he proposed that identity salience would be linked to the likelihood to donate in the future. Callero found significant correlations between role-identity and self-definition, as well as role-identity and the probability of future blood donations. Results suggest that the more one defines him or herself as a donor, and views donor behavior as part of the self, the more likely he or she will donate.

Religious identity salience has also been examined. Wimberley (1989) explains that when one holds multiple identities in which behaviors for those identities are incompatible, the hierarchy of salience influences the choice of behavior. Thus, if religious identity is highly salient for a given person, the behavioral requirements for the religious role are likely to take precedence over behaviors of other roles, should a conflict arise. Stryker and Serpe (1982) measured the salience of religious identity relative to the salience of three other identities, parent, spouse, and worker. It was hypothesized that the presence of other roles would be inversely related to the salience of the religious identity. Using a two-item scale, respondents

were asked to rank religion in relation to the other roles in the study. The higher one ranked religious identity relative to other roles, the higher religious identity salience. Standardized regression coefficients suggest there may in fact be an inverse relationship between the presence of the parental role ( $b=-.26$ ,  $p<.001$ ), spousal role ( $b=-.12$ ,  $p<.10$ ), and worker role ( $b=-.35$ ,  $p<.001$ ) and religious role salience. This provides support for the concept of identity salience hierarchy in that when behaviors associated with less salient roles are incompatible with the religious identity, one will choose to engage in behaviors related to the religious role identity where salience is high.

Results also suggested that there is a strong relationship between religious identity salience and religious commitment ( $b=.47$ ,  $p<.001$ ). In addition, the strength of commitment ( $b=.36$ ,  $p<.001$ ) and religious role salience ( $b=.34$ ,  $p<.001$ ) strongly predicted time spent in the religious role (Stryker & Serpe, 1982).

Grube and Piliavin (2000) utilized American Cancer Society (ACS) volunteers to understand the participation and retention of volunteers in organizational settings. Perceived expectations, personal importance to the organization, prestige of the organization, and organizational commitment were measured. In addition, number of hours donated to the ACS per month, as well as hours donated to other volunteer organizations was reported. Findings were consistent with previous research on blood donors in that perceived expectations of others was the single best predictor of role identity importance. Past behavior was also found to be a significant predictor of role identity salience and ACS hours.

Research examining role identities has found intention to donate and past behavior as important predictors of future behavior (Callero, 1985; Grube & Piliavin, 2000). Lee, Piliavin, and Call (1999) examined whether or not intention and past behavior would extend to donating time and money. A telephone interview was utilized to examine five possible predictors of blood, money and time donation identities. Perceived expectations of others to donate, whether or not parents had donated, whether or not a respondent knew someone who had donated or they had donated themselves (past receipt of services), past donation behavior, and personal norms were all measured. Personal norms are feelings of personal obligation to partake in a behavior, such as donating blood, time or money. Results suggested that all five variables were significant predictors of blood donor identity. Moreover, four of the five variables were significant predictors of money and time donation with the exception of past receipt of services. While all variables were significant predictors, there were some differences between donating blood, time and money. Results suggest feeling a sense of obligation to donate (personal norms) are a stronger predictor of blood donor identity ( $b=.29$ ) than time ( $b=.15$ ) or money ( $b=.16$ ) identities. In addition, intention was a greater predictor of giving time ( $b=.29$ ) than money ( $b=.21$ ). One explanation for these findings may be due to differences in social relationships. Blood and money donation allows for anonymity, whereas time donation requires individuals to meet face to face with recipients. Identity theory suggests that a role identity is sustained partly through relationships developed in the particular setting. Thus, a person may be more likely to have their volunteer identity verified through social interaction. In turn, time donors may feel stronger

social pressure to donate in the future than money or blood donors in order to obtain identity-behavior congruence.

Identity theory has also been utilized to examine gender, family and work roles and stress attached to each role (Wiley, 1991). Stress may occur when one must choose between role behaviors that confirm identities of similar salience and commitment. Thus, when an individual attaches equal salience to multiple identities, such as work and family, they may experience greater stress and role-conflict. Therefore, Wiley (1991) suggests gender may affect work and family identities by having different meanings for men and women. In addition, men and women may experience different levels of salience and commitment to work and family identities. Women who are invested in their family and committed to their career are more likely to suffer role-conflict and associated depression. In addition, men who place emphasis on the family role, particularly those with children, are more likely to experience conflict with work roles. However, some men may view providing for their family as part of their family role, thus may not experience as much stress due to role-conflict. This is consistent with studies by Baruch and Barnett (1986) and Berry and Rao (1997), in that fathers participating in child-related events experienced higher levels of stress due to lack of time for career work. These findings suggest men and women are likely to experience stress when they are unable to have their family and work identities verified due to role-conflict.

Ellestad and Stets (1998) studied the issue of inadequate role performance by examining motherhood and jealousy related to feelings of poor performance of the mother role. Identity theory states that an identity is a set of meanings connected

to various roles. Thus, mother identity is the set of meanings women connect to the mother role. The mother role is thought to be nurturing and comfort-giving, while the father role is more likely one of a playmate. Ellestad and Stets (1998) examined how the prominence and salience of the mother identity invokes emotional responses when the mother identity is challenged by nurturing father-child interactions. Stryker (1987) suggests the strength of emotional responses may be tied to identity salience. Therefore, if a woman with a salient mother identity feels she is not meeting her identity standard as a mother, she may experience negative emotion, such as jealousy. If a woman experiences strong feelings of jealousy, she may feel she is not adequately performing her mother role. In turn, the strong feelings of jealousy may encourage her to seek identity-behavior congruence by developing coping strategies to manage negative feelings.

Ellestad and Stets (1998) hypothesized those women who report negative emotional responses due to father-child interactions place importance on the mother identity. Secondly, women who place a great deal of importance on the mother identity will experience stronger emotional responses when the father steps into the nurturing role. Lastly, women who are salient in the mother identity will use coping strategies in response to negative feelings of jealousy. Eighty-six parents (51 mothers and 35 fathers) responded to two vignettes which challenged the mother identity and served as measures of jealous feelings and coping strategies. Results supported each of the hypotheses in that the prominence of the mother identity influenced the emotional response of jealousy ( $R^2=.04$ ), as well as the salience of the mother identity ( $R^2=.11$ ). In addition, salience of the mother identity

corresponded to how a mother behaves, copes with, or responds to jealous feelings in a given situation. Mothers with a more salient identity were more likely to invoke coping strategies when their mother identity was challenged in order to seek identity-behavior congruence, and realign behaviors with the identity standard.

Cast and Burke (2002) examined self-verification of the spousal role identity in a sample of newlyweds. It was suggested that individuals in a family may seek to verify multiple identities at any point in time (parent, spouse, child, sibling, etc.). In different situations, the various identities may compete with one another. The more salient identity in the given situation will be verified. Thus, self-verification, or identity-behavior congruency, is an organizing principle behind individual behavior.

Identity theory has been utilized to predict success with smoking cessation among adult smokers (Shadel & Cervone, 2011). Shadel and Cervone (2011) suggest three reasons why self-concept is important to understanding smoking initiation and cessation. First, people progress through a series of stages from never smoking to dependent smoking and the concept of self is critical to the transition between stages. Secondly, research has suggested that self-concept is multifaceted and each distinct self is composed of descriptive attributes that are organized according to context. In addition, smoking behavior is tied to context. It is suggested that social pressures in specific contexts can lead to initial smoking behavior, and specific social situations are more conducive to smoking behavior (e.g. alcohol consumption, being with other smokers). Therefore, examining one's concept of self could help our understanding of smoking on specific context.

The last reason why self-concept is important to understanding smoking initiation and cessation is that self-concept and transitions are both tied to development. According to the Centers for Disease Control (2009), smoking prevalence rates tend to be higher during young adulthood and decline in later adulthood. Shadel and Cervone (2011) suggest concept of self shifts and changes throughout the lifespan. As a child moves from childhood to adolescence, they may begin to experience conflict. This conflict occurs when adolescents use certain attributes to describe themselves, yet lack the maturity to deal with contraindications that arise between self-attributes. In turn, they look to social context to try and resolve self-conflict. This is often seen during early and middle adolescence. As teens move into late adolescents, they are better able to deal with conflict that arises. Therefore, examining developmental changes in the concept of self could help us better understand the developmental changes that take place in smoking behavior. Overall, Shadel and Cervone (2011) suggest that examining one's concept of self and developing interventions targeting self-concept can aid in changing smoking behavior.

The salience of blood, time, and money donor, religious, smoking, wife, and mother identities were found to be good predictors of future behavior. These results suggest that as individuals act out certain roles and the roles are reinforced through social interaction, they may become important to one's concept of self. In turn, as the identity becomes more salient to one's definition of self, the likelihood one will seek out situations in which to act out the salient role increases. Therefore, identity

theory may be a good theoretical approach for the study of the initiation and adherence of exercise and other health behaviors.

### **Exercise Identity**

In an attempt to examine salience of the exerciser role, a research perspective based on the reciprocal relationship between role-identities and behavior was developed. As some of the reviewed research has shown, role identities as part of one's concept of self helps give meaning to past behavior as well as motivate future behavior. Because role-identities motivate behavior consistent with the identity, role identity salience may predict exercise behavior. In addition, individuals with high exercise identity may seek out identity-behavior congruency, and regulate their behavior in a way that is consistent with the salience of their exercise identity. In turn, the exercise behavior is reinforced, thus strengthening one's identity and again influencing future behavior. Therefore, by understanding the relationship between exercise behavior and exercise identity, one may be able to identify individuals most likely and least likely to begin as well as maintain a physically active lifestyle and develop more effective intervention strategies.

Exercise behavior and identity have been studied in association with health beliefs. The Health Belief Model (HBM) with its emphasis on one's perceptions of susceptibility, benefits, social influences, cues to actions, and barriers is a motivational model that has been utilized to study and understand health related behavior for decades. While the HBM is able to identify factors which may influence health behavior, it has not been very effective in predicting exercise behaviors.

Storer, Cychosz, and Anderson (1997) examined whether HBM factors, along with physical self-efficacy and locus of control were possibly constellations of beliefs or attitudes that could be connected to role identities. They examined how constellations of beliefs, values and attitudes may define behavior. Values are said to generate behavior through the mediation of attitudes. Strader and Katz (1989) explain that behavior is determined by intention. Intention is determined by personal attitude and an individual's perception of social influences, or subjective norms. Both attitude and subjective norms are based on individual beliefs. Individual's values and beliefs are tied to specific role identities. In turn, identity models may be better approaches to explaining how attitudes and beliefs influence behavior. As individual's behavior becomes reinforced through involvement and social interaction, attitudes, beliefs and values may become part of a salient role identity and better predictors of future behavior, because of the person's need for identity-behavior congruency.

Iowa Department of Transportation employees were utilized to examine the relationship between HBM perceptions and beliefs concerning exercise behavior and competence in physical activity with the presence of or absence of four health lifestyle behavior indicators [cholesterol level, percent fat, physical endurance (METs), and smoking (Storer, Cychosz, & Anderson, 1997)]. Results from a canonical correlation analysis displayed two statistically significant functions between employee's attitudes and beliefs and the four measures of CHD risk factors. The first function suggested that employees who did not perceive short-term benefits or long-term health benefits of exercise and did not feel susceptible to the

health risks associated with a lack of exercise were those employees who smoked, had higher percent bodyfat, and lower physical endurance (METS). This constellation of attitudes and beliefs was labeled as wellness rejection identity, as it is inversely related to health-enhancing behavior. The second function indicated that employees who perceived themselves as physically competent, susceptible to health risks associated with a lack of exercise, and valued the benefits from exercise, displayed a lower percent bodyfat and higher physical endurance (METS). This function was labeled Exercise Identity (Storer, Cychosz, & Anderson, 1997).

Anderson and Cychosz (1995) studied the relationship between two behavioral measures of exercise commitment and a measure of exercise identity among employees of a medical center. Instruments were mailed to 800 randomly selected employees and 351 members of the facility fitness center. Exercise identity was measured by the sum of two Likert-typed items, which asked the importance of exercise behavior for one's concept of self. The two behavioral measures were self-reported type of exercise and reported minutes of exercise per week. Results of a regression analysis showed that as minutes of exercise per week increased, level of exercise identity also increased ( $r=.58$ ). The R-square from the regression analysis indicated that almost 35% of the variance in exercise identity was explained. Authors suggest the possibility of a mutually reinforcing relationship between the role of exerciser and one's behavior as an exerciser. Recognition and reinforcement from others may in fact validate a person's identity as an exerciser, and in turn, a person feels pressure to seek identity-behavior congruency through future exercise related behavior.

To examine the idea of role identities relating to exercise behavior, Anderson and Cychosz (1994) developed a nine item instrument to measure the salience of exercise identity and the extent to which exercise was descriptive of one's concept of self. A sample of college students completed the scale, and also provided self-reported data concerning exercise behavior including number of weeks of exercising, frequency per week of exercise, minutes of exercise per session, and perceived intensity of exercise. Exercise identity scores showed a significant positive correlation with the four self-reported behavior indicators of exercise participation (number of weeks  $r=.68$ , frequency/week  $r=.49$ , minutes/session  $r=.39$ , and intensity  $r=.29$ ). Forty-seven percent of the variance in exercise identity was explained by these four behavioral indicators. Individual's scoring higher on the Exercise Identity Scale were more involved in exercise. Internal consistency of the Exercise Identity Scale was assessed using Cronbach's reliability coefficient ( $\alpha=.94$ ). A single factor was displayed with factor loadings from .91 to .62. The test, re-test reliability was assessed over a one week interval and displayed a value of .93. Therefore, the Exercise Identity Scale was found to be a reliable and valid measure of salience of the role of exerciser (Anderson & Cychosz, 1994).

Holmquist (1997) measured exercise identity and wellness rejection identity, along with five exercise behavior measures among 2000 randomly selected home-office employees and 2000 randomly selected field employees of a large financial corporation in the midwest. Behavioral measures included self-reported type of exercise, number of years of regular exercise, average number of minutes of exercise per session, average number of sessions per week, and the relative

intensity of the performed exercise. Findings displayed a significant relationship between exercise identity scores and the behavior measures of exercise, with average duration per exercise session the major predictor variable for exercise identity. Approximately 31% of the variance in exercise identity was explained by the five behavioral measures. This study provides support to Anderson and Cychoz's (1994) Exercise Identity Scale in that salience of exercise identity was predictive of maintenance or expansion of exercise behaviors.

In another attempt to study the relationship between exercise identity and exercise behavior, Anderson, Cychoz, and Franke (1998) examined the relationship between exercise identity with age of subject, three dimensions of exercise behavior, three physiological indicators of fitness, and total cholesterol/HDL ratio. Behavioral measures included minutes per week of exercise, number of weeks of exercise and perceived level of exertion. Physiological indicators of exercises included standardized muscle endurance, standardized percent body fat, and standardized VO<sub>2</sub>. Data were collected from 448 law enforcement personnel of the State of Iowa's Department of Public Safety. Findings showed that behavioral measures and physiological indicators were significantly associated with exercise identity. Behavioral measures had an independent  $R^2=.48$ , and physiological measures an independent  $R^2=.29$ . However, total cholesterol/HDL ratio was non-significant. These findings suggest that participation in physical activity and improvements in fitness may contribute to the development of role identity salience underlying maintenance and expansion of exercise.

Anderson, Cychosz and Franke (2000) continued to examine the relationship of exercise identity with measures of exercise behavior by using a community context. Data were collected from two samples of community residents via a telephone survey. The first sample consisted of worksites participating in the 5 + 5 Challenge health promotion program, with the second sample a control group of randomly selected community residents. The 5 + 5 Challenge program was a community-based intervention program which encourages participants to eat five or more servings of fruits and vegetables daily, as well as participate in 30 minutes of physical activity five days a week. Results were consistent with previous findings, in that a significant relationship between exercise behavior and exercise identity was found ( $R^2=.27$ ). Results also suggested that duration of participation and perceived intensity was significantly associated with one's exercise identity.

A four-week study of women enrolled in a beginner, aerobic exercise program was utilized to examine the relationship between exercise identity, Health Locus of Control and drop-out status. As was predicted, internal Health Locus of Control significantly increased between the pre-test and post-test ( $t=6.3$ ,  $p=0.00$ ), as well as exercise identity ( $t=6.57$ ,  $p<0.00$ ). In addition, internal Health Locus of Control, combined with powerful others Health Locus of Control significantly predicted exercise identity scores at pre- and post-test ( $R^2 = .19$ ) (Lord, 2000).

Miller, Ogletree and Welshimer (2002) examined the relationship of level of physical activity and the length of time adherence to physical activity with physical activity identity (PAI) and physical activity self-efficacy (PASE). Data were collected from 409 employees at a midwestern university using four survey instruments, the

Physical Activity Assessment Tool, the Exercise Identity Scale/Physical Activity Identity Scale, the Physical Activity Self-Efficacy Scale and a demographic data sheet. Anderson and Cychosz's (1994) Exercise Identity Scale was modified to use the broader term "physical activity," rather than "exercise," therefore being referred to as Physical Activity Identity (PAI). Results indicated that PAI and PASE were significantly associated with level of physical activity. Respondents who reported that they were engaged in more vigorous activity scored higher on PAI and PASE. These data suggest that one's physical activity level may have greater importance on predicting physical activity identity and physical activity self-efficacy than length of time of adherence to physical activity. "Because behaviors, identity and self-efficacy may reinforce each other in a reciprocal manner, more vigorous activity could result in greater identification with and self-efficacy for physical activity, thus increasing the likelihood of adhering to physical activity program." These findings are consistent with studies by Anderson, Cychosz and Franke (1998, 2000) in which behavioral measures were statistically significant predictors of exercise identity. Therefore, if one has a strong identity for being a physically active person, one may thus be motivated to engage in behaviors consistent with that identity in order to maintain identity-behavior congruency. These behaviors may then reinforce and go on to strengthen the role identity.

Cardinal and Cardinal (1997) examined the relationship between exercise behavior and exercise identity utilizing a prospective research design. Participants in the experimental group attended aerobic exercise classes two days per week for one hour per session. Participants in the control group attended a non-exercise,

health education course. Exercise behavior was assessed using Godin and Shephard's (1995) self-report "Weekly Leisure Time Exercise Questionnaire." Exercise Identity was measured using Anderson and Cychosz's (1994) nine-item "Exercise Identity Scale." Results showed that over a fourteen week period participants in the experimental group increased both exercise behavior (M=22.3 to 58.4 METs) and exercise identity (M=28.0 to 33.9). However, those in the control group showed a decrease in exercise behavior (M=37.7 to 30.5) while exercise identity remained the same (M=31.5 to 32.9). They also found that exercise identity scores at weeks one and seven were significant predictors of exercise involvement through week fourteen (correlations ranging from .48 to .78).

Strachan, Brawley, Woodgate, and Tse (2005) examined the role of self-identity in regard to the relationship between self-regulation of exercise and actual maintenance behavior in a group of middle aged distance runners. Initially, runners completed a questionnaire. They were then contacted four weeks later and asked about their running behavior over the past week. Participants completed and answered questions related to self-regulatory efficacy, task self efficacy, self-identity and running behavior. The athletic identity scale was used to measure self-identity and the physical activity readiness questionnaire was used to measure running behavior. Social cognitions as a function of self-identity were examined. Results showed that individuals who identified most strongly with being runners (M=5.10) had greater confidence in task ( $F=11.65, p<.001$ ) and self-regulatory skills ( $F=5.18, p<.03$ ). In addition, high identity individuals reported more frequent ( $F=12.38,$

$p < .001$ ) and longer duration ( $F = 8.77$ ,  $p < .005$ ) bouts of vigorous exercise than lower identity ( $M = 3.01$ ) runners.

The relationship between exercise identity and physical activity was examined among a sample of high school students. Students completed Anderson and Cychoz's (1994) Exercise Identity Scale as well as the Previous Day Physical Activity Recall. Results demonstrated a positive relationship between exercise identity and physical activity ( $r = .36$ ,  $R^2 = 13.4\%$ ) (Soukup and Clayton, 2008).

Gray, Soukup, & Sherald (2007) used a sample of undergraduate university women to examine the influence of exercise identity on physical fitness. Women enrolled in a health course completed the Exercise Identity Scale as well as a fitness profile (e.g. heart rate, blood pressure, body fat). Results of a regression analysis suggested a significant relationship existed between exercise identity and physical fitness ( $R^2 = 0.69$ ,  $F = 5.973$ ,  $p < 0.05$ ).

Construct validity of the Exercise Identity Scale was examined in a sample of Greek adults (18-64 years). Three hundred twenty four adults were approached within fitness centers, while 323 outside fitness centers. In both samples of adults, exercise identity score was positively correlated with attitude toward exercise ( $r = .47$ ,  $r = .72$ ) self-efficacy ( $r = .38$ ,  $r = .58$ ) and intention for continued exercise ( $r = .39$ ,  $r = .67$ ), as well as exercise enjoyment in the fitness center sample ( $r = .28$ ). This suggests that level of exercise identity helps explain why individuals participate and adhere to exercise. In addition, exercise identity was more strongly correlated with strenuous ( $r = .59$ ) and moderate exercise behavior ( $r = .47$ ) than mild behavior ( $r = .18$ ) in the sample outside fitness centers. Overall, the exercise identity scale successfully

measures the construct of exercise identity in a sample of Greek adults (Vlachopoulos, Kaperoni, Moustake, & Anderson, 2008).

Strachan and Brawley (2008) examined the link between identity salience and exercise behavior among 165 volunteer exercisers using a challenge vignette. Initially, exercise identity was measured using Anderson and Cychosz's (1994) Exercise Identity Scale. In addition, identity salience was measured, as well as past physical activity behavior. Participants were then presented with a challenge vignette in which they were told to imagine the past three weeks had been busier than usual, resulting in them being much less active than usual. This schedule was going to continue for the next three weeks. Following exposure to the challenge vignette, affect, self-regulatory self-efficacy, exercise intentions and self-regulatory strategies were measured. A tertile split was used to select the highest ( $M=6.63$ ) and lowest ( $M=3.99$ ) exercise identity groups. Results from the identity salience measure showed high identity individuals ranked exercise among the three most salient identities and the low group ranked exercise in the three least salient. Results demonstrated that people in the high identity group had higher negative affect ( $F=7.22$ ,  $p<.008$ ) and lower positive affect ( $F=7.96$ ,  $p<.006$ ) when faced with the challenge vignette, indicating reduced levels of exercise. In addition, higher identity individuals intended to regulate future behavior in an identity consistent manner. They intended to exercise more in the next busy three weeks ( $F=26.65$ ,  $p<.001$ ), had stronger intentions to use self-regulatory strategies to accomplish this ( $F=12.84$ ,  $p<.001$ ), and held stronger beliefs in their ability to use self-regulatory strategies to

accomplish this than the low identity individuals ( $F=39.78$ ,  $p<.001$ ). Thus, indicating a higher motivation to maintain identity-behavior congruency.

Overall, individuals with higher identity strength were more likely to seek identity-behavior congruence. Stronger exercise identities were associated with reactions that may have motivated individuals to plan to self-regulate in order to resolve identity-behavioral incongruence. Lastly, these identities were salient relative to other commonly held identities. These results suggest that individuals with higher identity strength are more likely to seek out identity congruent behavior when faced with an identity incongruent situation.

Strachan, Brawley, Spink, and Jung (2009) examined exercise identity, behavior, exercise identity-behavior consistency and affect in a sample of students from university academic and exercises classes. Participants completed Anderson and Cychosz's (1994) Exercise Identity Scale, reported recent exercise behavior, and the behavioral amounts needed to reach identity-behavior consistency. In addition, participant's reported affective responses to recent exercise behavior. Results suggested negative affect was positively related to exercise identity ( $R^2=.02$ ), but negatively related to percent consistency ( $R^2=.29$ ). However, positive affect was positively related to both exercise identity and percent consistency ( $R^2=.17$ ,  $.42$ ). These results support Identity Theory as individuals who reported low percent consistency experienced higher negative affect and lower positive affect, than individuals who reported high exercise consistency. In addition, the study provided support for a relationship between identity strength and perceptions of behavior consistency. Individuals with stronger exercise identity appeared to be

associated with more frequent exercise ( $R^2=.12$ ), as well as perceptions that the individual confirmed his/her identity meaning through recent exercise behavior ( $R^2=.03$ ).

Strachan, Brawley, Spink, and Glazebrook (2010) extended previous research of exercise identity in a population of older adults (mean age 79.6). They examined physical activity identity, physical activity, self-regulatory efficacy, and satisfaction with life. Once again, the exercise identity scale was modified to measure physical activity identity because daily living activities are more representative of this sample than exercise alone. Participants in the study took part in physical activity classes twice per week at a group living facility. Results from a questionnaire showed older adults with greater strength of physical activity identity reported higher self-efficacy beliefs and stronger intentions to engage in physical activity than participants with low identity strength. In addition, physical activity identity was positively related to specific values of physical activity behavior over the past week ( $F=7.77$ ,  $p<0.007$ ). Interestingly, older adults whose identity strength was the highest ( $M=5.58$ ) were the only participants who approached recommended level of physical activity (30 minutes of moderate intensity most days of the week). Findings were consistent with previous research in that older adults with higher physical activity identity reported greater frequency of past moderate to vigorous physical activity, suggesting they were engaging in more identity-congruent behavior.

Pascual, Garcia and Henriquez (2010) translated the Exercise Identity Scale into Spanish and utilized 316 university students to examine psychometric properties

of the translated scale. Students completed Anderson and Cychosz's (1994) Exercise Identity Scale, as well as documented exercise sessions per week, minutes per session, and perceived exertion. Results suggested that minutes of exercise per session was the strongest predictor of exercise identity, explaining 54.9% of the variance. However, sessions per week ( $t=5.5034$ ,  $p<.01$ ) and perceived exertion ( $t=7.442$ ,  $p<.01$ ) were also significant predictors of exercise identity.

The Exercise Identity Scale was utilized to examine exercise identity in a group of high school students who participated in physical education to a group of student-athletes who participated in athletics to fulfill physical education requirements. Results demonstrated that student-athletes reported higher exercise identity scores ( $M=45.4$ ) than students in physical education classes ( $M=32.9$ ) ( $t=5.96$ ,  $p=0.00$ ). It was also suggested that gaining knowledge about health behaviors in physical education did not result in improved fitness. This suggests that simply knowing health behavior benefits may not be enough to influence exercise identity. Moreover, it was suggested that since student-athletes had the opportunity to continue participation once graduation requirements were met, they may continue to have their exercise identities strengthened. However, physical education students did not have this opportunity, as once graduation requirements were met, they were no longer required to participate in physical education. This possible decrease in exercise behavior may have led to a decrease in exercise identity strength.

To expand upon previous research comparing individuals with stronger and weaker exercise identities, Strachan, Flora, Brawley and Spink (2011), examined cognitive and affective reactions to identity-incongruent behavior. University students

were randomized into one of two groups in which they were presented with a challenge vignette related to personal factors or situational factors. It was hypothesized that when faced with identity-incongruent behavior, individuals with stronger compared to weaker exercise identities would report greater negative affect, less positive affect, and greater self-regulatory efficacy. In addition, it was believed that individuals who were introduced to the challenge vignette where the lack of exercise was due to personal factors rather than situational factors would exhibit greater internal, unstable, personally controllable attributions.

Results were consistent with previous findings (Strachan, Brawley, Spink, & Young, 2009) in that individuals with stronger exercise identities ( $M=6.28$ ) experienced greater negative affect ( $F=33.75$ ,  $p<.001$ ) and decreased positive affect ( $F=6.61$ ,  $p<.05$ ) when faced with the challenge vignette. Moreover, individuals with stronger exercise identities demonstrated stronger self-regulatory efficacy ( $F=17.72$ ,  $p<.001$ ), meaning they had greater intentions to regulate identity-behavior incongruence. Lastly, participants presented with the personally-controllable, compared to the situational-controllable vignette, reported greater ( $M=6.08$  vs.  $M=4.86$ ) and lower external controllability ( $M=3.42$  vs.  $M=5.08$ ). However, despite the type of challenge vignette, participants with stronger exercise identities experienced stronger reactions than participants with weaker exercise identities.

### **Healthy-Eater Identity**

While much research has been conducted on the link between identity and exercise behavior, limited research has examined the link between identity and

healthy eating, as well as other health behaviors. Strachan and Brawley (2008) attempted to determine whether or not the identity behavior relationship found among exercisers held between healthy-eater identity and healthy eating behaviors. This study examined a sample of students from two universities and was conducted similar to the previous described study by Strachan and Brawley (2008). Initially, participants answered questions about healthy-eater identity, identity salience, perceptions of healthy eating and recent eating behavior. Healthy-eater identity was measured by modifying the exercise identity scale to be relevant to healthy eating. The scale displayed good internal consistency in the sample of university students (Cronbach's  $\alpha=.90$ ). Participants were then presented with the challenge vignette. Following exposure to the vignette, affect, self-regulatory efficacy, healthy eating intentions, and self-regulatory strategies were measured. High identity participants ranked healthy-eating among top four salient identities and the low identity participants ranked healthy-eating among the four least salient identities. Higher identity individuals demonstrated more negative and less positive affect to the challenge vignette and intended to regulate future behavior toward identity-behavior consistency. In addition, individuals with higher identity strength had stronger intentions for future healthy eating, higher self-regulatory efficacy and more strategies to manage eating.

Strachan and Brawley (2009) utilized 101 university students to determine if healthy-eater identity and self-efficacy would be related to aspects of healthy eating behavior. Results demonstrated that viewing oneself as a healthy-eater predicted healthy eating behavior ( $R^2=.11$ ). In addition, the prediction of healthy-eating

behavior was increased when self-efficacy beliefs were considered ( $R^2=.12$ ). These results suggest that while identities provide a standard for behavior, self-efficacy beliefs may show one's confidence in their ability to engage in behaviors necessary to attain identity-behavior congruence.

Four items from the Exercise Identity Scale were utilized to examine self-concept as a weight loser and weight maintainer (West, Gorin, Subak, Foster, et al., 2011). Women were randomized into a 6-month behavioral weight loss program or an education control. Women in the behavioral weight loss program were further randomized into a motivation-focused weight maintenance program or a skill-based maintenance program. Follow-up occurred at 12 and 18 months after introduction to the weight loss program (baseline). Participants in the skilled-based group focused on current lifestyle recommendations, refining behavioral skills (i.e. goal setting), and developing new skills (i.e. expanding exercise options). Participants in the motivation-focused maintenance intervention focused on increasing and sustaining motivation to use dietary, physical activity, and behavior skills. Two of the primary goals of the motivation-focused intervention were to cultivate an identity as a successful weight loser, and support autonomous self-regulation. Therefore, women in the motivation intervention group were encouraged to identify personal reasons and core personal values related to weight maintenance. In doing so, they may be able to identify ways the weight maintenance program might support or conflict with their values, in turn, supporting the congruence between personal values and weight loss behaviors.

At the end of 6-months, higher levels of autonomous reasons for self-regulation were reported in the motivation-focused group, whereas the skill-based group demonstrated decreases in autonomous motivations for self-regulation. This trend was consistent at 12 and 18 months, resulting in significant differences in autonomous self-regulation across maintenance groups.

Results also indicated that participants entered the study with weak self-concepts as exerciser or successful weight loser/maintainer. However, participants in the treatment groups indicated greater increases in self-identity than participants in the control group throughout the course of the study. Furthermore, participants who held stronger self concepts for being an exerciser demonstrated increased weight change, regardless of motivation group. One possible explanation for the lack of difference in self-concept between motivation groups could be that both groups were successful in achieving weight loss. Identity theory suggests that the more one engages in a behavior, the more it becomes central to the person's concept of self. Therefore, since participants in both motivational groups engaged in successful weight maintenance behaviors, as well as high levels of physical activity (200 min/week), it could be expected that individuals in both groups would experience changes in self-concept related to exerciser or weight-maintainer.

Another construct that has been examined to understand motivation and regulation of behavior across various domains is possible selves (Markus & Nurius, 1986). Hooker and Kaus (1994) extended this research to the health domain, and found that having a health related possible self was strongly linked to reported health behaviors. In addition, individuals may hold certain standards or goals related to

health behaviors. If a discrepancy is perceived between the standard and current behavior, one will engage in behaviors to narrow the discrepancy, or seek health-related possible self-behavior congruency (Hooker & Kaus, 1994). Therefore, Hooker and Kaus (1994) wanted to determine at what point during a lifespan health becomes a more salient concern. It was hypothesized that health-related possible selves become more salient in middle age. It was also suggested that people who have a health-related possible self would list self-regulatory processes of self-efficacy positively related to health behaviors.

Young and middle aged adults reported on their hoped-for and feared selves related to health. Middle-aged adults had significantly more health-related possible selves ( $X^2=20.3$ ,  $p<.0001$ ). In addition, both young and middle-aged adults who had a health-related possible self were more likely to have a feared self than hoped-for self ( $X^2=18.3$  and  $19.1$ ,  $p<.001$ , respectively). This suggests participants were more concerned with forming a negative image of a future health-related possible self. Therefore, having a health-related possible self, and possibly a stronger feared self, may be associated with engaging in future health behaviors. Moreover, qualitative results suggested that middle-age is the time period when adults begin to think more frequently about health-related goals and hold a higher standard for health related behavior (e.g. "Is there anything that I haven't already become that I would like to become.").

Hooker and Kaus (1994) also suggest examining standards in terms of possible selves can be linked with emotions. Therefore, acting, or not acting, in a way that is congruent with one's health-related possible self may carry positive or

negative affective value. If a person has a possible self related to health, engaging in behavior consistent with the possible self will result in positive affect. In turn, motivation to engage in future health-related behavior will increase (Leventhal & Hirschman, 1982; McAuley, 1991).

Waley and Schrider (2005) examined possible selves related to exercise behavior in a group of older adults. Participants completed a questionnaire related to possible selves, a functional fitness test, and a semistructured interview to examine self-perceptions and exercise behavior. The older adults in this study appeared to have well-developed possible selves related to their exercise behavior. Through the interviews, investigators were able to understand what motivated the individuals to continue their exercise program. One of the most important factors related to a continued exercise program was the encouragement and expertise perceived from the staff at the exercise facility. As the exercise instructor or staff person provided feedback to participants, their health-related possible selves may have been validated and reinforced, influencing one's future behavior. Moreover, participants reported perceiving positive health benefits motivated them to continue an exercise program. Though perceptions may not be accurate indicators of one's actual abilities, they influence and drive one's behavior. If a person perceives competence in health behaviors, they may be more motivated to change a current self or current behavior. It is important for previously sedentary individuals to perceive exercise as a vital part of their concept of self in order to maintain behavior, in turn, becoming a salient part of the individual's identity hierarchy.

All studies reported demonstrated significant associations between behavioral measures of exercise commitment and exercise identity, as well as healthy eating behavior and healthy-eater identity. Significant positive correlations between behavioral indicators of exercise and exercise identity have been found (Anderson and Cychosz, 1994, 1995), as well as positive associations between behavioral measures and physiological indicators associated with exercise identity (Anderson, Cychosz, and Franke, 1998). Moreover, individuals with high exercise and healthy-eating identities were found to be more motivated to plan to self-regulate and resolve behavioral incongruence (Strachan, 2008, 2009). Overall, results from each study suggest that individuals high in exercise identity or healthy-eater identity will seek identity-behavior congruence.

These findings suggest that exercise identity and healthy-eater identity may be important predictors of the maintenance and expansion of related behaviors. As one engages in behaviors associated with the role of exerciser and healthy-eater, and the identity is reinforced and validated, the likelihood of future behaviors associated with these health behaviors may increase. In turn, the health behaviors may become increasingly important to one's concept of self, and a predictor of future behavior.

## CHAPTER 3. METHODS

### Participants

Questionnaires were sent to 348 employees at a rural community hospital. Approximately 41% of employees responded to the initial questionnaire (n=144). Sixty-two percent of respondents (n=89) to the first questionnaire completed a follow-up questionnaire six months later. All respondents reported being white not of Hispanic origin. Due to a small number of male respondents (4%, n=6), males were dropped from the final analysis. The average age was 42 years with a range of 24 to 62 years. The average body mass index was 26.5 with a range of 18.9 to 41.1.

Employees were enrolled in an employee health promotion program, "I Choose Health," in which they were required to complete various lifestyle behavior components in order to receive full benefits. Each employee was required to document several health promotion activities over the course of a benefit year. Some of the activities included completing blood work, being tobacco free or completing a tobacco cessation program, having a yearly physician physical, and an annual dental appointment. Employees also completed an online Health Risk Appraisal (HRA) which asked about various components of wellness (e.g. diet, exercise, stress, personal safety). In addition, they were to attend a health management program which utilized biofeedback to help employees learn to manage stress. Lastly, an exercise log had to be kept which documented at least 120 exercise sessions (about 3 times per week). By completing all components, employees received 50% lower copays, \$500 less deductible, \$500 less out of

pocket, as well as half price massage and reduced fitness center membership cost (\$12/month). By completing each component, it was hoped that employees would become more aware of making healthy lifestyle choices which may eventually reduce health care costs for the employer.

### **Procedures**

This investigation utilized a panel design that comprised assessment on two occasions. The two waves of data collection were separated by at least 6 months. This procedure resulted in a response attrition of 51 participants. Thus, final sample size was 83, with a follow-up response rate of 62% of the respondents to the first wave of data collection.

A brief message providing a description explaining the study and asking for willingness to participate was placed in the hospital's weekly newsletter. One week later an initial paper questionnaire with an informed consent letter was distributed to all hospital employees via the hospital mail system in July 2010. Participants were asked to complete the initial questionnaire and return it through the free employee medical center mail system. Employees were asked to complete a second questionnaire six months after the initial questionnaire. The second questionnaire was delivered and returned utilizing similar procedures as the initial questionnaire.

To maintain anonymity, day of birth and first three letters of hometown were used to match instrument one to instrument two. Procedures were approved by the

hospital fitness center supervisor and hospital administration, as well as the Iowa State University Human Subjects Committee.

## **Instruments**

### **Exercise Identity**

Exercise identity was measured using Anderson and Cychosz's (1994) Exercise Identity Scale (EIS), which measures the extent that exercise is descriptive of one's concept of self. The nine items were ranked on a Likert-type scale ranging from (1) "strongly disagree" to (7) "strongly agree." The items include statements such as: (a) "When I describe myself to other people, I usually include my involvement in physical exercise," (b) "Physical exercise is a central factor to my self-concept," (c) "For me, being an exerciser means more than just exercising." Internal consistency has been assessed using Cronbach's reliability coefficient in numerous studies and has usually been found to display alpha-values greater than .90. A single factor was displayed with factor loadings ranging from .62 to .91. One-week test retest reliability displayed a value of .93 (Anderson and Cychosz, 1994). In addition, a sample of ultramarathoners demonstrated internal consistency ( $\alpha=0.84$ ) (Lantz, Rhea and Mesnier, 2004), as well as adult volunteers ( $\alpha=.91$ ) (Stachan & Brawley, 2008), university students ( $\alpha=.92, .88$ ), and older adults ( $\alpha=.90$ ) (Strachan, et al, 2009, 2011, 2010). Moreover, a sample of Spanish university students demonstrated satisfactory levels of internal consistency ( $\alpha=.96$ ) and a test-retest reliability after one week period ( $\alpha=.90$ ) (Pascual, et al., 2010). The alpha coefficient for pre and post-

test respondents on the Exercise Identity Scale was .95 (see Table 1), with initial item-total correlations ranging from .68 to .86 and post-test item-total correlations ranging from .71 to .91. In addition, strong internal consistency of the scale was demonstrated ( $\alpha=.94$ ), as well as test-retest reliability over a six-week period ( $\alpha=.99$ ) (Vlachopoulos, et al., 2008).

Table 1. Item characteristics of the Exercise Identity Scale

Item	Preprogram $r^{it}$	Postprogram $r^{it}$
I consider myself an exerciser.	.80	.83
When I describe myself to others, I usually include my involvement in exercise.	.83	.83
I have numerous goals related to exercising.	.68	.71
Physical exercise is a central factor to my self-concept.	.86	.91
I need to exercise to feel good about myself.	.78	.77
Others see me as someone who exercises regularly.	.85	.87
For me, being an exerciser means more than just exercising.	.76	.84
I would feel a real loss if I were forced to give up exercising.	.83	.84
Exercising is something I think about often.	.76	.70
Alpha coefficient	.95	.95

### **Healthy-Eater Identity**

Healthy-eater identity was measured by modifying the nine items in the Exercise Identity Scale (Strachan & Brawley, 2009). In each statement the word exerciser was changed to healthy-eater, such as (a) "When I describe myself to other people, I usually include my involvement in healthy eating," (b) "Eating a healthy diet is a central factor to my self-concept," (c) "For me, being a healthy-eater means more than just eating healthy." This scale has demonstrated high internal consistency with Cronbach's  $\alpha$  of .90 (Strachan & Brawley, 2008; Strachan & Brawley, 2009). The alpha coefficient for initial respondents on the Healthy-Eater Identity Scale was .89 (see Table 2) with item-total correlations ranging from .53 to .81. For post-test respondents, the alpha coefficient was .89 and item-total correlations ranged from .35 to .78. Participants were also asked to report the average number of servings they consumed of various food groups (e.g. fruits and vegetables, red meat, dairy products) per day.

### **Exercise Behavior**

The Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shepard, 1985) was used to determine the amount of strenuous (e.g. running, vigorous swimming), moderate (e.g. volleyball, tennis), and mild (e.g. yoga, easy walking) exercise engaged in during a typical seven day period.

The questions were scored by multiplying the number of weekly sessions of physical activity by the accepted weighted (MET-based) scoring method for this tool: 9 for strenuous exercise, 5 for moderate exercise, and 3 for light exercise. The

Table 2. Item characteristics of the Healthy-Eater Identity Scale

Item	Preprogram $r^{it}$	Postprogram $r^{it}$
I consider myself a healthy-eater.	.53	.35
When I describe myself to others, I usually include my involvement in healthy-eating.	.69	.60
I have numerous goals related to healthy-eating.	.56	.67
Eating a healthy diet is a central factor to my self-concept.	.81	.78
I need to eat healthy to feel good about myself.	.69	.73
Others see me as someone who eats a healthy diet regularly.	.73	.73
For me being a healthy eater means more than just eating healthy.	.63	.72
I would feel a real loss if I were forced to give up eating healthy.	.70	.65
Healthy eating is something I think about often.	.58	.63
Alpha coefficient	.89	.89

scores were summed to obtain a total leisure time activity score in physical activity units. In addition, the GLTEQ measured how often (often, rarely, never) regular physical activity was engaged in long enough to work up a sweat. Test-retest reliability scores of .74 and .81 have been demonstrated in a healthy adult sample (Godin & Shepard, 1985). This measure was validated in adults by examining correlations between the questionnaire and percentile VO<sub>2</sub>max ( $r=0.24$ ,  $p<0.001$ )

and percentile body fat ( $r=0.13$ ,  $p<0.01$ ). The GLTEQ has been widely used to study a variety of populations (Wilson & Muon, 2008; Strachan, et al, 2009; Strachan & Brawley, 2009).

### **Healthy Eating Behavior**

Healthy eating behavior was measured by recalled recent positive and negative eating behaviors. Positive eating behaviors were servings of fruit and vegetables, whole grain breads and cereal, and low fat dairy per day. Negative eating behaviors were servings of snack foods (chips, cookies, candy, etc.) per day, servings of red meat per week, and fast food meals per week. Previous studies examining healthy-eater identity and healthy eating behavior have used these categories to measure healthy eating behavior (Strachan & Brawley, 2008, 2009).

### **Affect**

Affect was measured using Weiner's (1986) affect scale (Strachan & Brawley, 2009). Participants ranked their feelings about the frequency of their exercise and healthy eating over the past four weeks with the exercise or healthy eating expectations associated with the personal view of themselves as exercisers or healthy-eaters. The eight items were ranked on a scale ranging from (1) "don't feel at all" to (7) "feel very much." Three items measured positive affect and five items measured negative affect. Internal consistency has been assessed using Cronbach's reliability coefficient in a sample of community members and university students (Cronbach's  $\alpha$  for positive=0.77 and negative=0.83) (Strachan and Brawley, 2008), as well as

individuals from university academic and exercise classes ( $\alpha=.94$  for both positive and negative affect) (Strachan and Brawley, 2009). For this sample, the initial alpha coefficient for exercise positive affect was .89 and .92 for negative affect, while the post-test coefficient for positive affect was .96 and .93 for negative affect (Table 3).

Table 3. Item characteristics of exercise positive and negative affect

Item	Preprogram $r^{it}$		Postprogram $r^{it}$	
	+ Affect	-Affect	+ Affect	-Affect
Happy about my exercise over the past 4 weeks	.83		.92	
Ashamed about my exercise over the past 4 weeks		.72		.74
Pleased about my exercise over the past 4 weeks	.77		.92	
Depressed about my exercise over the past 4 weeks		.85		.86
Guilty about my exercise over the past 4 weeks		.85		.85
Proud about my exercise over the past 4 weeks	.74		.92	
Upset about my exercise over the past 4 weeks		.81		.80
Disappointed about my exercise over the past 4 weeks		.80		.79
Alpha coefficient	.89	.92	.96	.93

Internal consistency of healthy-eater positive and negative affect has been assessed using Cronbach's reliability coefficient in a sample of university students (Cronbach's  $\alpha$  for positive and negative=.87) (Strachan and Brawley, 2008). For this sample, the initial alpha coefficient for healthy-eater positive affect was .93 and .96 for negative affect. The post-test coefficient was .94 for both positive and negative affect (Table 4).

Table 4. Item characteristics of healthy-eater positive and negative affect

Item	Preprogram $r^{it}$		Postprogram $r^{it}$	
	+ Affect	-Affect	+ Affect	-Affect
Happy about my diet over the past 4 weeks	.86		.90	
Ashamed about my diet over the past 4 weeks		.87		.82
Pleased about my diet over the past 4 weeks	.91		.91	
Depressed about my diet over the past 4 weeks		.87		.82
Guilty about my diet over the past 4 weeks		.89		.83
Proud about my diet over the past 4 weeks	.84		.82	
Upset about my diet over the past 4 weeks		.90		.85
Disappointed about my diet over the past 4 weeks		.92		.87
Alpha coefficient	.93	.96	.94	.94

Various demographic variables were self-reported such as gender, date of birth, marital status, education, and race/ethnicity. Body mass index (BMI) was calculated using self-report height and weight. In addition, participants were asked about their tobacco use.

## CHAPTER 4. RESULTS

The present investigation utilized a panel design that comprised the assessment of several variables over time. As indicated in the methods, the two waves of data collection were separated by 6 months. This procedure resulted in an attrition rate of 49 participants or 37%. As a result, most of the statistical analyses were based upon a sample size of 83.

### Exercise Identity

At the time of the first survey (July, 2010) only 21.3% of all respondents indicated that they were not exercising regularly, at least three days per week. Data show that 22.7% of the participants that did not respond to the second survey (dropouts) and 20.5% of the participants that responded to both surveys (retained) were not exercising at the time of the first survey. So, initial exercise status does not appear to be related to follow-up response. It has been reported that 66% of adults in the United States do not engage in the recommended amount of physical activity. Therefore, these data suggest that exercise participation among respondents was relatively high to start with compared to the USA population (CDC, 2009).

Initially, a MANOVA was performed comparing the individuals which did not respond to the second survey to the individual's that completed both surveys with the dependent variables of initial exercise identity, leisure time physical activity score, positive affect, negative affect, weight and age. The main effect was not statistically significant ( $F(5, 120)=.909, p=0.492$ ). This suggests that the respondents to the second survey were similar for these variables as the individuals that did not

respond to the second survey. Final analyses were conducted using the 83 respondents who completed both pre- and post-surveys.

### **Correlation Analysis – Exercise Variables**

Correlations between the variables used in the analyses of exercise behavior are presented in Tables 5 and 6. Many of these correlations could be considered large (.50) according to Cohen's guidelines for interpreting correlations in the behavioral sciences (Cohen, 1988). However, correlations between exercise identity and negative affect and exercise behavior and negative affect were small.

Correlations among measures were computed at each time point to examine the relationships among the variables. As can be seen in Table 5, all pre-test correlations were significant. Exercise identity correlated most strongly with exercise behavior ( $r = 0.628$ ,  $p < 0.001$ ), followed by positive affect ( $r = 0.498$ ,  $p < 0.001$ ). Correlations were low between exercise identity and negative affect ( $r = -0.268$ ,  $p < 0.05$ ) and between exercise behavior and negative affect ( $r = 0.252$ ,  $p < 0.05$ ). Similar relationships were found when the relationships were examined at post-test (Table 6). As was seen with pre-test correlations, exercise identity correlated most strongly with exercise behavior and positive affect ( $r = 0.505$ ,  $p < 0.001$ ). Once again, the correlation between exercise identity and negative affect was small ( $r = .188$ ).

Respondents were divided into four groups based upon their July and January exercise behavior scores reflected in the GLTEQ (1985). Godin (2011) suggests a person whose score is greater than or equal to 24 units (i.e. about 14

Table 5. Correlation matrix for exercise pre-test variables

	Exercise Identity	GLTEQ Units	Positive Affect	Negative Affect
Exercise Identity	1.00			
GLTEQ Units	.628**	1.00		
Positive Affect	.498**	.495**	1.00	
Negative Affect	-.268*	-.252*	-.563**	1.00

\*\* p < .01; \*p < .05

Table 6. Correlation matrix for exercise post-test variables

	Exercise Identity	GLTEQ Units	Positive Affect	Negative Affect
Exercise Identity	1.00			
GLTEQ Units	.505**	1.00		
Positive Affect	.505**	.433**	1.00	
Negative Affect	-.188	-.439*	-.628**	1.00

\*\* p < .01; \*p < .05

kcal/kg/week) is considered active and may receive substantial health benefits. A score of 14-23 units (i.e. between 7 and 13.9 kcal/kg/week) is considered moderately active and carries with it some health benefits. However, individuals who score less than 14 units (i.e. less than 7 kcal/kg/week) are insufficiently active and receive less substantial or low health benefits from their leisure time physical activity score. Therefore, respondents were placed into a moderate-vigorously active group (14 and greater), or an insufficiently active group (less than 14) at the time of the first survey (July) and at follow-up 6 months later (January). Participants were further divided into four groups based on physical activity scores at both time points (Table

7): no exercise/exercise (NoEx-Ex), exercise/exercise (Ex-Ex), no exercise/no exercise (NoEx-NoEx), exercise/no exercise (Ex-NoEx). Of the participants who were exercising at 14 units or higher in July (n=73), 82% continued to exercise (n=60) while 18% stopped exercising by January (n=13). Moreover, of the individuals who were not exercising at 14 units or above in July (n=10), 60% started to exercise at 14 units or above (n=6) while 40% continued to not exercise at that level by January (n=4). Data showed that the decrease in exercise for participants in the Ex-NoEx group was not related to any reported medical condition.

Table 7. Number of participants in each exercise group

Group	July	January	Age		BMI		n	%
			July	Jan	July	Jan		
NoEx-Ex	No Exercise	Exercise	49±11	47±11	31.24 ±7.03	28.52 ±5.30	6	7
Ex-Ex	Exercise	Exercise	41±12	41±12	25.38 ±4.22	25.43 ±5.56	60	72
NoEx-NoEx	No Exercise	No Exercise	42±7	42±7	25.29 ±4.40	25.20 ±4.27	4	5
Ex-NoEx	Exercise	No Exercise	43±11	44±11	29.10 ±5.72	29.81 ±6.11	13	16
Total			42±11	42±11	26.46 ±5.05	26.33 ±5.75	83	100

### Multivariate Analysis of Variance – Exercise Variables

Difference scores were calculated for dependent variables of exercise behavior over the past 7 days (leisure time physical activity score), exercise identity,

positive affect and negative affect by subtracting pre-test scores from post-test scores. Mean differences are displayed in Table 8.

Table 8. Mean differences for each of the dependent variables by exercise group

Group	n	Exercise Identity	GLTEQ Units	Positive Affect	Negative Affect
1 (NEx-Ex)	6	0.835 ±.83	15.67 ±14.14	1.055 ±1.94	-0.333 ±2.57
2 (Ex-EX)	60	0.052 ±1.00	-4.95 ±16.92	-0.355 ±1.71	0.400 ±1.42
3 (NEx-NEx)	4	-0.335 ±1.07	-0.25 ±4.50	0.165 ±.69	-0.900 ±.62
4 (E-NEx)	13	-0.094 ±.77	-17.92 ±8.21	-1.668 ±1.43	1.307 ±2.24
Total	83	0.067 ±.98	-5.27 ±16.96	-0.433 ±1.75	0.426 ±1.67

A MANOVA was then performed to compare each of the four exercise groups with each of the four dependent variable differences. With the use of Pillai's Trace criterion, results showed that the combined dependent variables were significantly related with the independent variable of exercise group ( $F(5,72)=2.45$ ,  $p=0.005$ ).

As should be expected, univariate tests indicated that the change in reported 7 day exercise behavior (difference) was significantly related to exercise group ( $F(3,80)=6.77$ ,  $p=0.000$ ) and the association was quite large ( $\eta^2=0.20$ ). The difference in positive affect ( $F(3,80)=4.25$ ,  $p=0.008$ ) was also significantly related to exercise group and the association was more moderate ( $\eta^2=0.14$ ). Exercise identity ( $F(3,80)=1.62$ ,  $p=0.190$ ) and negative affect approached significance ( $F(3,80)=2.55$ ,

$p = 0.062$ ) and the size of the associations were less ( $\eta^2=0.06$ ,  $\eta^2=0.09$ , respectively).

Examination of the mean differences (Table 8) and the pre-test and post-test means (Table 9) may provide some understanding of what may have transpired over the six to twelve month time frame. Participants who increased their exercise level (NoEx-Ex) showed a large mean increase in exercise behavior, almost 16 units. As a group, they also showed a mean increase of about one point for exercise identity and positive affect.

Respondents who were exercising at the time of both surveys (Ex-Ex) displayed the highest mean value for exercise behavior at both times (40 and 35

Table 9. Mean values for each of the dependent variables at time 1 (July) and time 2 (January) by exercise group

Group	n	Exercise Identity		GLTEQ Units		Positive Affect		Negative Affect	
		July	Jan	July	Jan	July	Jan	July	Jan
1(NEx-Ex)	6	2.87 ±1.17	3.71 ±1.29	7.50 ±4.14	23.17 ±10.36	1.95 ±1.06	3.00 ±1.84	3.50 ±1.90	3.17 ±1.34
2 (Ex-Ex)	60	4.62 ±1.35	4.68 ±1.49	40.20 ±19.10	35.25 ±17.01	4.37 ±1.42	4.02 ±1.55	2.47 ±1.43	2.87 ±1.49
3 (NEx-NEx)	4	2.86 ±.83	2.53 ±1.25	4.25 ±5.32	4.00 ±5.23	1.42 ±.50	1.58 ±.69	5.85 ±1.45	4.95 ±1.95
4 (E-NEx)	13	2.65 ±.98	2.56 ±.77	26.00 ±8.29	8.08 ±3.93	3.57 ±1.26	1.90 ±1.01	3.03 ±1.87	4.34 ±1.98
Total	83	4.10 ±1.51	4.17 ±1.61	33.88 ±20.18	28.61 ±18.73	3.92 ±1.59	3.49 ±1.70	2.80 ±1.69	3.22 ±1.69

units, respectively), though the standard deviations were large (19.10, 17.01). These respondents showed the highest mean values for exercise identity and positive affect both times, while mean values for negative affect were the lowest. The mean difference for leisure time physical activity decreased about 5 units, while the mean difference for exercise identity was very small. In addition, the mean differences showed a small decrease in positive affect and a small increase in negative affect.

Individuals who were not exercising above 14 units in July and January (NoEx-NoEx) displayed the lowest exercise behavior mean values both times, only about four units. Correspondingly, their exercise identity and positive affect were low both times while mean values for negative affect were the highest both times (5.85, 4.95, respectively).

The respondents who became less active during the study (Ex-NoEx) displayed a large decrease in mean value for exercise behavior, almost 18 units. Interestingly, their mean value for exercise identity was low to begin with in July (2.65) and it remained low in January (2.56). Also, for these respondents mean value for positive affect decreased the most (1.67) while the mean value for negative affect increased the most (1.31).

Individuals who decreased their exercise level by follow-up showed the greatest changes in both positive affect (-1.67) and negative affect (1.31). However, participants who increased exercise level by follow-up reported the greatest increase in mean value for positive affect (1.05).

The previous results reflect group means but there could be individual variability in the relationships within each group. This was examined using

correlation analyses. The overall correlation between change in exercise behavior and change in identity was 0.20,  $p=0.06$ . Remembering that cell sizes were small for three of the four groups, Figures 1-4 show scatter plots of change in exercise identity by change in leisure time physical activity score for respondents in each of the four exercise groups. As was seen with the mean values for these variables, respondents who increased their exercise level over the course of the study (NoEx-Ex) generally showed an increase in exercise identity and exercise behavior. The correlation among change variables was 0.52,  $p=0.29$  (Figure 1).

Results in Figure 2 suggest the majority of respondents exercising at the time of the initial survey and follow-up (Ex-Ex) had little change in exercise identity despite some modest fluctuations in exercise behavior. The correlation among

Figure 1. Plot of change in exercise identity by change in physical activity score for respondents in the NoEx-Ex group ( $r=0.52$ ,  $p=0.29$ )

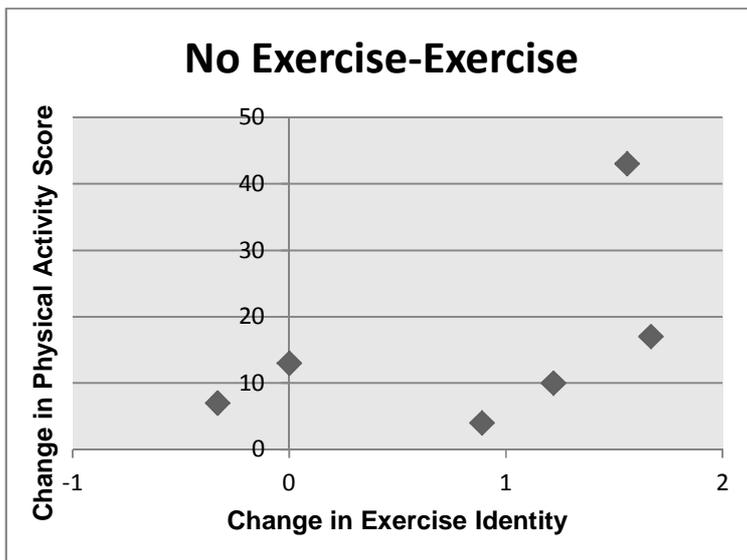


Figure 2. Plot of change in exercise identity by change in physical activity score for respondents in the Ex-Ex group ( $r=0.14$ ,  $p=0.30$ )

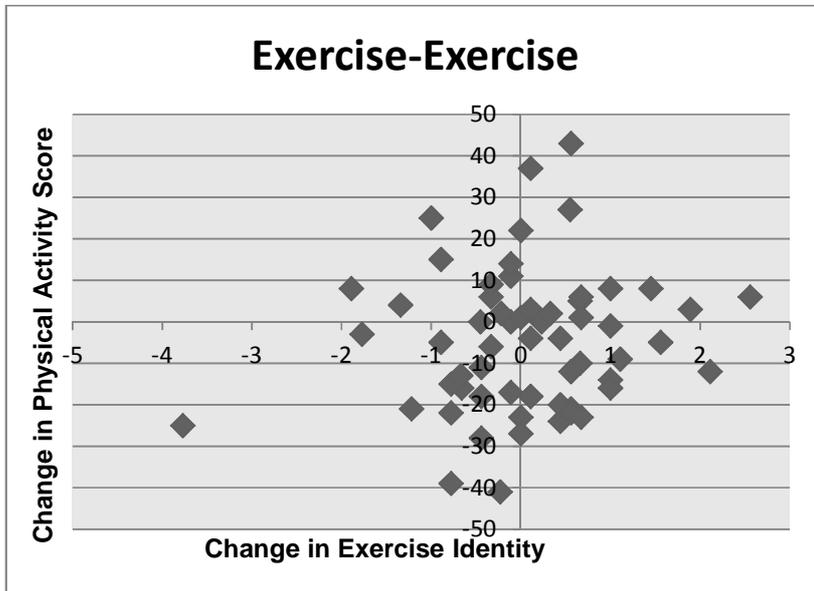
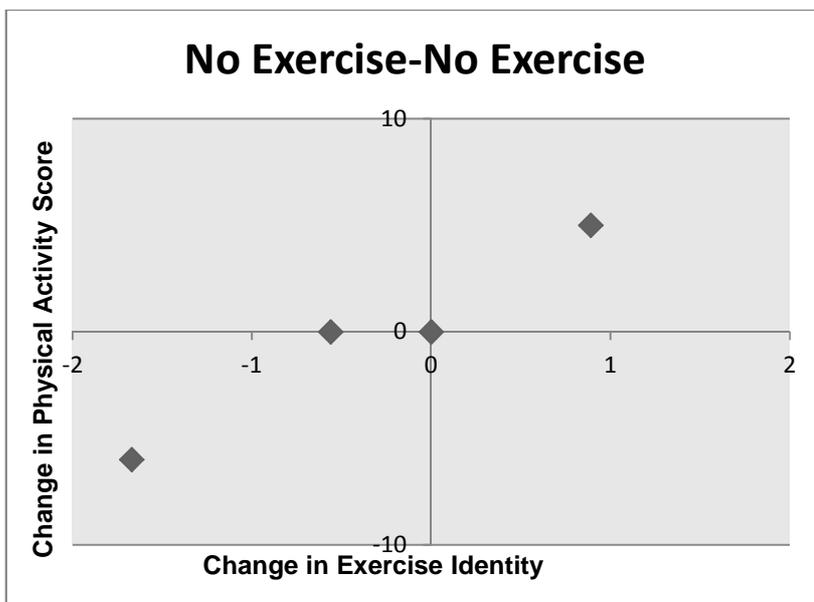
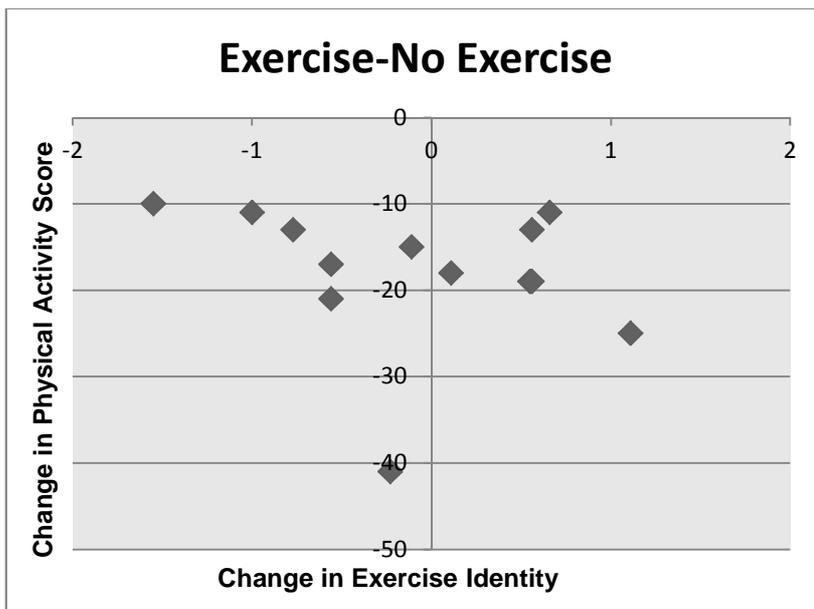


Figure 3. Plot of change in exercise identity by change in physical activity score for respondents in the NoEx-NoEx group ( $r=0.98$ ,  $p=0.02$ )



measures was low ( $r=0.14$ ,  $p=0.30$ ) showing little relationship between these changes. Results in Figure 3 show that exercise identity and behavior remained stable for respondents who remained inactive ( $r=0.98$ ,  $p=0.02$ ). Results in Figure 4 show that exercise identity remained stable for respondents who decreased exercise behavior over six-months despite becoming less active over the course of the study. The low correlation between changes ( $r=-0.24$ ,  $p=.42$ ) show that the change in identity was not related to their changed behavior.

Figure 4. Plot of change in exercise identity by change in physical activity score for respondents in the Ex-NoEx group ( $r=-.24$ ,  $p=0.42$ )



### Healthy-Eater Identity

A multivariate analysis of variance was performed comparing respondents which did not respond to the second survey to individuals that completed both surveys with the dependent variables of healthy-eater identity, servings of fruits and

vegetables per day, and healthy-eater positive and negative affect. The main effect was not statistically significant ( $F(4, 115)=0.319, p=0.87$ ). This suggests that the respondents to the second survey were similar for these variables as the respondents that did not respond to the second survey.

### Correlation Analysis – Healthy Eating Variables

The correlations between the variables used in the analyses of healthy-eating behavior are presented in Tables 10 and 11. Many of these correlations could be considered moderate (0.30) according to Cohen's guidelines for interpreting correlations in the behavioral sciences (Cohen, 1988). However, as previously seen with exercise identity and exercise behavior, correlations between healthy-eater identity and negative affect and healthy eating behavior and negative affect were low.

Table 10. Correlation matrix for healthy-eater pre-test variables

	Healthy-Eater Identity	Fruit/Veg Per Day	Positive Affect	Negative Affect
Healthy-Eater Identity	1.00			
Fruit/Veg Per Day	.290**	1.00		
Positive Affect	.345**	.288**	1.00	
Negative Affect	-.061	-.186	-.629**	1.00

\*\*  $p < .01$

Table 11. Correlation matrix for healthy-eater post-test variables

	Healthy-Eater Identity	Fruit/Veg Per Day	Positive Affect	Negative Affect
Healthy-Eater Identity	1.00			
Fruit/Veg Per Day	.271**	1.00		
Positive Affect	.376**	.357**	1.00	
Negative Affect	.036	-.164	-.584**	1.00

\*\* p < .01

Perception of healthy eating may be one of the factors that influences an individual's eating behavior. Therefore, review was conducted to try to better understand adults perceptions of healthy eating behaviors. Respondents reported consumption of fruits and vegetables as one of the most important factors related to healthy eating. Limiting intake of foods of low nutritional value was also recognized as an important factor related to healthy eating (Paquette, 2005). However, Strachan and Brawley (2009) suggested healthy-eater identity was a stronger predictor of fruit and vegetable consumption than consumption of foods of low nutritional value. Moreover, individuals with more salient healthy-eater identities were more likely to engage in fruit and vegetable consumption than avoidance of foods of low nutritional value. Therefore, respondents were divided into four groups based on their reported fruit and vegetable consumption (Table 12). Respondents who reported consumption of less than three servings of fruits and vegetables a day at pre-test and 3 or more servings at follow-up were placed into Group 1 (No-FV). Respondents who consumed three or more servings at both time points were placed into Group 2 (FV-FV), and those who consumed less than three servings at the time of both

surveys were put into Group 3 (No-No). Finally, respondents who consumed three or more servings at the time of the initial survey and at follow-up consumed less than three were placed into Group 4 (FV-No).

Of the participants who were eating three or more servings of fruits and vegetables in July (n=50), 66% continued eating more than three servings (n=33) while 34% decreased fruit and vegetable consumption by January (n=17). Moreover, of the individuals who were not eating three or more servings of fruits and vegetables in July (n=32), 28% started to eat more servings (n=9) while 72% continued to not consume more than three by January (n=17) (Table 12). Clearly, the trend was toward consistent eating behavior.

Table 12. Number of participants in each healthy eating group

Group	July	January	Age		BMI		n	%
			July	Jan	July	Jan		
No-FV	Less than 3	3 or more	39±3	40±11	27.00 ±4.89	27.20 ±5.06	9	11
FV-FV	3 or more	3 or more	44±12	44±12	25.62 ±4.65	26.22 ±4.82	33	40
No-No	Less than 3	Less than 3	43±10	44±10	26.37 ±4.73	26.87 ±5.05	23	28
FV-No	3 or more	Less than 3	38±12	37±10	28.05 ±6.42	25.48 ±8.61	17	21
Total			42±11	42±11	26.48 ±5.08	26.36 ±5.78	82	100

### Multivariate Analysis of Variance – Healthy Eating Variables

Difference scores were calculated for dependent variables of average servings of fruit and vegetables per day, healthy-eater identity, positive affect and negative affect by subtracting pre-test scores from post-test scores. Mean differences are displayed in Table 13.

A MANOVA was then performed to compare each of the four eating behavior groups for each of the dependent variable differences. With the use of Pillai's Trace criterion, results showed that the combined dependent variables were not significantly related with the independent variable of healthy-eater group ( $F(3,73)=0.496, p=0.88$ ).

Table 13. Mean differences for each of the dependent variables by healthy eating group

Group	N	Healthy-Eater ID	F/V per Day	Positive Affect	Negative Affect
FV-No	9	0.667 ±.73	1.55 ±.73	0.297 ±1.40	-0.022 ±1.65
FV-FV	33	0.115 ±1.31	-0.212 ±.82	-0.273 ±1.04	0.334 ±1.31
No-No	23	0.100 ±.76	0.044 ±.71	-0.362 ±1.93	0.201 ±1.80
No-FV	17	-0.099 ±1.04	-1.83 ±.73	-0.778 ±1.60	0.463 ±2.20
Total	82	0.127 ±.107	-0.28 ±1.21	-0.329 ±1.49	0.284 ±1.67

Examination of the means (Table 13) and mean differences (Table 14) of the three dependent variables illustrate changes in the predicted direction, though changes are small. Respondents in Group 1 (FV-No) showed an increase in mean fruit and vegetable consumption. In addition, they reported a slight increase in healthy-eater identity. As could be expected, respondents in Group 2 (FV-FV) reported the highest consumption of fruits and vegetables per day as well as the highest healthy-eater identity, positive affect and lowest negative affect of all four groups, although identity was near the midpoint. Respondents in Group 3 (No-No) reported consuming the least amount of fruits and vegetables at both time 1 and time 2, and low mean values for healthy-eater identity, positive affect and negative

Table 14. Mean values for each of the dependent variables at time 1 (July) and time 2 (January) by healthy-eating group.

Group	n	Healthy-Eater Identity		Fruits and Veg Per Day		Positive Affect		Negative Affect	
		July	Jan	July	Jan	July	Jan	July	Jan
FV-No	9	3.09 ±.67	3.75 ±.88	1.56 ±.73	3.11 ±.33	3.07 ±1.71	3.37 ±1.18	3.62 ±2.20	3.60 ±1.53
FV-FV	33	4.41 ±1.22	4.54 ±1.13	4.24 ±.90	4.03 ±.95	4.54 ±1.30	4.26 ±1.64	2.51 ±1.42	2.84 ±1.61
No-No	23	3.73 ±1.25	3.83 ±1.14	1.65 ±.57	1.70 ±.47	3.65 ±1.83	3.29 ±1.78	3.13 ±1.89	3.34 ±1.64
No-FV	17	3.82 ±1.14	3.72 ±1.58	3.71 ±.59	1.88 ±.33	4.13 ±1.13	3.40 ±1.58	2.45 ±1.34	2.94 ±2.12
Total	82	3.95 ±1.23	4.09 ±1.25	3.11 ±1.41	2.83 ±1.27	4.04 ±1.54	3.72 ±1.66	2.80 ±1.66	3.09 ±1.71

affect. Respondents in Group 4 (No-FV) reported an almost two point decrease in fruit and vegetable consumption, and the greatest decrease in positive affect and increase in negative affect of the four groups.

The previous results reflect group means but there could be individual variability in the relationships within each group. Similar to the previous analyses with exercise identity, the change in eating identity was correlated with the change in eating behavior. The correlation was low ( $r=0.22$ ,  $p=0.05$ ) suggesting little relationship between these variables. While mean values for healthy-eater identity and healthy eating behavior for Group 1 (No-FV) increased over six-months, the correlation of change variables was moderate and negative ( $r=-0.47$ ,  $p=0.20$ ). As was seen in the previous analysis of exercise identity, respondents in Group 2 (FV-FV) reported a slight decrease in fruit and vegetable consumption over six months, while healthy-eater identity appeared to remain stable. The correlation among change variables was low ( $r=0.13$ ,  $p=0.48$ ) showing little relationship between these changes. The correlation of differences for Group 3 (No-No) was low ( $r=0.25$ ,  $p=0.25$ ), which suggests healthy-eater identity and healthy eating behavior remained stable. Respondents in Group 4 (FV-No) reported a decrease in healthy eating behavior, though healthy-eater identity remained stable. The correlation between changes ( $r=0.18$ ,  $p=0.50$ ) was low.

### **Correlation Analysis – Exercise and Eating Behaviors**

To determine if exercise identity, exercise behavior, healthy-eater identity, and fruit and vegetable consumption were related at pre- and post-test, a correlation

analysis was conducted. As can be seen in Table 15, all four correlations involving exercise identity with healthy-eater identity were significant, ranging from .305 to .515, the largest being post exercise identity with post healthy-eater identity.

Interestingly, neither exercise identity or exercise behavior were significantly related to reported fruit and vegetable consumption. Correlations ranged from -.023 to .193. These correlations between healthy-eater identity and exercise behavior were also small ( $r=.048$  to  $.121$ ).

Table 15. Correlation matrix of identity and behavior variables

	Pre EX ID	Post EX ID	Pre GLTEQ Units	Post GLTEQ Units	Pre HE ID	Post HE ID	Pre Fruits/ Veg	Post Fruits/ Veg
Pre Exercise Identity	1.00							
Post Exercise Identity	.806**	1.00						
Pre GLTEQ Units	.628**	.490**	1.00					
Post GLTEQ Units	.534**	.505**	.622**	1.00				
Pre Healthy-Eater Identity	.305**	.371**	.048	.108	1.00			
Post Healthy-Eater Identity	.325**	.515**	.118	.121	.630**	1.00		
Pre Fruits/Veg	.193	.127	.179	.154	.290**	.233*	1.00	
Post Fruits/Veg	-.023	.036	-.034	-.087	.129	.271*	.597**	1.00

\*\*  $p < .01$ ; \*  $p < .05$

## CHAPTER 5. DISCUSSION

The purpose of this investigation was to examine exercise identity, healthy-eater identity and frequency of exercise and healthy-eating behaviors, as well as the stability and frequency of these behaviors during six months. This study was exploratory in nature, as the relationship between exercise identity and healthy-eater identity and the respective behaviors were examined, as well as the relationship between exercise and healthy-eater identities and affect as it relates to consistency of one's health behaviors. It is important to note that at the time of the initial survey, 88% of respondents to both surveys (n=73) reported a GLTEQ physical activity score of 14 units or greater. It is possible that in this sample of medical center workers, they already know benefits of regular physical activity, thus a high percentage of employers were already committed to exercise behavior.

Of the respondents that were exercising initially, 17% (n=13) stopped exercising sometime in the six months following survey one (Ex-NoEx), thus this has to be viewed as a change in behavior with a negative outcome. Initially, 12% (n=10) of the respondents were not exercising (NoEx-Ex & NoEx-NoEx). Of these 10 respondents, 60% (n=6) started exercising in the next six months (NoEx-Ex). This shows a positive change for these respondents. The remaining 40% (n=4) of these nonexercising (less than 14 units) respondents continued to be nonexercisers (NoEx-NoEx). This has to be viewed as a negative outcome due to a failure to change behavior in a positive direction. Of the 23% (n=19) of the respondents that changed their behavior (NoEx-Ex & Ex-NoEx), 32% (n=6) changed in a positive

direction or started to exercise above 14 units, while 68% (n=13) displayed a negative behavior change or stopped exercising more than 14 units. Of the respondents displaying no change in behavior (Ex-Ex & NoEx-NoEx), 94% (n=60) continued to display a positive behavior pattern (exercise) while only 6% (n=4) continued to display a negative behavior pattern (nonexerciser). Thus, it appears that throughout the six-months between the initial survey and the follow-up survey, few respondents changed exercise behavior in a positive direction.

### **Exercise Variables**

Results from the MANOVA indicated that there were statistically significant changes from the time of the initial survey to follow-up in exercise behavior and positive affect across the four exercise groups. The differences in exercise identity and negative affect approached statistical significance. The lack of significance in the change in identity would be expected, because in the largest group of respondents (Ex-Ex, n=60), identity remained stable from the time of the initial survey to follow-up.

Remembering that cell sizes were frequently small, examination of the means for each exercise group shows some differences in the changes across time. As previously mentioned, the largest group of respondents was exercising above 14 units at the time of the initial survey as well as at follow-up six months later (Ex-Ex). In addition, this group had the highest exercise identity mean and it remained similar six months later (4.62, 4.68) even though there was a mean decrease of five units in exercise behavior for these respondents over the last seven days, The high mean

values for exercise identity suggest that exercise identity was salient with these respondents over six months. The low correlation for mean differences ( $r=0.14$ ) and the scatterplot (Figure 2) seem to suggest that changes in exercise behavior that are small and/or temporary (last seven days) had limited impact upon level of exercise identity for these respondents. Previous research has shown that length of time that one has been exercising is significantly associated with exercise identity salience (Anderson and Cychosz, 1994; Anderson, Cychosz, and Franke, 1998, 2000). Anderson and Cychosz (1994) found that weeks of exercise was more strongly correlated with exercise identity ( $r=.68$ ) than sessions per week ( $r=.49$ ) or minutes per session ( $r=.39$ ). Therefore, these results suggest it may not necessarily be only the amount of exercise that is important, but the length of time (i.e. number of weeks) of exercise that help to increase or maintain exercise identity salience.

Mean values for exercise identity and exercise behavior and the low correlation of differences are consistent with identity theory, since identity theory suggests stability in identity and identity salience across time and situations (Stryker & Burke, 2000). Respondents in the Ex-Ex group also reported the highest mean value for exercise behavior at the time of the initial survey and at follow-up (40.20, 35.25), compared to individuals in the other three groups. Identity theory suggests each identity holds a set of meanings. This set of meanings results in an identity standard that serves as a point of reference for future behavior (Burke & Stets, 2009). Therefore, respondents in the Ex-Ex group likely have higher exercise identity salience and a higher exercise identity standard than respondents in the other three groups initially, and use this standard as a reference to evaluate recent behavior and

guide future behavior. Moreover, individuals with stronger exercise identities may work more effectively to have the identity as an exerciser verified and maintained. For this group of respondents, exercise behavior seems likely to influence future exercise identity salience and identity salience seems likely to influence future exercise behavior in the direction which will validate and reinforce the standard and small or temporary changes in exercise behavior do not seem to change the salience of exercise identity.

Similar findings have been suggested in individuals with high religious identity and blood donor identity. Individuals with stronger religious and blood donor identities spent more time in religious activities and time donating blood (Stryker & Serpe, 1982; Callero, 1985). In addition, numerous studies have suggested college-aged students, law enforcement officers, community members, distance runners, as well as many others, with more salient exercise identities reported higher levels of exercise behavior (Anderson & Cychosz, 1994; Anderson, Cychosz & Franke, 1998, 2000; Strachan, et al., 2005).

While respondents in the Ex-Ex group reported the highest mean value of exercise behavior at the time of the initial survey and at follow-up, their exercise behavior decreased slightly (-4.95 units, -12%) at follow-up. Further, there was a decrease in positive affect and an increase in negative affect toward the consistency of their exercise behavior over the past 30 days. The time of the follow-up survey was just after the winter holiday season, thus this group may have experienced a challenge to their identity where they may not have been able to maintain exercise identity-behavior congruence. This may have resulted in an increase in negative

affect and a decrease in positive affect relating to their exercise behavior the past four weeks. Cast and Burke (2002) and Stryker and Burke (2000) suggest if an individual perceives identity-behavior congruency, they may experience more positive emotions. However, if an individual perceives identity-behavior incongruence, they may experience more negative emotions, which may in turn motivate an individual to adjust behavior to seek identity verification, or align future behavior with one's exercise identity standard. Further, how one copes with negative affect will influence how well they are able to align future behavior with their identity standard (Ellestad & Stets, 1998). These findings are consistent with previous research where individuals with more salient exercise identities reported lower positive affect and higher negative affect when presented with a behavior challenge, where respondents were told the past three weeks had been busier than usual and they were not able to be as active as usual (Strachan & Brawley, 2008; Strachan, et al., 2011). In addition, Hooker and Kaus (1994) suggest acting, or not acting, in a way that is congruent with one's health-related possible self may carry positive or negative affective value. Therefore, it is possible respondents in the Ex-Ex group didn't meet their identity standard in the 30 days prior to follow-up, causing changes in both positive and negative affect even though, as would be predicted by identity theory, exercise identity remained stable (Figure 2). Therefore, it may be that when exercise identity reaches a certain level, short or small changes in behavior that are incongruent with one's identity do not cause a change in identity, but a change in affect toward the consistency of one's behavior.

Social psychologically, the situation for respondents who were not exercising at the time of the initial survey and follow-up (NoEx-NoEx) was probably quite similar to respondents who were exercising at both time points (Ex-Ex) discussed previously. These respondents displayed the lowest mean value for exercise behavior both times (4.25, 4.00 units) along with low mean values for exercise identity and positive affect as well as high mean values for negative affect. The results of the correlations and scatterplot in Figure 3 show that exercise identity and exercise behavior remained stable for respondents who remained inactive. In this case where there was low salience for an exercise identity, one would predict low levels of exercise behavior. Likewise, where there was a low level of exercise behavior one would predict low commitment and salience for exercise identity in the future. In this manner, identity-behavior congruence was once again maintained. In addition, exercise identity remained stable from the time of the initial survey to follow-up for this group of respondents (Figure 3). Since exercise identity and exercise behavior were low to begin with, identity theory would predict both identity and behavior to remain low. Therefore, for this group of respondents there appears to have been little movement toward an increase in exercise behavior.

This group of respondents (NoEx-NoEx) reported the highest negative affect toward their exercise behavior over the past 30 days at the time of the initial survey (5.85) and at follow-up (4.95), and lowest level of positive affect (1.42, 1.58, respectively). Since this group reported the lowest mean values for exercise identity and exercise behavior, one would expect this group to have a weak exercise identity standard. In turn, it would be expected that with low levels of exercise behavior,

respondents would not experience as high levels of negative affect or low levels of positive affect about their level of exercise. These respondents appear to be “ashamed,” “depressed,” “guilty,” “upset,” and “disappointed” about their exercise behavior over the past four weeks, and they are not “happy,” “pleased,” or “proud” about their exercise over the past four weeks. Mean values for exercise identity, positive affect and negative affect for these respondents suggest that the personal standard toward exercise behavior may be higher than suggested by their low level of exercise identity. However, their low level of exercise identity may be a stronger influence on their exercise behavior than their level of affect. The mean values for affect may be influenced by the process of social comparison with co-workers and the new health plan which includes the expectation of more exercise. It appears that the identity-behavior relationship is stronger for these respondents than the affect behavior relationship.

Yun and Silk (2011) suggest behavioral intention may vary depending on one’s reference group. Cherrington (1994) suggests one of the main purposes of reference groups is social comparison, which suggests that sometimes individual’s assess their own actions by comparing them to other’s actions. It is through social comparison that reference groups may have a strong influence on behavior and one’s assessment as to whether or not the level of their behavior is socially acceptable. Therefore, respondents in the NoEx-NoEx group may be examining their level of exercise behavior by looking at the reference group (co-workers) and using social comparison when evaluating the consistency of their exercise behavior with co-workers, many of who may exercise more. As previously mentioned, a large

percentage of all respondents were already exercising above 14 units at the time of the initial survey and at follow-up. Therefore, when respondents in the NoEx-NoEx group were asked how they felt about their exercise in the past thirty days, it is possible they reported higher levels of negative affect and lower levels of positive affect due to social comparison of their reference group (co-workers that exercise). It is possible respondents know they should be exercising and feel ashamed about their lack of exercise behavior, but they have low exercise identity and low levels of exercise behavior which is consistent across time. Moreover, employees may report higher levels of negative affect since they are aware the WHP program is in place and know they should be exercising, and yet exercise behavior remains low. This group of individuals may be viewed as wellness rejecters (Storer, Cychosz, & Anderson, 1997). Moreover, these results demonstrate the possible weakness of affect, as it was measured in this study, as a strong motivator for increasing nonexercisers level of future exercise behavior in all situations.

For respondents who reported a decrease in exercise behavior (Ex-NoEx), mean exercise behavior was rather high (26 units) at the time of the initial survey. This mean value was larger than the mean value for the two nonexercise groups, but lower than the mean value for the other exercise group (40 units). According to identity theory, this group of individuals might be predicted to continue participating in exercise behavior throughout the course of the study due to high initial exercise behavior. It seems possible that the level of exercise behavior for these respondents at the time of the initial survey may have been in some part due to changes in the employee health insurance program. Exercise identity was initially low and it stayed

low six months later. Exercise behavior decreased quite a bit for these respondents. The low correlation for mean differences in exercise behavior and exercise identity and the scatterplot in Figure 4 suggest that change in behavior had limited impact upon level of exercise identity. This group of respondents may have initially increased their exercise behavior, but the behavior was not great and/or long enough to increase the salience of their exercise identity to a level that would result in maintenance or continued increase in levels of exercise behavior.

Interestingly, the initial mean value for positive affect was relatively high (3.57), which suggests this group of respondents seem positive about their frequency of exercise behavior, but shows a relatively large decrease six months later (1.90). The initial mean value for negative affect was moderate (3.03) and this value increased over six months (4.34). These respondents seem to feel more ashamed, depressed, guilty, upset and disappointed about their decrease in exercise, and less happy, pleased, and proud about their exercise behavior over the last four weeks. Their affect may be influenced through a social comparison process relating to the knowledge of the worksite health promotion program expectations and/or the level of exercise among many co-workers. Even though this group seems to experience the change in affect, mean exercise behavior decreased drastically (18 units) over the six-month time period. This seems to suggest that exercise identity was not positively validated and verified at a high enough frequency through social interaction for this group of respondents to a level that would result in the maintenance or even increase of exercise behavior. Therefore, it seems possible that respondents in the Ex-NoEx group, while initially exercising, may not have felt

strongly connected in a rewarding way to many other exercising co-workers or have experienced strong verification of their exercise identity. The lack of, commitment to the exercise identity role may have made it more difficult for these individuals to maintain or increase their exercise behavior. Therefore, results for this group of respondents are similar to respondents in the NoEx-NoEx group in that it appears the identity-behavior relationship was stronger for these respondents than their affect-behavior relationship.

For respondents who reported an increase in exercise behavior (NoEx-Ex), mean level of exercise was initially low (7.5 units) and mean value for exercise identity was also low, very similar to mean values for the NoEx-NoEx and Ex-NoEx groups. Identity theory would predict that these individuals with low exercise identity salience and low levels of exercise behavior would continue to exercise little and remain physically inactive. However, results indicate that this did not happen. For this group of respondents, mean value for exercise identity increased nearly one full point in six months and exercise behavior increased almost 16 units, while mean value of positive affect increased and negative affect stayed about the same. The correlation for mean differences for exercise identity and exercise behavior was 0.52. This suggests that for this group of respondents, the increase in exercise behavior from pre-test to post-test may have influenced exercise identity salience at follow-up.

One possible explanation for this unpredicted change in behavior and identity salience is that changes in the WHP program that were in place made a real difference for these six employees. It is possible that these individuals experienced

an increase in exercise commitment and as exercise behavior increased, there was also an increase in exercise identity (Figure 1). Respondents who increased exercise behavior (NoEx-Ex) may have begun to feel more connected to other individuals and an increase in strength of ties to others who exercise frequently and their new exercise identity standard was validated and positively supported. As exercise behavior increased and it was positively reinforced, commitment to one's exercise identity increased. In turn, exercise identity may have been validated more, strengthening commitment and increasing the likelihood of engaging in future exercise behavior. As this mutually reinforcing relationship continues, and their exercise standard increases, individuals in this group may begin to feel pressure to seek identity-behavior congruence with their new and higher exercise standard and in turn seek to maintain the meanings, expectations, and resources associated with the changing role of exerciser (Stets & Burke, 2000). However, because of the recent change in exercise behavior and exercise identity, these respondents are probably still at high risk of dropping out.

Another possible explanation for this change in behavior is that through the increase in exercise behavior, the NoEx-Ex group may have perceived positive health benefits which in turn motivated their exercise behavior which would influence their exercise identity. Waley and Schrider (2005) suggest that if previously sedentary individuals perceive exercise as important to their concept of self, they will be more likely to engage in future exercise behavior. Possibly, perceiving benefits of a behavior enhances its importance to one's concept of self, and if you add to that positive reinforcement from co-workers and others, these individuals may be more

likely to maintain the exercise behavior, in turn, increasing the salience of their exercise identities.

### **Healthy Eating Variables**

At the time of the initial survey, 61% of respondents to both surveys (n=50) indicated they were consuming three or more servings of fruits and vegetables per day (FV-FV & FV-No). While the individuals in the FV-FV group were consuming more than three servings of fruits and vegetables at the time of the initial survey and at follow-up, it may not be possible to view them as positive change in behavior, rather they may be viewed as positive outcome with no change.

In contrast, of the respondents initially consuming more than three servings, 34% (n=17) decreased fruit and vegetable consumption sometime in the six months following survey one (FV-No). This group must be viewed as a change in behavior with a negative outcome. Initially, 39% (n=32) of the respondents were not consuming more than three servings (No-FV & No-No). Of these 32 respondents, 28% (n=9) increased fruit and vegetable intake in the next six months (No-FV), demonstrating a positive change in behavior. The remaining 72% (n=23) of these noncompliant respondents continued to consume less than three servings (No-No). This group failed to change behavior in a positive direction, thus must be viewed as a negative outcome. Of the 21% (n=26) of the respondents that changed their behavior (No-FV & FV-No), 35% (n=9) changed in a positive direction, or increased fruit and vegetable intake to more than three servings, while 65% (n=17) displayed a negative behavior change or decreased fruit and vegetable intake below three

servings per day. Of the respondents displaying no change in behavior (FV-FV & No-No), 64% (n=33) continued to display a positive behavior pattern, while 41% (n=26) continued to display a negative behavior pattern.

U.S. Dietary Guidelines recommend individuals consume five to nine servings of fruits and vegetables per day (Centers for Disease Control and Prevention, 2007). However, only 16% (n=13) of respondents at the time of the initial survey, and 7% (n=9) at follow-up met the 2007 recommended guidelines by consuming five or six servings of fruits and vegetables per day. Thus, it seems that a large percentage of the respondents were not meeting the dietary guidelines related to fruit and vegetable consumption.

Results from the MANOVA of healthy eating indicated that there were no statistically significant differences in healthy-eater identity, reported consumption of fruits and vegetables, or positive and negative affect across the four healthy eating groups. Mean values for healthy-eater identity were slightly lower than findings from previous studies. In two samples of university volunteers, mean values for healthy-eater identity were 4.66, which is above the scale midpoint (Strachan & Brawley, 2008, 2009). In addition, participants in both studies reported higher mean values for servings of fruits and vegetables consumed per day (M=5.29, 3.95, 4.44, respectively). However, in another study examining fruit and vegetable consumption among adults, participants reported consuming  $3.4 \pm 1.54$  servings per day, with an average 1.85 servings of vegetables and 1.55 servings of fruit (Guillaumie, Godin, Manderscheid, Spitz, et al., 2012). Moreover, results from the National Health and Nutrition Examination Survey demonstrated an average of 1.07 servings of fruit and

1.71 servings of vegetables per day were reported from 1999-2002 (Casagrande, Wang, Anderson, & Gary, 2007). In this study, mean values for healthy-eating behavior were low (3.11, 1.70, 1.88) for all groups with the exception of Group 2 (FV-FV) (4.03), yet healthy-eater identity was near or above the scale midpoint for all four groups at the time of initial (3.95) and follow-up surveys (4.09). Therefore, for this sample, healthy-eater identity was slightly lower than previous studies, while healthy eating behaviors were consistent with some, but lower than others. Findings in this study were consistent with previous research in that people with more salient healthy-eating identities reported most frequent consumption of fruits and vegetables (Strachan and Brawley, 2008, 2009). This would be predicted by identity theory in that individuals with more salient identities would be more likely to seek identity-behavior congruence by continuing to consume fruits and vegetables.

Respondents reporting low levels of healthy eating behavior, but high levels of healthy-eater identity (No-FV & No-No) would not be predicted by identity theory. The correlations of differences for these respondents were low ( $r=-0.47$ ,  $r=0.13$ ). Respondents in Group 2 (FV-FV) and Group 4 (FV-No) reported a decrease in healthy eating behavior, though healthy-eater identity remained stable. The correlations of differences for these respondents were also low ( $r=0.25$ ,  $r=0.18$ ). The low correlations of differences for the four groups suggest that small or temporary (last seven days) changes in healthy eating behavior had limited impact upon level of healthy-eater identity for these respondents. These results provide support for identity theory in that identity theory suggests stability in identities and identity salience across time (Stryker & Burke, 2000).

One possible explanation for the low levels of eating behavior, but high levels of healthy-eater identity may be that eating in a healthy manner means different behaviors for different people. Strachan and Brawley (2009) suggest the public health view of healthy-eating may be related to following national guidelines and recommendations, such as eating the appropriate servings of fruits and vegetables, protein, dairy, and grains for one's recommended caloric intake. However, personal views of healthy eating may be related to constricting caloric intake, limiting intake of certain unhealthy foods, or eating healthy foods. Therefore, it is possible personal views of healthy eating may be influencing responses to questions about healthy eating behavior and healthy-eater identity as the majority of respondents do not appear to meet national recommendations for fruit and vegetable consumption. Moreover, while respondents are reporting low levels for consumption of fruits and vegetables, they are not experiencing low levels of positive affect or high levels of negative affect, because it appears to them they are meeting their healthy-eater identity standard through other behaviors. Thus, it appears to be this specific personalized perception of healthy-eating that serves as the identity standard that guides future eating behavior and affect towards that behavior.

Another possible explanation is that measurement of healthy eating behavior is not as focused as exercise behavior. When measuring exercise behavior, there is only one construct to be measured. However, Paquette (2005) suggests eating behavior is multi-faceted (Paquette, 2005), thus there are numerous constructs that can be utilized to measure healthy-eating (e.g. servings of red meat, low fat dairy, snack food/fast food, and fruits/vegetables consumed). In this study, only one

construct of healthy-eating was utilized, servings of fruits and vegetables consumed per day. Moreover, it is difficult to measure some other possible important aspects of healthy-eating. Individuals may have different perceptions of serving sizes, thus reported servings may not have been consistent across respondents.

### **Correlation Analysis – Exercise and Eating Behaviors**

Examination of the correlations for initial and follow-up exercise identities and behavior variables demonstrated large correlations, about .50 or above. This would be predicted by identity theory. Identity theory suggests a reciprocal relationship between role identities and behavior, such as exercise behavior and exercise identity in this instance. Similar findings have been demonstrated between self-concept and exercise behavior utilizing the reciprocal effects model (Marsh, Papaioannou, & Theodorakis, 2006). Thus, as one's exercise identity is reinforced and validated through exercise behavior and social interaction, the likelihood of future exercise behavior is increased, in turn positively reinforcing the validity of one's exercise identity. It is through this process that the role identity of exerciser may become a salient part of one's concept of self and frequent exercise behavior continues. Some have discussed the possibility where in extreme cases, exercise addiction may even result.

Correlations between initial healthy-eater identity and follow-up healthy-eater identity, as well as the correlations between initial healthy eating behavior and follow-up behavior were also large ( $r > .50$ ). However, correlations between healthy-eater identity and healthy eating behavior across time were low ( $r < .30$ ). As

discussed earlier, one possible explanation may be that only fruit and vegetable consumption was used to measure healthy eating behavior and this may be only a narrow part healthy eating. Therefore, the lack of finding a stronger reciprocal relationship between the role identities of healthy-eater and eating behavior could be in some part the result of the weakness of the behavioral measure. Thus, more thought and work needs to be put into the development of the measure of healthy eating behavior which could better bring together standards with how people perceive healthy eating.

Identity theory suggests the self is multi-faceted, thus every individual has multiple roles or identities (Stets & Burke, 2000). Each identity has a set of meanings attached to it and some identities share meanings while others do not. Therefore, multiple identities and meanings may be held for various health behaviors. The two health behaviors examined in this study were exercise and healthy eating, and their respective identities. The average health promotion worker may expect these two constructs to be related, but results from this study suggest the constructs may function independently of one another. While exercise identity and healthy-eater identity were significantly correlated, they explained only about 9% of the variance with the exception of follow-up exercise identity and follow-up healthy-eater identity which explained 25% of the variance. There also appeared to be no significant relationship between healthy-eater identity and exercise behavior, exercise identity and healthy-eating behavior, or exercise behavior and healthy eating behavior, which were less than .20.

It was previously mentioned that only one aspect of healthy eating behavior was measured. There are numerous other aspects that could be related to healthy eating, thus measuring healthy eating behavior may not be as simple as measuring exercise behavior. Measures of exercise behavior may be more narrowly focused than measures of healthy eating behavior. In early research, Storer, Cychosz, and Anderson (1997) found similar results between an exercise identity construct and wellness rejecter identity construct. A canonical correlation analysis found two sets of variables to be separate constructs related to health behaviors and outcomes. These findings were quite surprising, as not only are exercise identity and healthy-eater identity acting independently, but exercise and healthy eating behaviors as well. Moreover, as these two identities show only a small relationship at best, identity theory would suggest that for many respondents in this study they do not share common meanings.

One other possible explanation is that individuals with salient exercise identities may engage in exercise behavior to compensate for unhealthy eating behaviors. An individual may feel that since they engage in a regular physical activity program, they are not as susceptible to health risks associated with eating an unhealthy diet. While this is the first study to examine the relationship between exercise identity and healthy-eater identity, this relationship should be further studied in a variety of populations to see to what extent exercise and healthy eating behaviors and identity function as separate constructs.

Mean values for the four exercise groups were consistent with identity theory, as individuals with salient exercise identities appeared to hold a higher identity

standard and were more likely to seek identity-behavior congruence. This also held true for healthy-eater identity in that individuals with more salient healthy-eater identities were more likely to seek identity-behavior congruence by consuming more servings of fruits and vegetables per day than respondents with lower healthy-eater identities.

The secondary purpose of this study was to explore the identity-affect relationship. As was expected, individuals with more salient identities experienced higher positive affect and lower negative affect than individuals with less salient identities. Moreover, employees who changed behavior in a positive direction reported increased positive and decreased negative affect, while employees who changed behavior in a negative direction reported decreased positive and increased negative affect.

Though a large number of respondents were already exercising at the time of the initial survey and continued to do so at follow-up, there were a few people that changed behavior in a positive direction. It may be that in this medical setting, many of the few people in Group 3 (no exercise-no exercise) are the very hard to change or what some refer to as wellness rejecters (Storer, Cychosz, & Anderson, 1997). Therefore, more specific intervention programs targeted at social psychological mechanisms that clearly and positively connect exercise or healthy eating behavior to the role identities of exerciser or healthy-eater may need to be implemented.

## Limitations

Possible limitations of this study should be recognized. The lack of diversity of the sample should be noted. Due to a small number of male respondents, only female participants were retained for the final analysis. In addition, all respondents were Caucasian. Moreover, respondents were employees of a small rural medical center, thus, it may be difficult to generalize findings to a more diverse population. Future research should examine changes in exercise identity and healthy-eater identity among a more diverse population.

It is possible that hospital employees who were already exercising were more likely to respond to the survey. Therefore, there were a large number of respondents already exercising at the beginning of the study and continued to do so throughout the six month period. Due to a large number of respondents in the Ex-Ex group, cell sizes were small for the other three groups

It also should be noted that the drop-out rate was high (n=55, 38%). One possible explanation for the high drop-out rate may be that the turnover rate of employees at the hospital was high during the time of the study. Thus, numerous respondents to the first survey may no longer have been employed by the hospital at the time of follow-up.

There were some limitations to the measures utilized in the study. The Healthy-Eater Identity Scale was modified from the Exercise Identity Scale, but the adaptability of the scale is questionable. Item-total correlations suggest that items such as "I would feel a loss if I were forced to give up exercise" may not be easily modified to "I would feel a loss if I were forced to give up healthy eating," or "I

consider myself a(n) exerciser/healthy-eater.” Also, as previously discussed, the measure of healthy eating behavior is not as focused as exercise behavior.

Therefore, more thought and work needs to be put into the development of the measure of healthy eating behavior. The lack of finding a relationship between healthy eating identity/behavior and exercise identity/behavior could be due to the weakness of the two measures related to healthy eating.

Lastly, it is important to recognize limitations of using the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985), and the cut point of 14 as a measure of exercise behavior. If an individual had exercised three times a week for fifteen minutes, at a moderate intensity, their activity score would be 15. However, they would only be exercising for 45 minutes which does not meet current physical activity guidelines of 150 minutes of moderate-intensity physical activity per week (CDC, 2009).

### **Future Directions**

Future research should examine changes or stability of exercise identity and healthy-eater identity in more diverse populations. While participants who were exercising at both time points (Ex-Ex) reported slightly less exercise behavior at follow-up than initially, as well as lower positive and higher negative affect, it would be interesting to follow-up with these respondents to see if they regulated exercise behavior in order to be congruent with their identity-behavior standard.

This was the first longitudinal study examining both exercise identity and healthy-eater identity. Therefore, more longitudinal studies with controlled interventions should be used to examine changes in identity. In order to better examine the stability of or changes in health behavior identities, experiments with smaller sample sizes and control groups should be utilized. Moreover, specific interventions should be used to better understand changes in identity and behavior over time.

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## APPENDIX. SURVEY INSTRUMENT

Day of Birth \_\_\_\_\_  
First Three Letters of Hometown \_\_\_\_\_

I. The following questions ask about your past and current exercise behavior.

A1. Do you participate in a regular (3 times per week) exercise program? \_\_\_\_ Yes \_\_\_\_ No

A2. If yes, what types of exercise are involved?

_____ Walking	_____ Nu-Step
_____ Running or jogging	_____ Spinning
_____ Lifting	_____ Yoga
_____ Swimming	_____ Step Aerobics
_____ Sports	_____ Other _____

A3. How many weeks or years have you been doing this? \_\_\_\_ weeks or \_\_\_\_ years

B1. What percentage of your coworkers do you think have exercised regularly for at least the past month?  
\_\_\_\_\_ %

B2. What percentage of your friends do you think have exercised regularly for at least the past month?  
\_\_\_\_\_ %

C. If you exercise regularly, please indicate the percentage of time you exercise alone and with others.

\_\_\_\_\_ % alone                      \_\_\_\_\_ % with others                      \_\_\_\_\_ Does not apply

D1. In comparison to your co-workers, do you exercise

\_\_\_\_\_ considerably less  
\_\_\_\_\_ somewhat less  
\_\_\_\_\_ same  
\_\_\_\_\_ somewhat more  
\_\_\_\_\_ considerably more

D2. In comparison to your friends, do you

\_\_\_\_\_ considerably less  
\_\_\_\_\_ somewhat less  
\_\_\_\_\_ same  
\_\_\_\_\_ somewhat more  
\_\_\_\_\_ considerably more

E1. During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

a) STRENUOUS EXERCISE  
(HEART BEATS RAPIDLY)

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

Times Per Week

\_\_\_\_\_

b) MODERATE EXERCISE  
(NOT EXHAUSTING)

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

\_\_\_\_\_

c) MILD EXERCISE  
(MINIMAL EFFORT)

(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking

E2. During a typical 7-Day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

1. Often \_\_\_\_\_ 2. Sometimes \_\_\_\_\_ 3. Rarely/Never \_\_\_\_\_

**IIA. Directions:** The following questions ask you to describe yourself and how you feel. Please circle the number which best describes your personal opinion. For each item indicate on a scale from (1) strongly disagree to, (7) strongly agree.

	Strongly Disagree				Strongly Agree		
A. I consider myself an exerciser.	1	2	3	4	5	6	7
B. When I describe myself to other people, I usually include my involvement in physical exercise.	1	2	3	4	5	6	7
C. I have numerous goals related to exercising.	1	2	3	4	5	6	7
D. Physical exercise is a central factor to my self-concept.	1	2	3	4	5	6	7
E. I need to exercise to feel good about myself.	1	2	3	4	5	6	7
F. Other people see me as someone who exercises regularly.	1	2	3	4	5	6	7
G. For me, being an exerciser mean more than just exercising.	1	2	3	4	5	6	7
H. I would feel a loss if I were forced to give up exercise.	1	2	3	4	5	6	7
I. Exercise is something I think about often.	1	2	3	4	5	6	7

**IIB. Directions:** Please circle the number which best describes your personal opinion. For each item indicate on a scale from (1) unlikely (7) likely, how you feel. Please answer all the questions and do not make more than one mark per item.

My exercise could be prevented by:	Unlikely				Likely		
A. lack of time	1	2	3	4	5	6	7
B. injuries or soreness	1	2	3	4	5	6	7
C. my work schedule	1	2	3	4	5	6	7
D. family responsibilities and/or children	1	2	3	4	5	6	7
E. unsuitable weather	1	2	3	4	5	6	7
F. lack of facilities or interest	1	2	3	4	5	6	7
G. lack of desire or interest	1	2	3	4	5	6	7
H. lack of energy	1	2	3	4	5	6	7
I. lack of enjoyment	1	2	3	4	5	6	7
J. a preference to do other things with my time	1	2	3	4	5	6	7
K. lack of self-discipline	1	2	3	4	5	6	7
L. confusion regarding the use of training techniques	1	2	3	4	5	6	7
M. lack of someone to exercise with	1	2	3	4	5	6	7
N. confusion in choice of shoes or other equipment	1	2	3	4	5	6	7
O. not knowing how to avoid injuries	1	2	3	4	5	6	7
P. the cost of participating	1	2	3	4	5	6	7

My exercise is supported by:	Unlikely						Likely
A. my spouse or loved one	1	2	3	4	5	6	7
B. my children	1	2	3	4	5	6	7
C. my friends	1	2	3	4	5	6	7
D. my physician	1	2	3	4	5	6	7
E. my co-workers	1	2	3	4	5	6	7
F. my employer	1	2	3	4	5	6	7

IIC. **Directions:** The next four questions ask about your satisfaction level. Please circle the number which best describes your personal opinion. For each item indicate on a scale from (1) not at all satisfied to, (7) very satisfied.

	Not at all						Very
How satisfied are you with your current level of exercise?	1	2	3	4	5	6	7
How satisfied are you with your current physical condition/fitness level?	1	2	3	4	5	6	7
How satisfied are you with your current health?	1	2	3	4	5	6	7
How satisfied are you with your current diet?	1	2	3	4	5	6	7

II.

D1. How much exercise would you have to do in a typical week in order for your behavior to be consistent with your personal view of yourself as an exerciser?

\_\_\_\_\_ Days per week                      \_\_\_\_\_ Minutes per session

D2. During the past month, have you behaved consistently with your view of yourself as an exerciser?

\_\_\_\_\_ Yes                                      \_\_\_\_\_ No

D3. **Directions:** When you consider the *consistency* or *inconsistency* of your physical activity over the past 4 weeks with the exercise expectations associated with your personal view of yourself as an exerciser, how does it make you feel? For each item indicate on a scale from (1) don't feel at all to, (7) feel very much.

	Don't feel at all						Feel very much
Happy about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Ashamed about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Pleased about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Depressed about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Guilty about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Proud about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Upset about my exercise over the past 4 weeks	1	2	3	4	5	6	7
Disappointed about my exercise over the past 4 weeks	1	2	3	4	5	6	7

E1. Do you use tobacco products? \_\_\_\_\_ Yes      \_\_\_\_\_ No      \_\_\_\_\_ I have quit within the past 6 months.

E2. If yes, please briefly describe frequency. (packs per day, cigars per day, etc.) \_\_\_\_\_

E3. For how long have you used tobacco products? \_\_\_\_\_

III. The following questions ask about your past or current diet behavior.

A. How often do you eat a nutritionally balanced meal?

1. Often \_\_\_\_\_ 2. Sometimes \_\_\_\_\_ 3. Rarely/Never \_\_\_\_\_

B. If often, how many weeks or years have you been doing this? \_\_\_\_\_ weeks or \_\_\_\_\_ years

C1. Are you currently enrolled in a nutritional program (e.g. Weight Watchers)? \_\_\_\_\_ Yes \_\_\_\_\_ No

C2. If yes, what type of program are you involved in? \_\_\_\_\_

D. On average,

How many servings of fruits and vegetables do you eat per day? \_\_\_\_\_

How many servings of whole grain breads and cereal do you eat per day? \_\_\_\_\_

How many servings of low fat dairy products do you eat per day? \_\_\_\_\_

How often do you eat snack foods (chips, cookies, candy, etc) per day? \_\_\_\_\_

How many servings of red meat do you eat per **week**? \_\_\_\_\_

How many meals do you eat at a fast food restaurant per **week**? \_\_\_\_\_

E. **Directions:** The following questions ask you to describe yourself and how you feel. Please circle the number which best describes your personal opinion. For each item indicate on a scale from (1) strongly disagree to, (7) strongly agree.

	Strongly Disagree				Strongly Agree		
	1	2	3	4	5	6	7
A. I consider myself a healthy-eater.	1	2	3	4	5	6	7
B. When I describe myself to other people, I usually include my involvement in healthy-eating.	1	2	3	4	5	6	7
C. I have numerous goals related to healthy-eating.	1	2	3	4	5	6	7
D. Eating a healthy diet is a central factor to my self-concept.	1	2	3	4	5	6	7
E. I need to eat healthy to feel good about myself.	1	2	3	4	5	6	7
F. Other people see me as someone who eats a healthy diet regularly.	1	2	3	4	5	6	7
G. For me, being a healthy-eater means more than just eating healthy.	1	2	3	4	5	6	7
H. I would feel a loss if I were forced to give up healthy eating.	1	2	3	4	5	6	7
I. Healthy eating is something I think about often.	1	2	3	4	5	6	7

F1. How many healthy meals per week would you have to consume in order for your behavior to be consistent with your personal view of yourself as a healthy-eater?

\_\_\_\_\_ Meals per week

F2. During the past month, have you behaved consistently with your view of yourself as a healthy-eater?

\_\_\_\_\_ Yes \_\_\_\_\_ No

F3. **Directions:** When you consider the **consistency** or **inconsistency** of your diet/eating behavior over the past 4 weeks with the expectations associated with your personal view of yourself as a healthy-eater, how does it make you feel? Use the scale below to indicate how you feel.

	Don't feel at all				Feel very much		
Happy about my diet over the past 4 weeks	1	2	3	4	5	6	7
Ashamed about my diet over the past 4 weeks	1	2	3	4	5	6	7
Pleased about my diet over the past 4 weeks	1	2	3	4	5	6	7
Depressed about my diet over the past 4 weeks	1	2	3	4	5	6	7
Guilty about my diet over the past 4 weeks	1	2	3	4	5	6	7
Proud about my diet over the past 4 weeks	1	2	3	4	5	6	7
Upset about my diet over the past 4 weeks	1	2	3	4	5	6	7
Disappointed about my diet over the past 4 weeks	1	2	3	4	5	6	7

IV.

A. Sex: Male \_\_\_\_\_ Female \_\_\_\_\_

B. Age: \_\_\_\_\_

C. Please estimate your: Height \_\_\_\_\_ Weight \_\_\_\_\_

D. Currently are you? \_\_\_\_\_ Married \_\_\_\_\_ Single \_\_\_\_\_ Divorced \_\_\_\_\_ Other

E. Do you have any medical problems which keep you from exercising?  
 \_\_\_\_\_ No \_\_\_\_\_ Yes: (Identify) \_\_\_\_\_

F. Race/Ethnicity (Circle one)

(a) White, not of Hispanic Origin. Persons having origins in any of the original people of Europe.

(b) African-American. Persons having origins in any of the Black racial groups of Africa.

(c) Asian or Pacific Islander. Persons having origins in any of the original people of the Far East, Southeast Asia, Indian Subcontinent, or the Pacific Islands.

(d) Middle Easterner or North African.

(e) American Indian or Alaska Native. Persons having origins in any of the original peoples of North America.

(f) Hispanic. Personal of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of language

(g) Other: \_\_\_\_\_

G. Please mark the highest education level completed:

\_\_\_\_\_ Elementary-8<sup>th</sup> grade

\_\_\_\_\_ High School

\_\_\_\_\_ Community College (Associate Degree)

\_\_\_\_\_ College/University (BA, BS)

\_\_\_\_\_ Graduate School (MS, MBA)

\_\_\_\_\_ PhD, MD, JD, DO, DVM, or equivalent

\_\_\_\_\_ Other \_\_\_\_\_